2025 SAMOS Data Quality Report

Kristen R. Briggs, Julia O'Neill, and Shawn R. Smith

Center for Ocean Atmospheric Prediction Studies
The Florida State University
Tallahassee, FL 32306-2741

Contact: samos@coaps.fsu.edu

REVISION HISTORY

- Originally published 10 July 2026

Funding for the SAMOS data center at COAPS is provided by the National Oceanic and Atmospheric Administration's Global Ocean Monitoring and Observing Program (FundRef http://data.crossref.org/fundingdata/funder/10.13039/100018302) and the Office of Marine and Aviation Operations via subawards (191001.361472.01B,191001.361472.01F) from the Northern Gulf of Mexico Cooperative Institute agreement NA21OAR4320190 administered by the Mississippi State University. Support for Academic Research Fleet vessels' participation within SAMOS is provided by the National Science Foundation (NSF), Oceanographic Instrumentation and Technical Services Program via a subcontract from the University of California San Diego grant OCE-2439640. The Schmidt Ocean Institute (SOI) provides contract funding to include the *RV Falkor* and *RV Falkor (too)* in the SAMOS initiative. Any opinions, findings, and conclusions/recommendations expressed in this report are those of the authors and do not necessarily reflect the views of NOAA, NSF, or SOI.

The authors wish to thank the technicians working onboard participating research vessels. You are the backbone to the data system, which makes the SAMOS Initiative possible and successful. We also thank the operators, captains, and crews of these vessels for your dedication to marine meteorological and oceanographic data collection and research.

Table of Contents

1. Introduction 7
2. System review 11
    a. Temporal coverage 12
    b. Spatial coverage 21
    c. Available parameter coverage 23
3. Data quality 24
    a. SAMOS quality control 26
    b. 2025 quality across-system 63
    c. 2025 quality by ship
        BIOS:
        Atlantic Explorer 63
        IMOS:
        Investigator 66
        Nuyina 69
        Tangaroa 73
        NOAA:
        Bell M. Shimada 76
        Fairweather 79
        Ferdinand Hassler 82
        Gordon Gunter 84
        Henry B. Bigelow 87
        Nancy Foster 90
        Okeanos Explorer 93
        Oregon II 97
        Oscar Dyson 100
        Oscar Elton Sette 103
        Pisces 106
        Rainier 109
        Reuben Lasker 112
        Ron Brown 115
        Thomas Jefferson 117
        OPP:
        Nathaniel B. Palmer 121
        SIO:
        Robert Gordon Sproul 124
        Roger Revelle 127
        Sally Ride 130
        SOI:
        Falkor (too) 133
        UA:
        Sikuliaq 137
        UH:
        Kilo Moana 140

UW:
Thomas G. Thompson 142
USCG:
Healy 146
WHOI:
R/V Atlantis 149
R/V Neil Armstrong 153

4. Metadata summary 156
5. Plans for 2026 160
6. References 161
Annex A: Notifications and Verified Issues, Unflagged or Only Partially Flagged (listed by vessel) 163
Annex B: SAMOS Online Metadata System Walk-through Tutorial 188
PART 1: the end user 188

1. Introduction

This report describes the quantity and quality of observations collected in 2025 by research vessels participating in the Shipboard Automated Meteorological and Oceanographic System (SAMOS) initiative (Smith et al. 2018). The SAMOS initiative focuses on improving the quality of, and access to, surface marine meteorological and oceanographic data collected *in-situ* by automated instrumentation on research vessels (RVs). A SAMOS is typically a computerized data logging system that continuously records navigational (ship position, course, speed, and heading), meteorological (winds, air temperature, pressure, moisture, precipitation, and radiation), and near-surface oceanographic (sea temperature, conductivity, and salinity) parameters while the RV is underway. Original measurements from installed instrumentation are recorded at high-temporal sampling rates (typically 1 minute or less). A SAMOS comprises scientific instrumentation deployed by the RV operator and typically differs from instruments provided by national meteorological services for routine marine weather reports. The instruments are not provided by the SAMOS initiative.

Data management at the DAC focuses on a ship-to-shore-to-user data pathway (Figure 1). SAMOS version 1.0 relies on daily packages of one-minute interval SAMOS data being sent to the DAC at the Florida State University via e-mail attachment or pulled from a shore-side data service hosted by the operating institution. Data reduction from original measurements down to 1-minute averages is completed onboard each ship using their respective data acquisition software. Broadband satellite communication facilitates transferal of SAMOS data to the DAC as near as possible to 0000 UTC daily. For SAMOS 1.0, a preliminary version of the SAMOS data is made available via web services within minutes of receipt. All preliminary data undergo common formatting, metadata conjoining, and automated quality control (QC). A data quality analyst examines each preliminary file to identify any major problems (e.g., sensor failures). When necessary, the analyst will notify the responsible shipboard technician via email while the vessel is at sea. On a 10-day delay, all preliminary data received for each ship and calendar day are merged to create daily intermediate files. The merge considers and removes temporal duplicates and retains values with the "best" quality control flag when duplicates for a given parameter exist. For all NOAA vessels and the *Falkor (too)*, visual QC is conducted on the intermediate files by a qualified marine meteorologist, resulting in research-quality SAMOS products that are nominally distributed with a 10-day delay from the original data collection date. All data and metadata are version controlled and tracked using a structured query language (SQL) database. All data are distributed free of charge and proprietary holds through the web (https://samos.coaps.fsu.edu/html/) under "Data Access" and long-term archiving occurs at the US National Centers for Environmental Information (NCEI). SAMOS data at NCEI are accessible in monthly packages sorted by ship and have been assigned a collection-level reference and digital object identifier (Smith et al. 2009) to facilitate referencing the SAMOS data in publications. Details of the SAMOS data center activities are documented in a data management plan published in 2025 (https://samos.coaps.fsu.edu/html/docs/SAMOS_DMP_for_NOAA_24Feb2025_v06.pdf)

In 2025, out of 31 recruits, a total of 30 research vessels routinely provided SAMOS observations to the DAC (Table 1). SAMOS data providers included the National Oceanographic and Atmospheric Administration (NOAA, 15 vessels), the Schmidt Ocean Institute (SOI, 1 vessel), the Woods Hole Oceanographic Institution (WHOI, 2 vessels), the National Science Foundation Office of Polar Programs (OPP, 1 vessel), the United States Coast Guard (USCG, 1 vessel), the Bermuda Institute of Ocean Sciences (BIOS, 1 vessel), the University of Hawaii (UH, 1 vessel), the University of Washington (UW, 1 vessel), the University of Alaska (UA, 1 vessel), Scripps Institution of Oceanography (SIO, 3 vessels), and the Australian Integrated Marine Observing System (IMOS, 3 vessels). The Louisiana Universities Marine Consortium (LUMCON) vessel *Pelican* was recruited but inactive in the SAMOS system, because they continued to have problems with their shipboard acquisition and data delivery systems.

IMOS is an initiative to observe the oceans around Australia (Hill et al. 2010). One component of the system, the "IMOS underway ship flux project" (hereafter referred to as IMOS), is modelled on SAMOS and obtains routine meteorological and surface-ocean observations from one vessel (*Tangaroa)* operated by New Zealand and two vessels (*Investigator, Nuyina*) operated by Australia. In 2015 code was developed at the SAMOS DAC (updated in 2018) which allows for harvesting *Tangaroa, Investigator,* and *Nuyina* SAMOS data directly from the IMOS THREDDS catalogue. In addition to running a parallel system to SAMOS in Australia, IMOS is the only international data contributor to SAMOS.

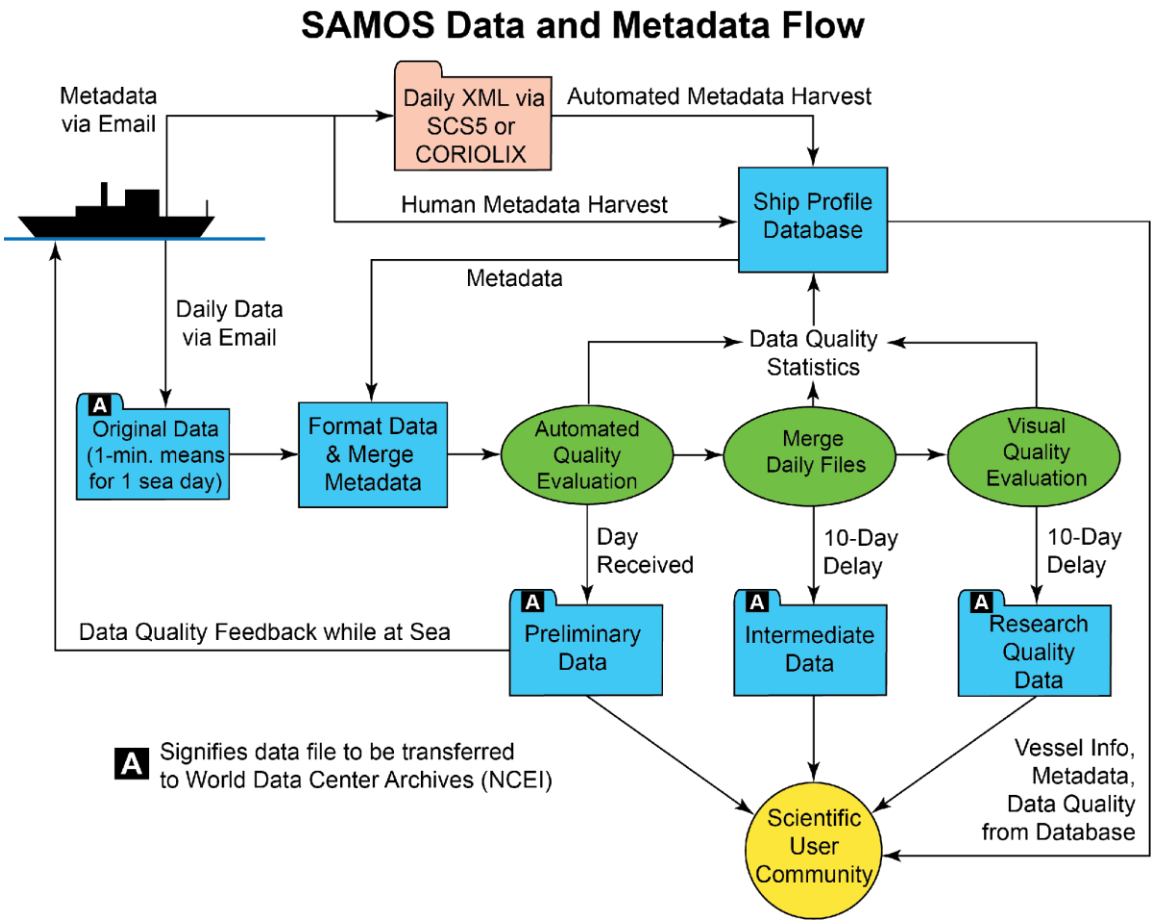


Figure 1: Diagram of operational data flow for the SAMOS initiative in 2025. Note that metadata for SCS5 and CORIOLIX ships is transmitted in daily XML files along with the data message. For other vessels, metadata is still received via separate emails or communication with the ship technicians.

Beginning in 2013, funding did not allow for visual quality control procedures for any non-NOAA vessels except the *Falkor* (2013-2021) and her successor the *Falkor (too)* (beginning 2023), the latter of which have been separately supported via a contract with SOI. As such, visual QC for all remaining vessels was discontinued, until such time as funding is extended to cover them. It should be noted that in the case of the *Tangaroa*, the IMOS project conducted their own visual QC until a personnel change there in June 2013. Only automated QC for the *Investigator, Nuyina,* and *Tangaroa* occurs at the SAMOS DAC. The quality results presented herein are from the research quality products for all NOAA vessels and the *Falkor (too)* and automated-only quality controlled and daily merged (intermediate) products for all remaining vessels.

During 2025, the overall quality of data received varied widely between different vessels and the individual sensors on the vessels. Major problems included non-ideal sensor placement that enhanced flow distortion (nearly all vessels experience some degree of flow distortion), sensors that were exposed, either by non-ideal placement on the ship or by temporary circumstance, to thermal contamination in either the sensible (heat) spectrum (nearly all vessels) or radiative (SW) spectrum (*Lasker* and *Falkor (too)*), sensor damages from extreme weather events (*Nuyina),* sensor failures/sensors or

equipment that remained problematic or missing for extended periods (most notably, *Neil Armstrong's* Eppley LW radiometer, *Atlantic Explorer's* hygrometer, *Investigator's* port rain sensor and port anemometer, *Nuyina's* LW radiometer, *Healy's* bow anemometer, *Shimada's* jack staff anemometer, *Nancy Foster's* air temp and humidity sensor, the *Okeanos Explorer's* suddenly propellor-less mechanical anemometer, *Oscar Dyson's* air temp and humidity sensor, and *Robert Gordon Sproul's* air temperature sensor, *Henry Bigelow's* starboard main mast ultrasonic anemometer, and *Pisces's* Kipp and Zonen LW and SW radiometers), anemometers with loose mounts (chiefly WXTs) or anemometers that were reinstalled backwards (*Lasker*, *Thompson*, *Sette*, *Okeanos Explorer*), sensor channels that continued to record a signal despite the sensor having being temporarily removed (chiefly *Fairweather's* and *Pisces's* air temperature and humidity as well as calculated dew point and wet bulb temperatures, and all of *Gunter's* atmospheric sensors), incorrectly applied calibration coefficients/offset values (*Nuyina's* and *Palmer's* atmospheric pressure, *Thompson's* bow anemometer, one of *Revelle's* bow air temperature sensors, and *Healy's* 'NaN' relative humidity values), suspected or confirmed sea water plumbing or sea water sensor installation issues (*Hassler*, *Oregon II*, *Falkor(too),* among others), periodic bird roosting (especially in the tropics) affecting sonic anemometers, acoustic rain sensors, and radiometers (*Atlantis*, *Thompson*, *Falkor (too)*, potentially others), sensors icing over or freezing (*Fairweather's* sonic anemometers, potentially others), major issues configuring or connecting sensors to data acquisition systems or installing/configuring/programming sensors or peripheral equipment (*Shimada's* gyro and POS/MV, *Okeanos Explorer*, *Oregon II*, and *Rainier's* WXTs, *Sette's* relative humidity and other sensors connecting through the same translator, *Thomas Jefferson's* starboard anemometer, and one of *Revelle's* short wave radiation sensors), and data transmission oversights or issues (many vessels). Several vessels also sampled extreme environments in 2025 which, while not strictly categorized as data "issues", typically did result in a lot of climatology (G) flagging (*Healy* and *Nuyina* operating in the polar latitudes, *Sikuliaq* encountering an exceptional heat wave in Seward, AK, *Atlantis* experiencing a strong Tehuantepec Gap wind event, and *Falkor(too)* sampling a volcanic heat-impacted atmosphere in the South Sandwich Islands).

This report begins with an overview of the vessels contributing SAMOS observations to the DAC in 2025 (section 2). The overview treats the individual vessels as part of a global ocean observing system, considering the parameters measured by each vessel and the completeness of data and metadata received by the DAC. Section 3 discusses the quality of the SAMOS observations. Statistics are provided for each vessel and major problems are discussed. The status of vessel and instrumental metadata for each vessel is provided in section 4. Recommendations for improving metadata records are discussed. The report is concluded with plans for the SAMOS project in 2026. Annexes include a listing of vessel notifications and vessel data identified as suspect but not flagged or only partially flagged by quality control procedures (Annex A), as well as web interface instructions for accessing SAMOS observations (Annex B, part 1).

2. System review

In 2025, a total of 31 research vessels were under active recruitment to the SAMOS initiative; 30 of those vessels routinely provided SAMOS observations to the DAC (Table 1). The *Pelican* sailed in 2025, but in her case proper configuration of the SAMOS SCS file template and mail server (for the purposes of transmitting SAMOS data) could not be established in 2025. The *Pelican* technicians are working to change to OpenRVDAS and CORIOLIX in 2026, so we hope to restart SAMOS processing sometime this year.

In total, 6,611 ship days were received by the DAC from January 1 to December 31 2025, resulting in 9,095,936 records. Each record represents a single (one minute) collection of measurements. Records often will not contain the same quantity of information from vessel to vessel, as each vessel hosts its own suite of instrumentation. Even within the same vessel system, the quantity of information can vary from record to record because of occasional missing or otherwise unusable data. From the 9,095,936 records received in 2025, a total of 260,659,626 distinct measurements were logged. Of those, 13,182,053 were assigned A-Y quality control flags – about 5.0 percent – by the SAMOS DAC (see section 3a for descriptions of the QC flags). This is essentially the same as in 2024. Measurements deemed "good data," through both automated and visual QC inspection, are assigned Z flags. In total, fourteen of the SAMOS vessels (the *Tangaroa, Nuyina*, *Investigator, Atlantis, Neil Armstrong, Nathaniel B. Palmer, Healy*, *Atlantic Explorer*, *Kilo Moana, Thomas G. Thompson, Sikuliaq*, *Roger Revelle, Sally Ride*, and the *Robert Gordon Sproul*) only underwent automated QC. None of these vessels' data were assigned any additional flags, nor were any automatically assigned flags removed via visual QC.

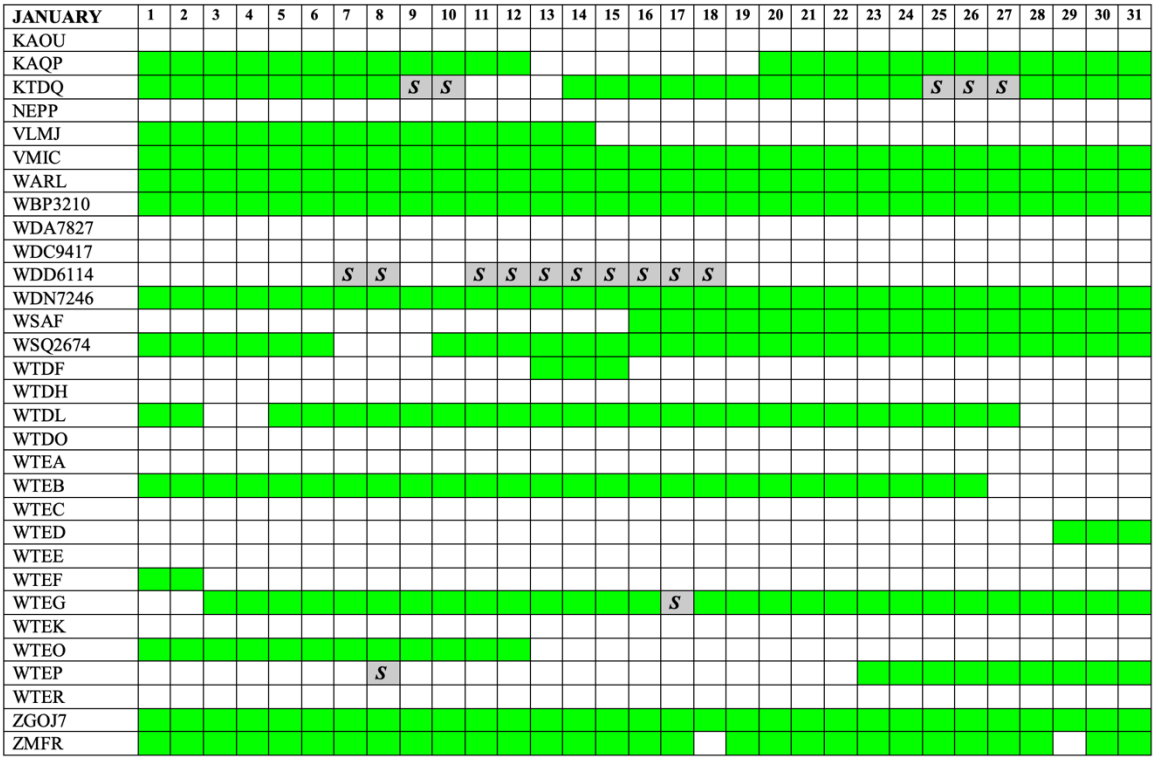
SHIP NAME	CALL SIGN	# of Days	# of Vars	# of Records	# of A-Y Flags	# of All Flags	% Flagged
TOTAL	-	6611	962	9095936	13182053	260659626	5.1
ROGER REVELLE	KAOU	257	37	362185	329839	12257542	2.7
ATLANTIS	KAQP	283	32	393394	196019	11986701	1.6
T.G. THOMPSON	KTDQ	153	28	208841	114671	5847428	2.0
HEALY	NEPP	139	38	196116	78922	6639902	1.2
INVESTIGATOR	VLMJ	258	34	345771	520763	11221743	4.6
NUYINA	VMIC	331	32	452049	846935	14230718	6.0
NEIL ARMSTRONG	WARL	333	32	456200	534506	14079154	3.8
NATHANIEL B. PALMER	WBP3210	277	24	393819	613250	8376287	7.3
KILO MOANA	WDA7827	59	28	71925	13722	2013900	0.7
ATLANTIC EXPLORER	WDC9417	181	36	224904	262801	7643300	3.4
SIKULIAQ	WDN7246	355	35	504095	593566	16204221	3.7
SALLY RIDE	WSAF	349	29	490652	352815	14137943	2.5
ROBERT GORDON SPROUL	WSQ2674	335	35	449506	550064	11935082	4.6
HENRY B. BIGELOW	WTDF	271	40	379967	889449	14561325	6.1
OKEANOS EXPLORER	WTDH	196	34	271589	247820	6253640	4.0
PISCES	WTDL	173	43	238060	785741	8191186	9.6
OREGON II	WTDO	178	40	240076	624861	9179442	6.8
THOMAS JEFFERSON	WTEA	188	22	245949	306428	5069178	6.0
FAIRWEATHER	WTEB	283	24	382824	525988	7915030	6.7
RON BROWN	WTEC	16	31	22111	12560	673921	1.9
BELL M. SHIMADA	WTED	227	38	314725	256767	10067709	2.6
OSCAR ELTON SETTE	WTEE	172	32	229195	192234	6449348	3.0
RAINIER	WTEF	228	26	313878	226482	5387258	4.2
REUBEN LASKER	WTEG	126	28	167824	441523	4595238	9.6
FERDINAND HASSLER	WTEK	190	22	270055	862687	4883320	17.7
GORDON GUNTER	WTEO	210	39	291602	1038855	9587535	10.8
OSCAR DYSON	WTEP	127	31	167818	166795	5104610	3.3
NANCY FOSTER	WTER	228	36	327300	414381	10586477	3.9
FALKOR (TOO)	ZGOJ7	259	39	361097	529836	10181528	5.2
TANGAROA	ZMFR	229	17	322409	651773	5398960	12.1

Table 1: CY2025 summary table showing (column three) number of vessel days received by the DAC, (column four) number of variables reported per vessel, (column five) number of one-minute records received by DAC per vessel, (column six) total incidences of A-Y flags per vessel, (column seven) total incidences of A-Z flags per vessel, (column eight) percentage flagged A-Y.

a. Temporal coverage

As demonstrated in Figure 2, the files received by the DAC from each vessel are not often equally matched to the scheduled days reported by each institution. Scheduled days may sometimes include days spent at port, which are assumedly of less interest to the scientific community than those spent at sea. We are therefore not intensely concerned when we do not receive data during port stays, although if a vessel chooses to transmit port data we are pleased to apply automated and visual QC and archive it. Occasionally vessel technicians may be under orders not to transmit data due to vessel location (e.g., within an exclusive economic zone, marine protected area, underwater cultural heritage site, etc., denoted with a "*" in Figure 2, when known). However, when a vessel is reportedly "at sea" (denoted with an "***S***" in Figure 2, when possible) and we have not received expected underway data, we endeavor to reclaim any available data, usually via email communication with vessel technicians and/or lead contact personnel. For this reason, we perform visual QC on a 10-day delay. SAMOS data analysts strive to follow each vessel's time at sea by focusing on continuity between daily files and utilizing online resources (when available), but as ship scheduling is subject to change and in some cases is unavailable in real time, we may be unaware a vessel is at sea until well after the 10-day delay period. The DAC provides JSON web services (https://samos.coaps.fsu.edu/html/webservices.php) to allow interested parties to track the date data was last received by the DAC for each vessel (Preliminary File), the results of the automated quality control on these files (Preliminary Quality), and to search for available SAMOS data by cruise identifier for those vessels cataloged by the Rolling Deck to Repository (R2R) project. This allows operators and the DAC to track the completeness of SAMOS data for each vessel and to identify when data are not received within the 10-day limit for visual quality control. When data are received after the 10-day limit, current funding for the SAMOS initiative does not permit the visual quality control of a large number of "late" files, so it is important that vessel operators and SAMOS data analysts do their best to ensure files are received within the 10-day delayed-mode window.

In Figure 2, we directly compare the data we've received (green) to final 2025 ship schedules provided by each vessel's institution. Days identified on the vessel institution's schedule for which no data was received by the DAC are shown in grey. Within the grey boxes an italicized "***S***" indicates a day reportedly "at sea." As an added metric, Table 2 attempts to measure each vessel's actual submission performance by matching scheduled at-sea (or assumed at-sea) days to the availability of SAMOS data files for those days. All data received for 2025, with the exceptions of *Tangaroa, Nuyina,* and *Investigator,* has been archived at the NCEI. Through agreement with IMOS, we receive data for the *Tangaroa, Nuyina,* and the *Investigator* and for these vessels perform automated QC only. IMOS data is archived within the IMOS DAC-eMarine Information Infrastructure (eMII).



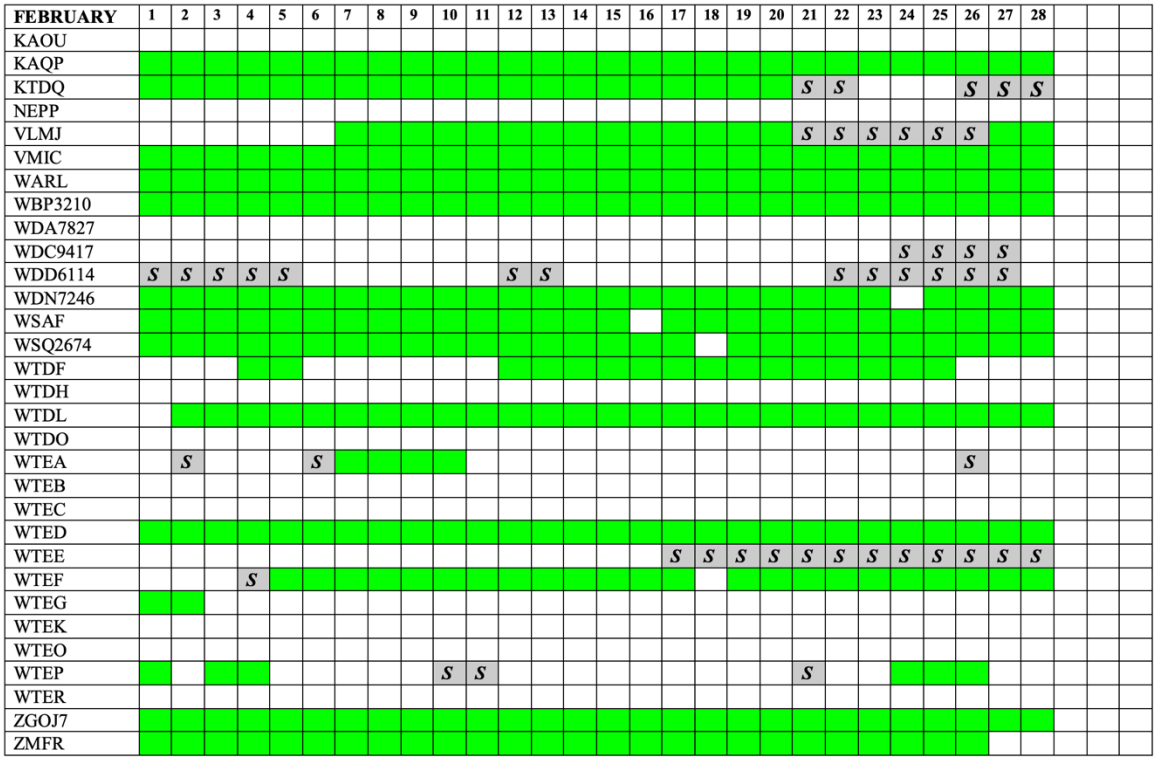
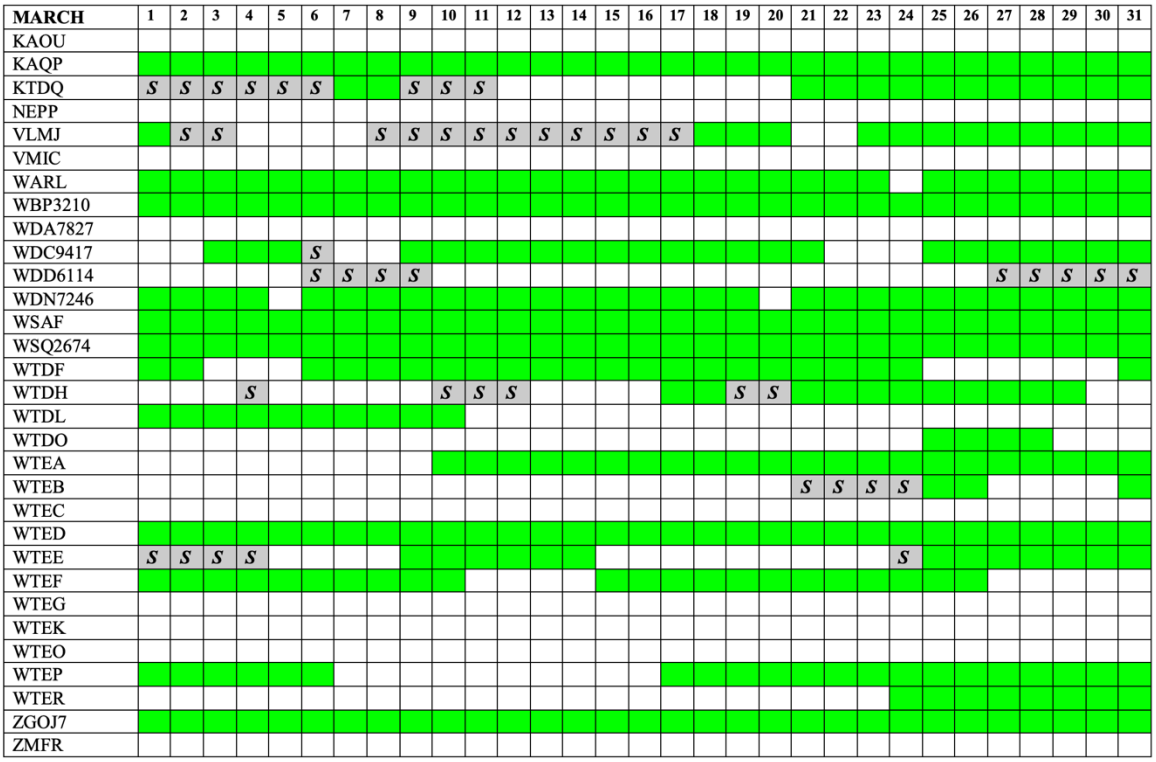
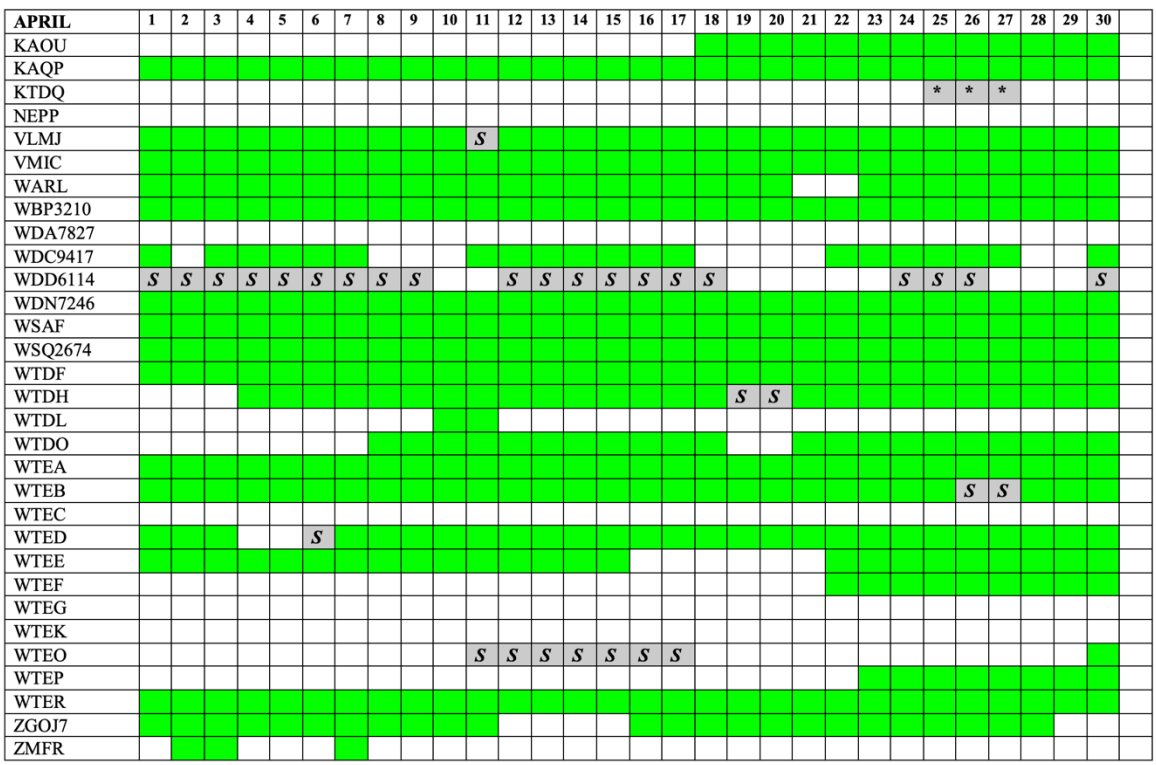
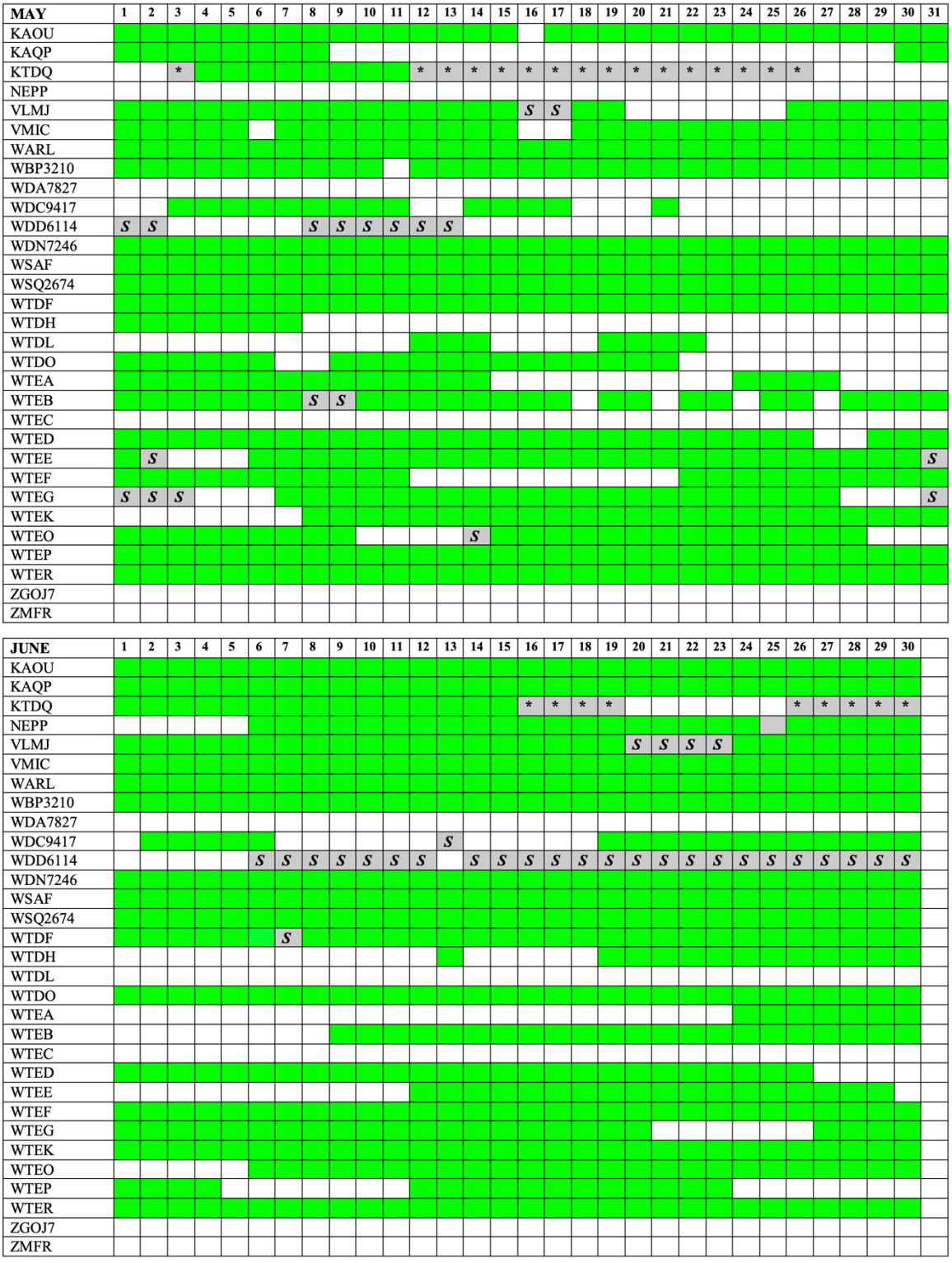


Figure 2: 2025 calendar of ship days received by DAC (**green**) and (**grey**) additional days reported afloat by vessels; "**S**" denotes vessel reportedly at sea, "P" denotes vessel in port, "*" denotes a known "restricted data" situation (e.g., a maritime EEZ, underwater cultural heritage 'UCH' protocol, etc.) with no expectation of data. Vessels are listed by call sign (see Table 1).

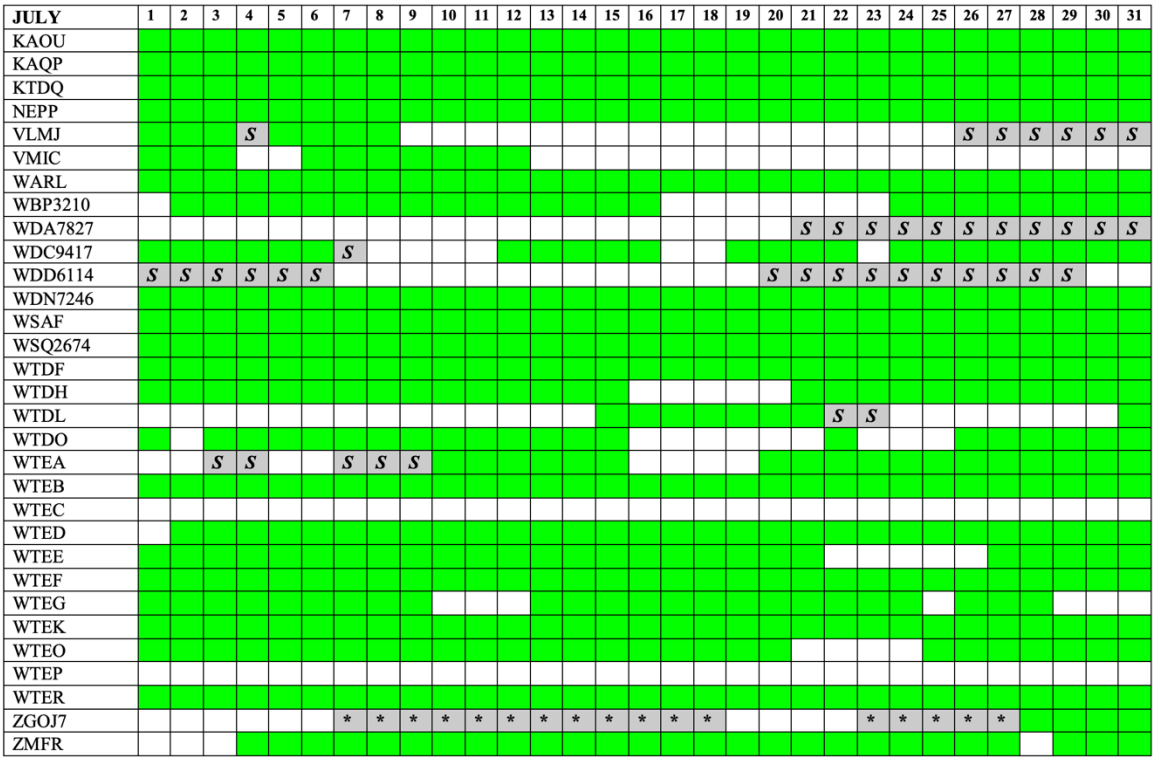


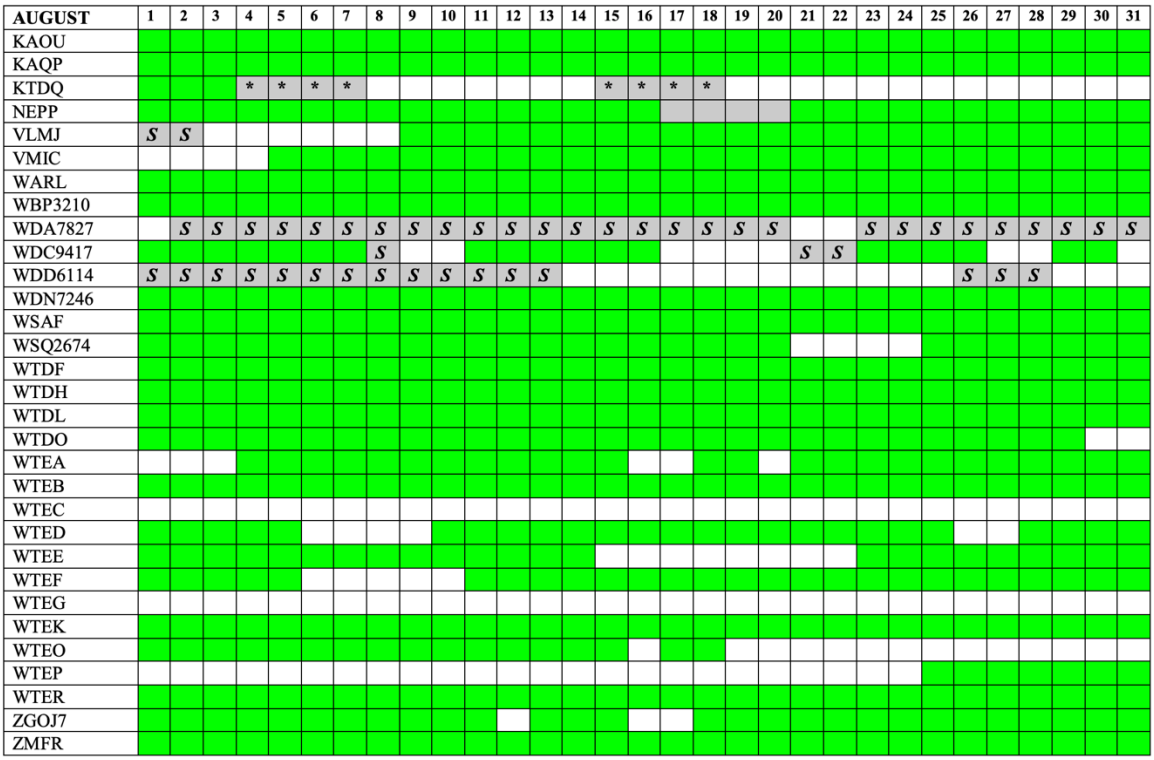


(Figure 2: cont'd)

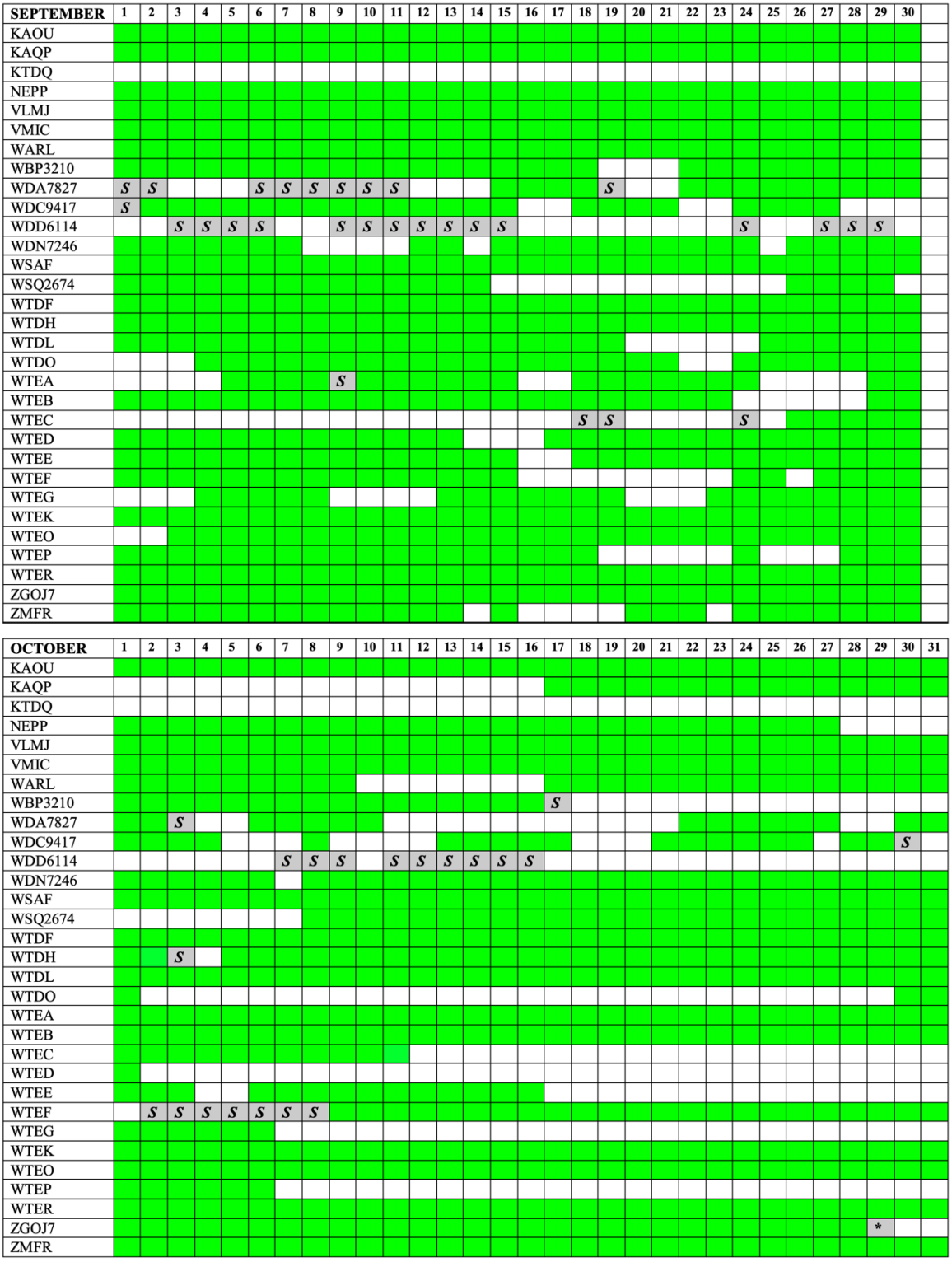


(Figure 2: cont'd)

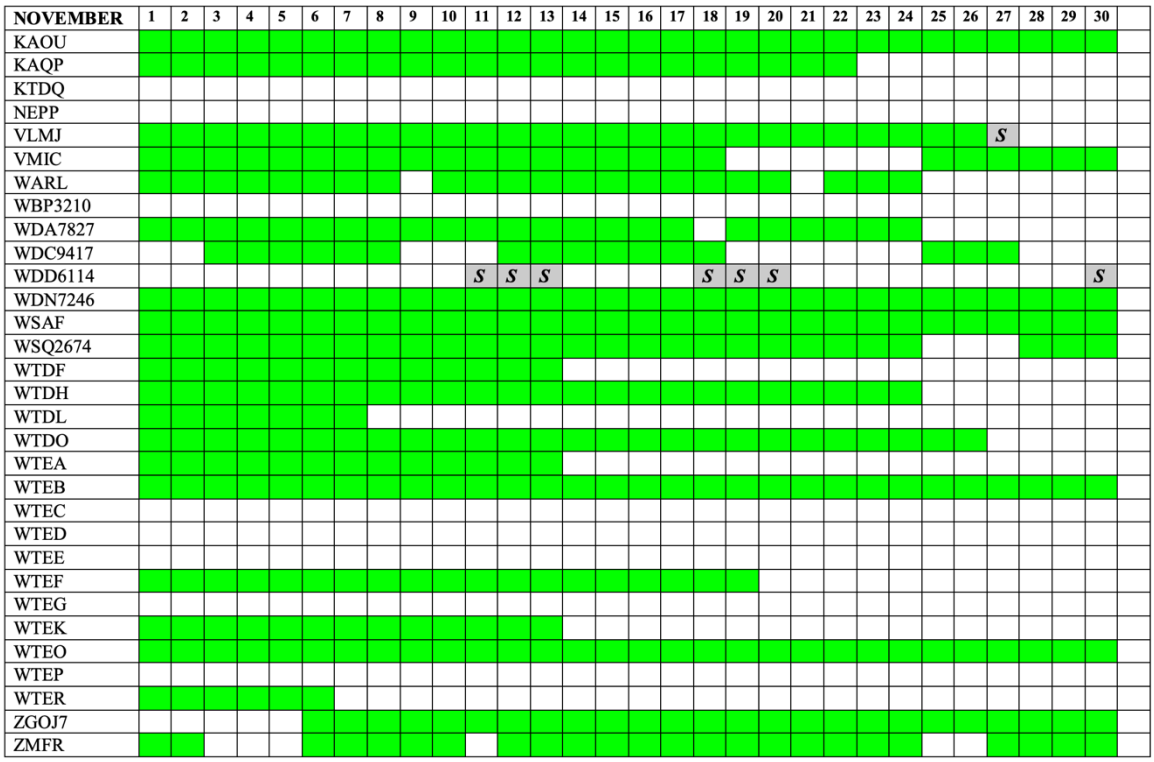


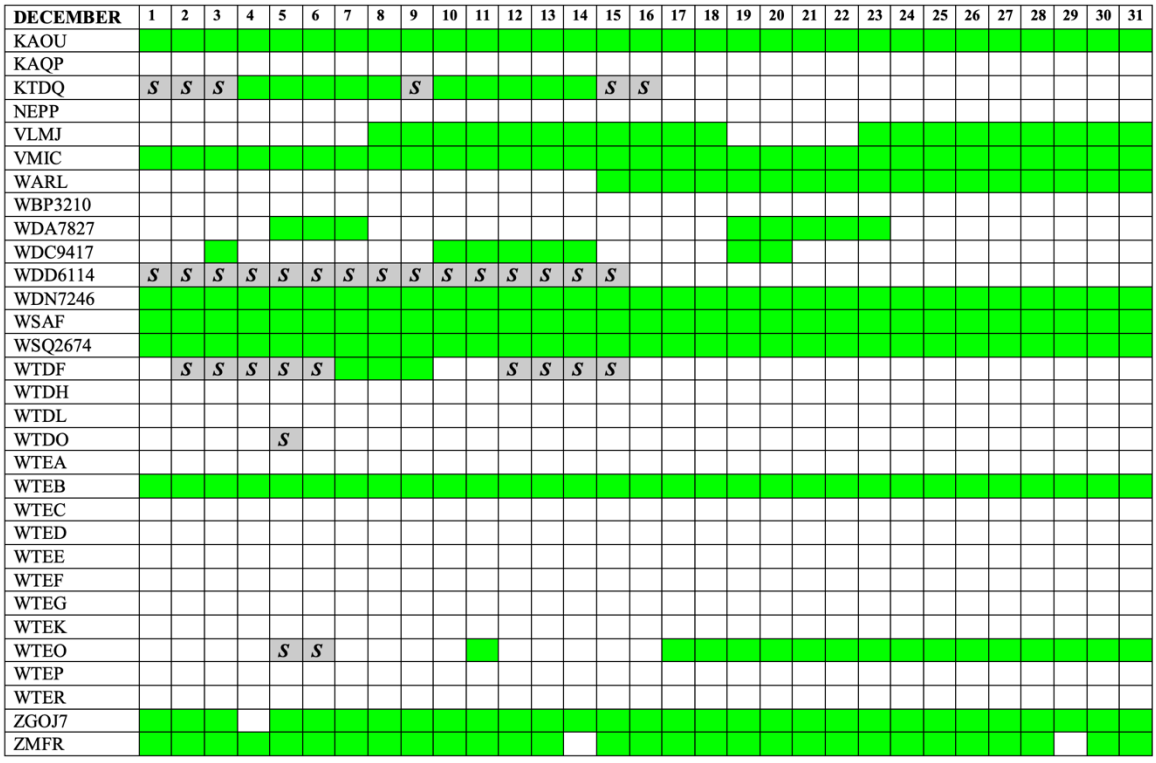


(Figure 2: cont'd)



(Figure 2: cont'd)





(Figure 2: cont'd)

NOAA								
Ship Name	Bell M. Shimada	Fairweather	Ferdinand Hassler	Gordon Gunter	Henry Bigelow	Nancy Foster	Okeanos Explorer	Oregon II
Call Sign/ Ship Code	WTED/SH	WTEB/FA	WTEK/FH	WTEO/GU	WTDF/HB	WTER/NF	WTDH/EX	WTDO/OT
# scheduled at-sea days	146	137	86	121	165	127	165	162
# matching SAMOS days	145	129	86	111	155	127	156	161
→% received	99%	94%	100%	92%	94%	100%	95%	99%

NOAA (cont'd)							
Ship Name	Oscar Dyson	Oscar E. Sette	Pisces	Rainier	Reuben Lasker	Ron Brown	Thomas Jefferson
Call Sign/ Ship Code	WTEP/OD	WTEE/OS	WTDL/PI	WTEF/RA	WTEG/RL	WTEC/RB	WTEA/TJ
# scheduled at-sea days	117	160	76	76	128	4	127
# matching SAMOS days	113	141	74	68	123	1	118
→% received	97%	88%	97%	89%	96%	25%	93%

TOTAL scheduled at-sea days:	1797
TOTAL matching SAMOS days:	1708
OVERALL RATIO:	**95%**

Table 2: 2025 data submission performance metrics listed by institution and ship. Note where official schedules specify “at sea” days only those days are counted. In all other cases “at sea” is assumed and scheduled days are counted as-is. Note also while SAMOS days follow GMT, ship schedules may not. This leaves room for some small margin of error. Lastly, note any transit through an exclusive economic zone, marine protected area, etc. may preclude data transmission. All public schedule resources are listed in the References.

IMOS			
Ship Name	**Investigator**	**Nuyina**	**Tangaroa**
Call Sign	**VLMJ**	**ZMFR**	**ZMFR**
# scheduled at-sea days	219	135	224
# matching SAMOS days	184	135	224
→% received	84%	100%	100%
TOTAL scheduled at-sea days:	578		
TOTAL matching SAMOS days:	543		
OVERALL RATIO:	**94%**		

SIO			
Ship Name	**Robert G. Sproul**	**Roger Revelle**	**Sally Ride**
Call Sign	**WSQ2674**	**KAOU**	**WSAF**
# scheduled at-sea days	109	188	221
# matching SAMOS days	109	188	221
→% received	100%	100%	100%
TOTAL scheduled at-sea days:	518		
TOTAL matching SAMOS days:	518		
OVERALL RATIO:	**100%**		

WHOI		
Ship Name	**R/V Atlantis**	**R/V Neil Armstrong**
Call Sign	**KAQP**	**WARL**
# scheduled at-sea days	227	241
# matching SAMOS days	227	240
→% received	100%	100%
TOTAL scheduled at-sea days:	468	
TOTAL matching SAMOS days:	467	
OVERALL RATIO:	**100%**	

	BIOS	LUMCON	OPP	SOI	UAF	UHI	USCG	UW
Ship Name	**Atlantic Explorer**	**Pelican**	**Nathaniel B. Palmer**	**Falkor (too)**	**Sikuliaq**	**Kilo Moana**	**Healy**	**Thomas G. Thompson**
Call Sign	**WDC9417**	**WDD6114**	**WBP3210**	**ZGOJ7**	**WDG7520**	**WDA7827**	**NEPP**	**KTDQ**
TOTAL scheduled at-sea days	185	162	160	193	237	104	113	213
TOTAL matching SAMOS days	173	0	159	175	237	55	108	152
OVERALL RATIO:	**94%**	**0%**	**99%**	**91%**	**100%**	**53%**	**96%**	**71%**

(Table 2: cont'd)

b. Spatial coverage

Geographically, SAMOS data coverage maintains its traditional global coverage in 2025, with both the typical exposures and a few trips outside traditional mapping/shipping lanes. Cruise coverage for 1 January to 31 December 2025 is shown in Figure 3. As usual, there were numerous cruises in the Southern Ocean, from Punta Arenas, Chile to and along the Antarctic shelf, furnished by the *Falkor (too),* R*oger Revelle* and the *Nathaniel B. Palmer* and *Laurence M. Gould*, as well as forays near the other side of Antarctica completed by the Australian and Kiwi vessels Nuyina and *Tangaroa*. The well-traveled *Revelle* also spanned the entire Atlantic Ocean, from Punta Arenas over to Africa and up to Iceland and Greenland. Meanwhile, broad exposure in the North Atlantic was afforded by the *Atlantic Explorer, Neil Armstrong, Henry Bigelow,* and *Pisces* (among others). The Arctic Ocean was visited by the *Fairweather*, *Sikuliaq* and the *Healy*. The Gulf of Alaska and the Bering Sea saw heavy coverage between the *Fairweather*, *Atlantis*, *Oscar Dyson, Rainier*, and *Sikuliaq* (among others). Moving out again into the open ocean, several broad swaths of the North Pacific were provided by the *Atlantis*, *Kilo Moana*, and *Thomas G. Thompson* (among others). The south Pacific had its visitors, too, in the forms of the *Thompson*, the WHOI vessel *Atlantis* (east Pacific), the *Falkor (too)* (much of her time spent along the western side of South America), and the *Sikuliaq* on her first transit south to Antarctica. The waters around Australia were explored by the *Thompson, Nuyina*, and *Investigator*, and the waters east of New Zealand received heavy coverage from the *Tangaroa*. The *Atlantic Explorer* naturally spent a lot of time cruising around Bermuda, but also pinged in San Juan, PR and as far north as Iceland. Natively, the entire East coast was sampled by the *Ferdinand Hassler*, *Henry Bigelow*, *Nancy Foster*, *Neil Armstrong*, *Oregon II, Pisces*, *Roger Revelle*, and *Thomas Jefferson*. Comparable coverage of British Columbia and the West coast was effected by, among others, the *Bell M. Shimada, Reuben Lasker*, *Sikuliaq*, the Scripps ships *Sally Ride* and *Robert Gordon Sproul*, and the *Atlantis*. The Hawai'ian archipelago was comprehensively explored by the *Kilo Moana*, *Oscar Elton Sette*, and *Okeanos Explorer*. There was also the typical full coverage in the northern Gulf of Mexico, as contributed by the *Gordon Gunter*, *Nancy Foster*, *Oregon II*, and others.

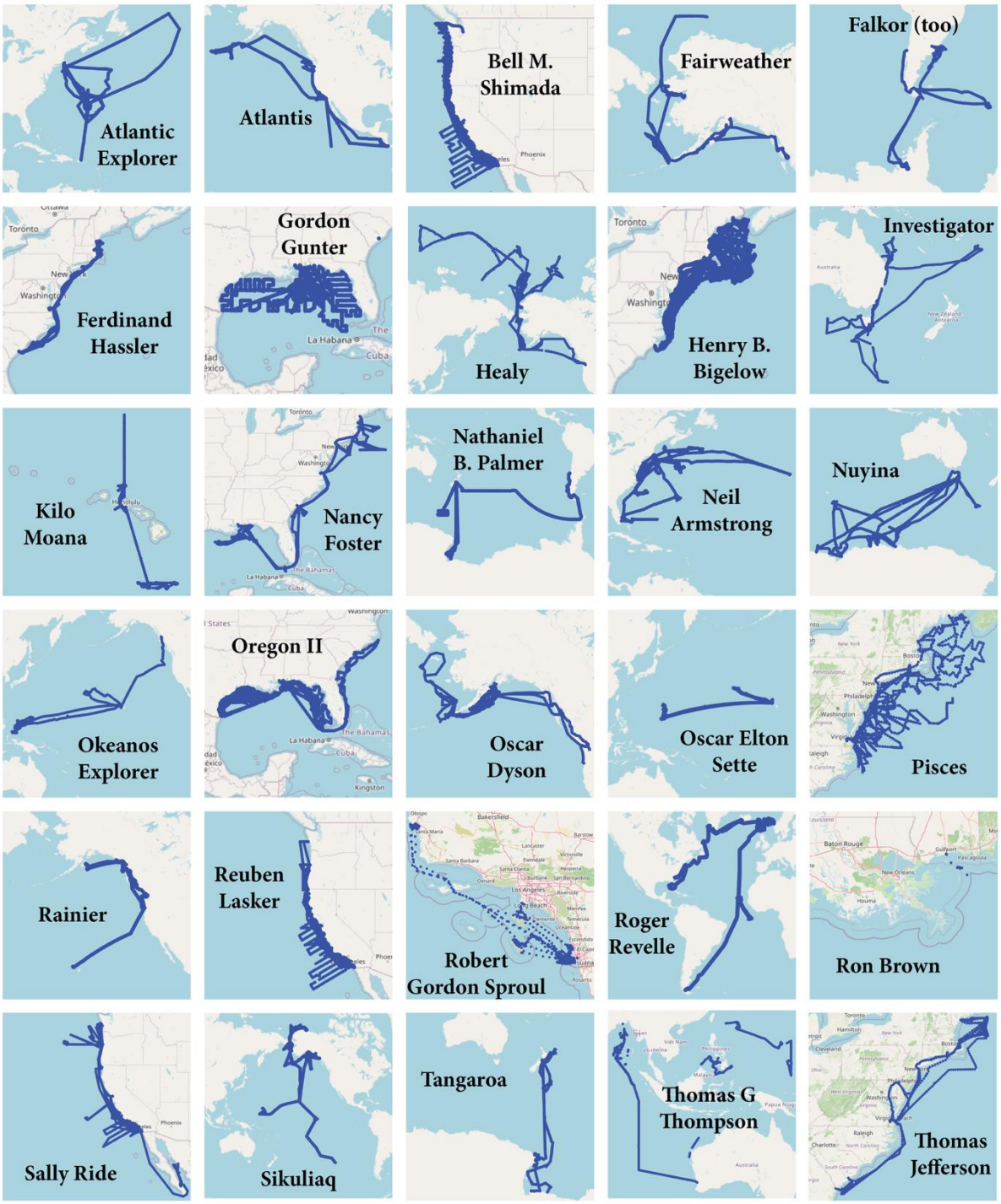


Figure 3: Cruise maps plotted for each vessel in 2025.

c. Available parameter coverage

The core meteorological parameters – earth relative wind speed and direction, atmospheric pressure, air temperature and relative humidity – are reported by all ships. Most ships also report the oceanographic parameter of sea temperature. Many SAMOS vessels additionally report dew point and wet bulb temperatures; precipitation accumulation; rain rate; and longwave, shortwave, and photosynthetically active radiation; along with seawater conductivity and salinity. A quick glance at Table 4 (located in Section 4) shows which parameters are reported by each vessel: those boxes in columns 6 through 13 on the first page and columns 2 through 16 on the second page with an entry indicate a parameter was enabled for reporting and processing at the writing of this publication. (Further detail on Table 4 is discussed in Section 4.) Some vessels furnish redundant sensors, which can be extremely helpful for visually assessing data quality, and those boxes in columns 6 through 13 on the first page and columns 2 through 16 on the second page in Table 4 with multiple entries indicate the number of redundant sensors available for reporting and processing in 2025/2026; boxes with a single entry indicate the existence of a single sensor.

3. Data quality

a. SAMOS quality control

Definitions of A-Z SAMOS quality control flags are listed in Table 3 and detailed descriptions of the quality tests are provided in Smith et al. (2018). It should be noted that no secondary automated QC was active in 2025 (SASSI), so quality control flags U-Y were not in use. A “special value” (set equal to -8888) may exist in any variable when a value received does not fit the memory space allocated by the internal SAMOS format (e.g., character data value received when numeric value was expected). A "missing value" (set equal to -9999) is assigned for any missing data across all variables except time, latitude, and longitude, which must always be present. In general, visual QC will only involve the application of quality control flags H, I, J, K, M, N and S. Quality control flags J, K, and S are the most commonly applied by visual inspection, with K being the catchall for the various issues common to most vessels, such as (among others) steps in data due to platform speed changes or obstructed platform relative wind directions, data from sensors affected by stack exhaust contamination, or data that appears out of range for the vessel's region of operation. M flags are primarily assigned when there has been communication with vessel personnel in which they have dictated or confirmed there was an actual sensor malfunction. Port (N) flags are reserved for the latitude and longitude parameters and, in an effort to minimize over-flagging, are rarely used. The primary application of the port flag occurs when a vessel is known to be in dry dock. The port flag may also be applied, often in conjunction with flags on other parameters, to indicate that the vessel is confirmed (visually or via operator) in port and any questionable data are likely attributable to dockside structural interference, although this practice is traditionally only used in extreme cases. (We note that, owing to a timeworn visual flagging platform, the H flag is not routinely used, to achieve expeditious flagging.) SAMOS data analysts may also apply Z flags to data, in effect removing flags that were applied by automated QC. For example, B flagging is dependent on latitude, and occasionally a realistic value is assigned a B flag simply because it occurred very close to a latitude boundary. This happens with sea temperature from time to time in the extreme northern Gulf of Mexico – TS values of 32˚C or 33ºC are not unusual there in the summer, but portions of the coastline are north of 30 degrees latitude and thus fall into a region where such high temperature are coded as "out of bounds." In this case the B flags would be removed by the data analyst and replaced with good data (Z) flags.

Flag	Description
A	Original data had unknown units. The units shown were determined using a climatology or some other method.
B	Original data were out of a physically realistic range bounds.
C	Time data are not sequential or date/time not valid.
D	Data failed the T>=Tw>=Td test. In the free atmosphere, the value of the temperature is always greater than or equal to the wet-bulb temperature, which in turn is always greater than or equal to the dewpoint temperature.
E	Data failed the resultant wind re-computation check. When the data set includes the platform's heading, course over the ground, and speed over the ground along with platform relative wind speed and direction, a program re-computes the Earth relative wind speed and direction. A failed test occurs when the difference between the reported and re-computed true wind direction is >20 degrees (or >2.5 m/s for true wind speed).
F	Platform velocity unrealistic. Determined by comparing distance travelled between sequential (3-minute interval) latitude and longitude positions. Flags applied to latitude and longitude (not the platform speed).
G	Data are greater than 4 standard deviations from the ICOADS climatological means (da Silva et al. 1994). The test is only applied to pressure, temperature, sea temperature, relative humidity, and wind speed data.
H	Discontinuity (step) found in the data. Flags assigned to the maximum and minimum points in the discontinuity.
I	Interesting feature found in the data. More specific information on the feature is contained in the data reports. Examples include: hurricanes passing stations, sharp seawater temperature gradients, strong convective events, etc.
J	Visual inspection shows the value to be erroneous/poor quality. The value should NOT be used.
K	Data suspect/use with caution - Applied when the data looks to have obvious errors, but no specific reason for the error can be determined. Some data may be useful, but uncertainty would be high and use is not recommended.
L	Oceanographic platform position over land when comparing reported latitude and longitude to ETOPO 1-arc-minute topography dataset.
M	Known instrument malfunction.
N	Signifies that the data were collected while the vessel was in port. Typically these data, though realistic, are significantly different from open ocean conditions.
O	Original units differ from those listed in the *original_units* variable attribute. See quality control report for details.
P	Position of platform or its movement are uncertain. Data should be used with caution.
Q	Questionable - observation reported as questionable/uncertain in consultation with vessel operator or data arrived at DAC already flagged as questionable/uncertain (use with caution).
R	Replaced with an interpolated value. Done prior to arrival at the DAC. Flag is used to note condition. Method of interpolation is often poorly documented.
S	Spike in the data. Usually one or two sequential data values (sometimes up to 5 values) that are drastically out of the current data trend. Spikes occur for many reasons including power surges, typos, data logging problems, lightning strikes, etc.
T	Time duplicate
U	Data failed statistical threshold test in comparison to temporal neighbors. This flag is output by automated Spike and Stair-step Indicator (SASSI) procedure developed by the DAC. (SASSI presently not in use).
V	Data spike as determined by SASSI. (SASSI presently not in use).
X	Step/discontinuity in data as determined by SASSI. (SASSI presently not in use).
Y	Suspect values between X-flagged data (from SASSI). (SASSI presently not in use).
Z	Data passed evaluation

Table 3: Definitions of SAMOS quality control flags

b. 2025 quality across-system

This section presents the overall quality from the system of ships providing observations to the SAMOS data center in 2025. The results are presented for each variable type for which we receive data and are broken down by month. The number of individual 1-minute observations varies by parameter and month due to changes in the number of vessels at sea and transmitting data.

Latitude and longitude (Figure 4) primarily only receive flags via the auto flagger, although occasionally the data analyst will apply port (N) flags as prescribed in the preceding section 3a, and in the rare cases of system-wide failure they can each be assigned malfunction (M) flags by the data analyst. Other than these few cases, LAT and LON each primarily receive either land error flags (L) or platform velocity unrealistic (F) flags during automated quality control. L flags are usually removed during visual quality control by the data analyst when it is determined that the vessel was very close to land but still over water. We note such flags sometimes occur simply as a result of our comparing lat/lon data against a 1 arc-minute topo grid that isn't capable of fully resolving coastlines or inland waterways (see Smith et al. 2018, note land flag removal is not possible for non-visual QC ships). Otherwise, L and F flags are commonly assigned to spikes in LAT and LON data. It should be noted that *Atlantis*, *Neil Armstrong*, *Revelle*, *Sproul*, *Sally Ride, Sikuliaq*, and *Palmer* in particular are known to transmit a good deal of port data, and, since they do not receive visual QC, some amount of erroneous L (position over land) auto flagging would be expected for 2025.

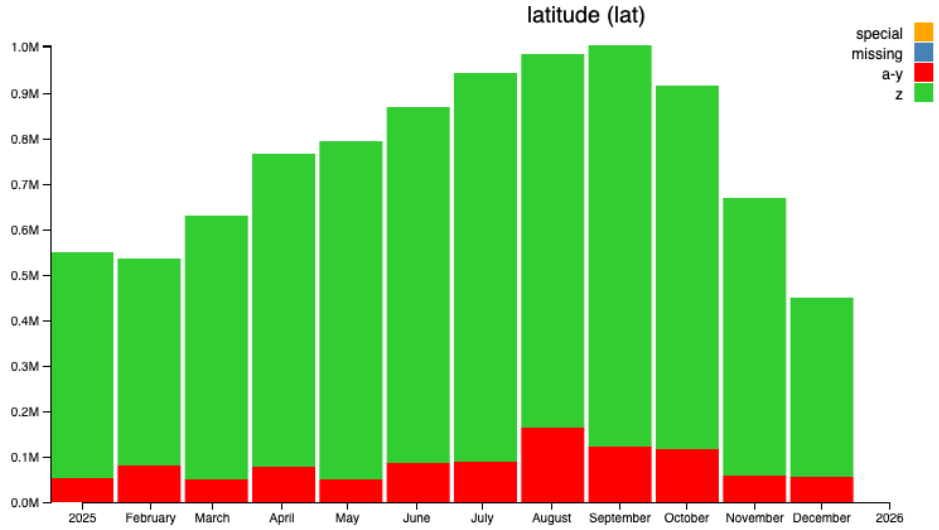


Figure 4: Total number of (this page) latitude – LAT – and (next page) longitude – LON – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

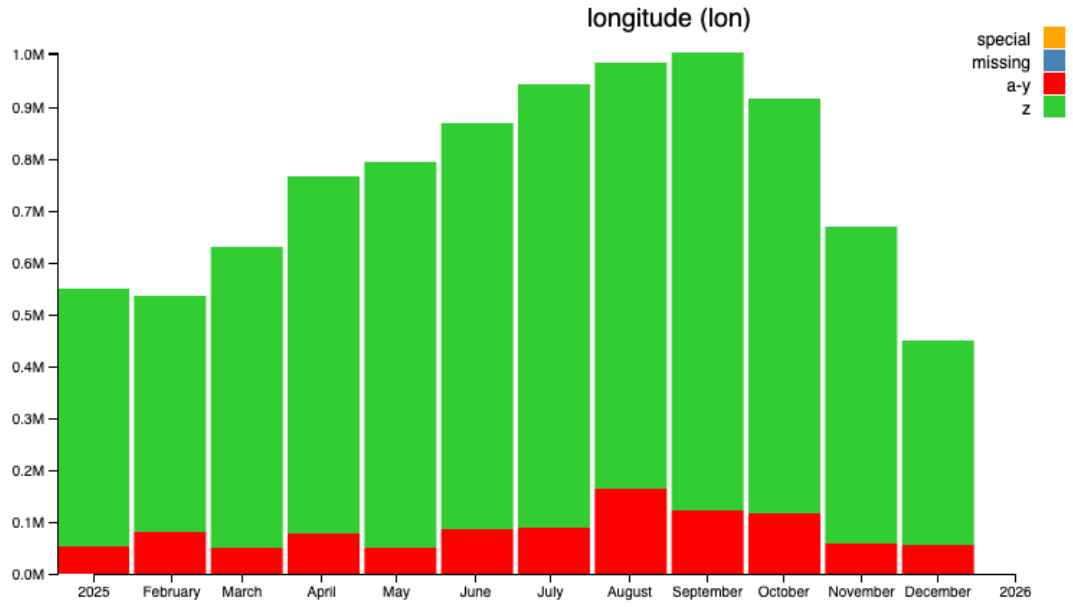


Figure 4: cont'd.

The remainder of the navigational parameters exhibited no major problems of note. They are nevertheless included for completeness: platform heading (Figure 5), platform course (Figure 6), platform speed over ground (Figure 7), and platform speed over water (Figure 8). We note, regarding PL_SOW and PL_SOW2, it is common for these sensors only to transmit data when underway. As such, frequent missing values are the norm for those two. We also note that, in some situations (for unclear reasons), NOAA SCSv5 data acquisition software apparently provides SAMOS values of "?" instead of null or NaN values when an instrument is not in use or when an SCSv5 sensor configuration has errors. These non-numeric values convert to "special" values in SAMOS processing. There is no real cause for concern in either of the above cases, and no real cause for concern with any of the flagging seen in Figures 5 through 8.

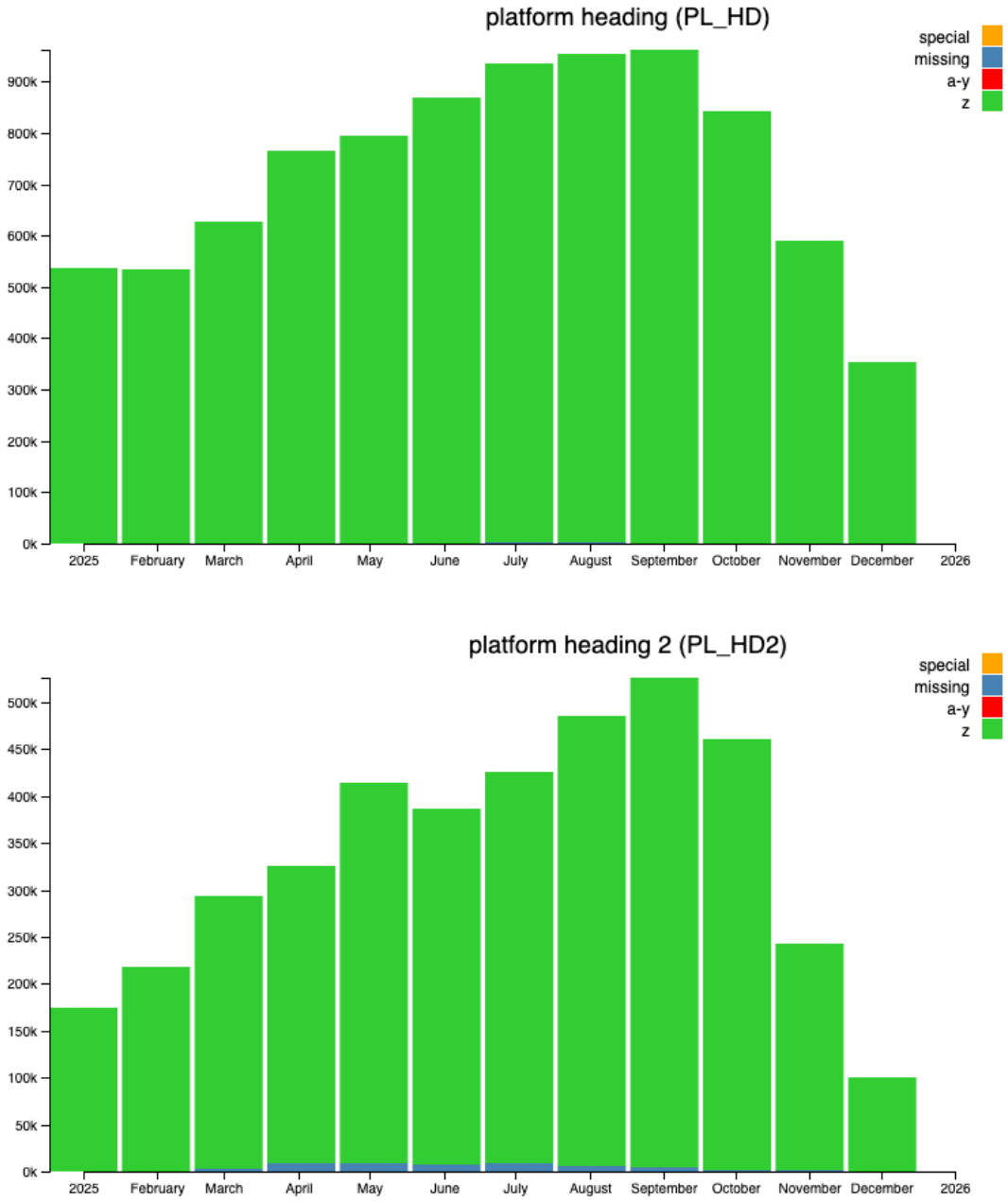


Figure 5: Total number of (this page, top) platform heading – PL_HD – (this page, bottom) platform heading 2 – PL_HD2 – and (next page) platform heading 3 – PL_HD3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

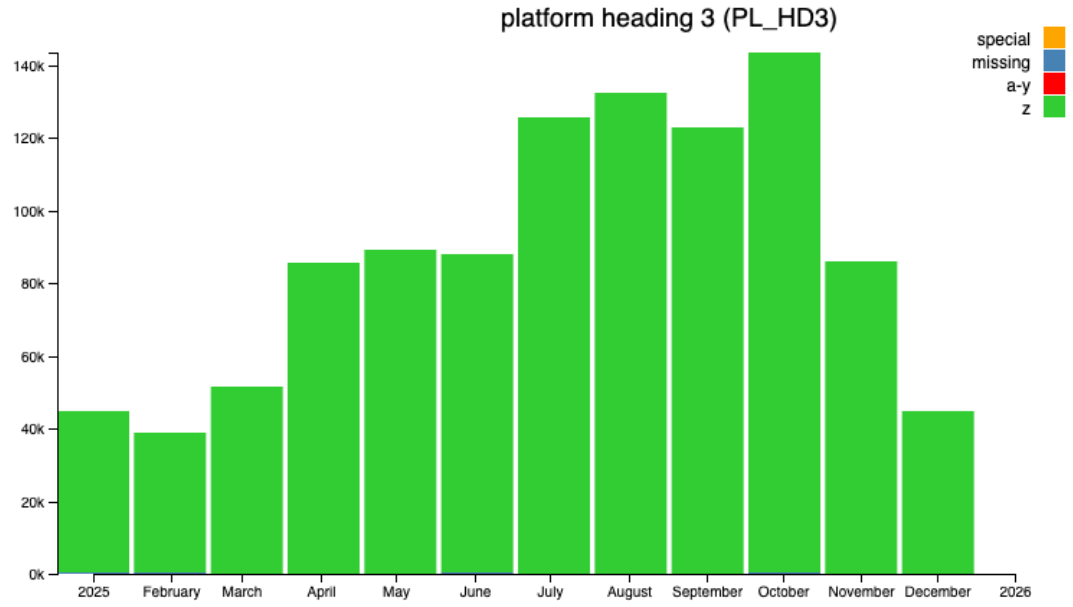


Figure 5: cont'd.

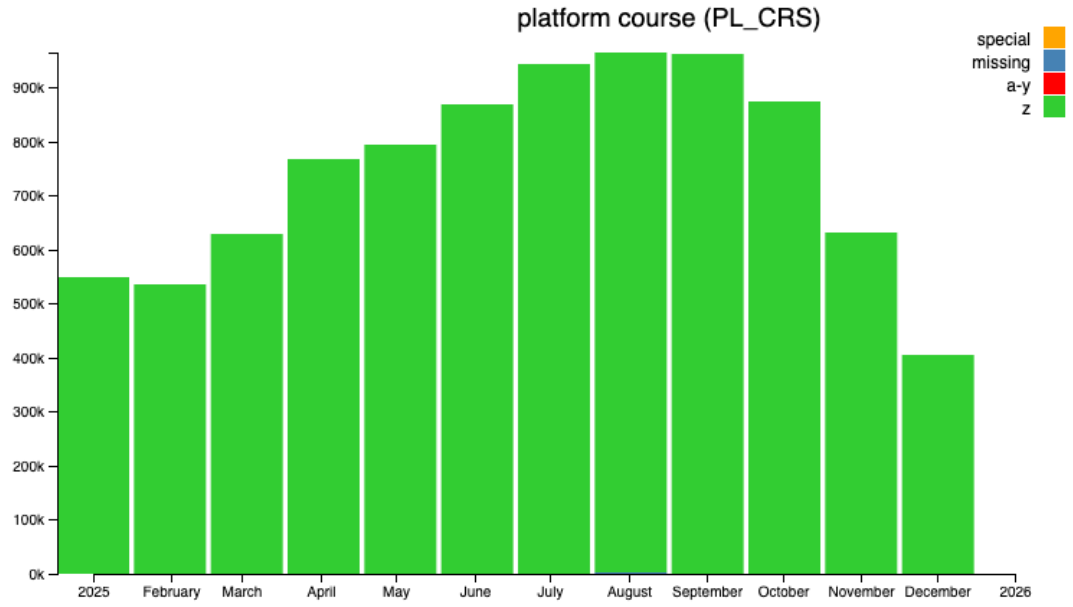
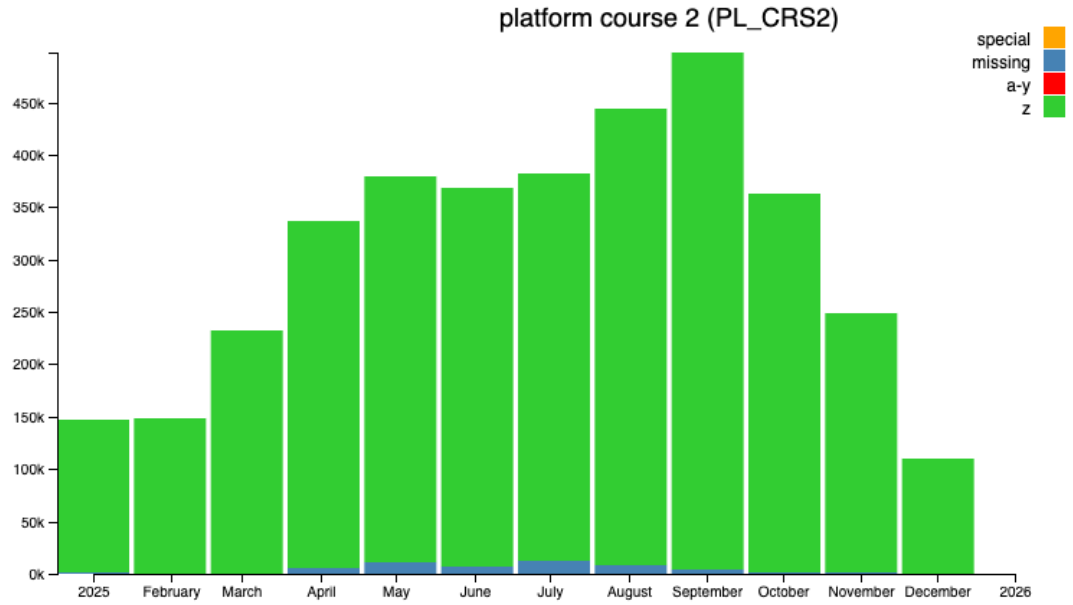


Figure 6: Total number of (this page) platform course – PL_CRS – (next page, top) platform course 2 – PL_CRS2 – and (next page, bottom) platform course 3 – PL_CRS3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



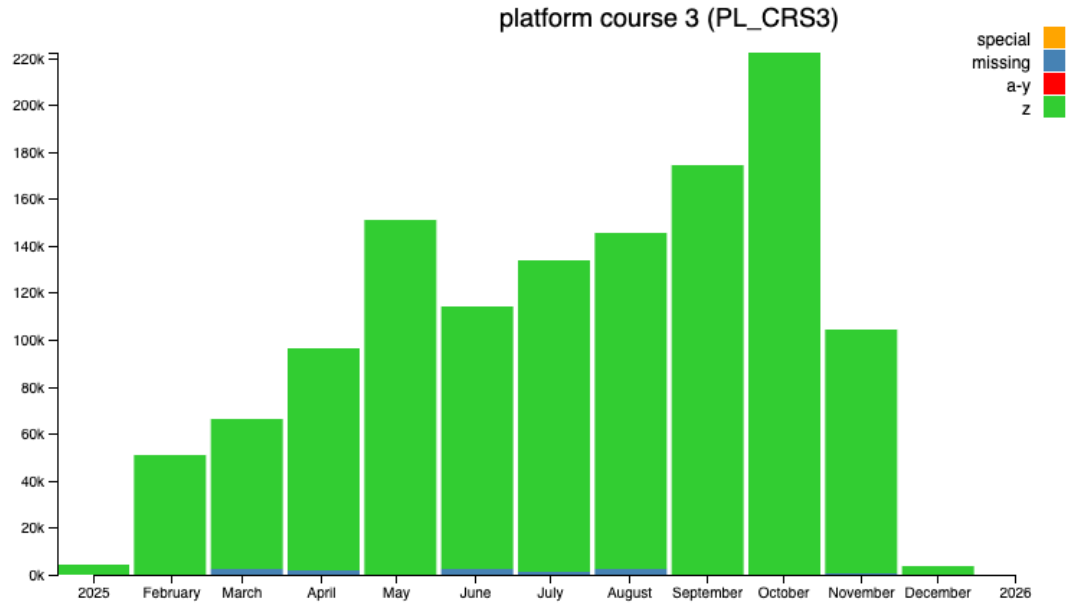


Figure 6: cont'd.

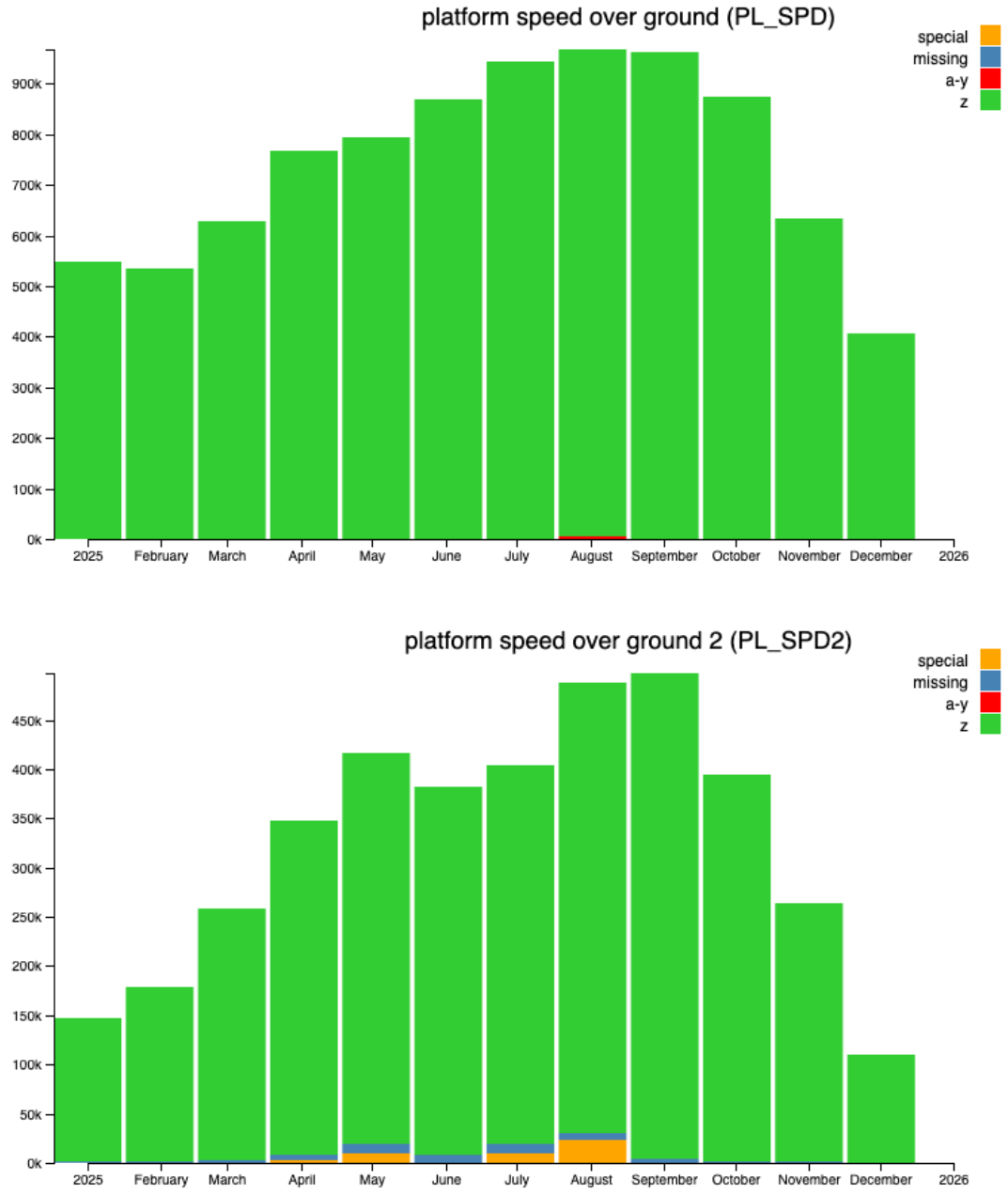


Figure 7: Total number of (this page, top) platform speed over ground – PL_SPD – (this page, bottom) platform speed over ground 2 – PL_SPD2 – and (next page) platform speed over ground 3 – PL_SPD3 — observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

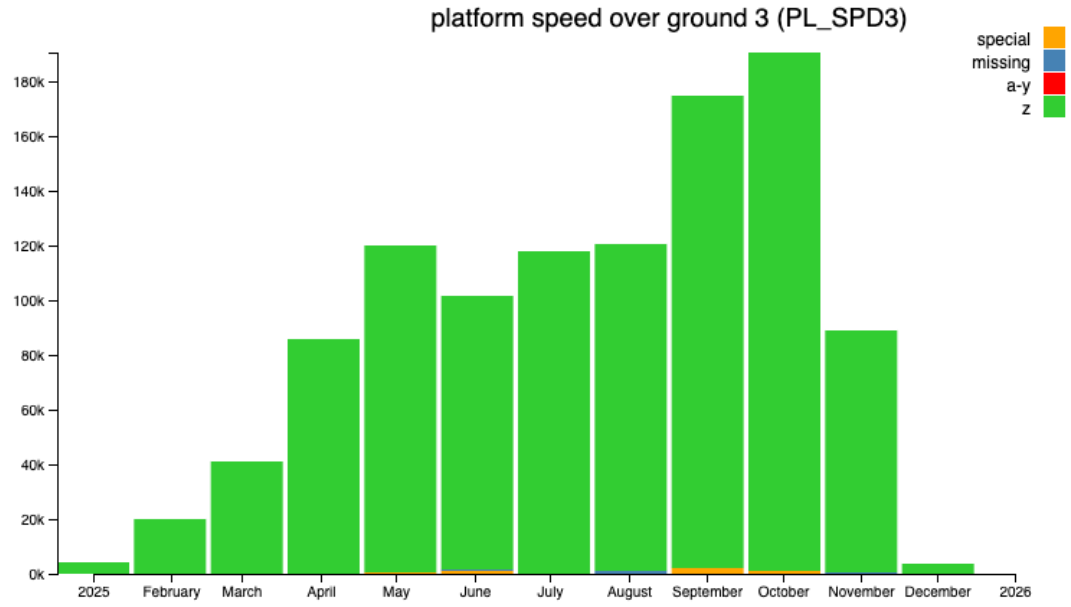


Figure 7: cont'd.

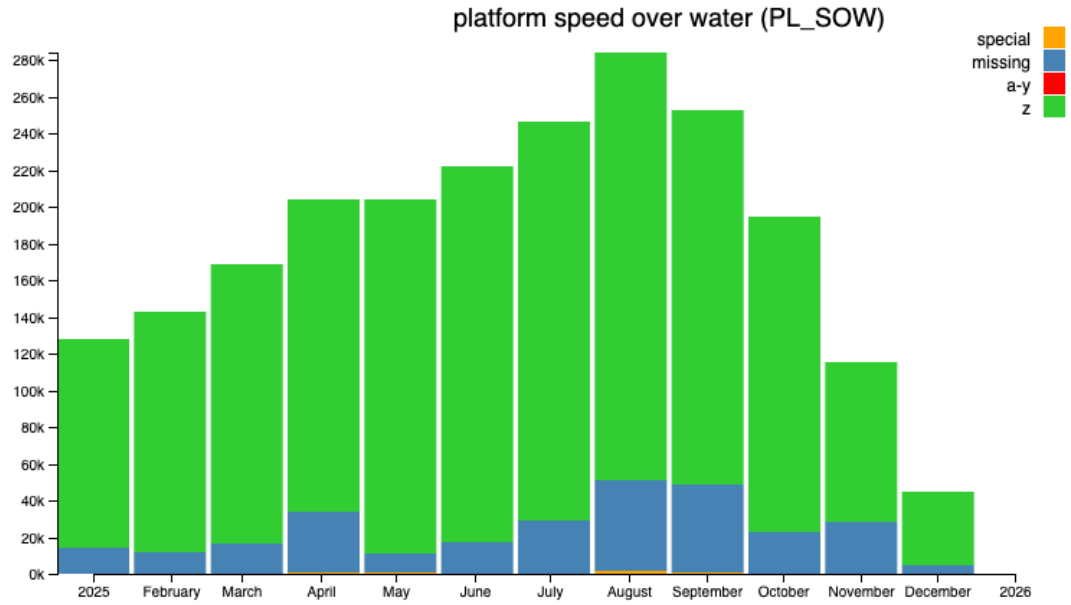


Figure 8: Total number of (this page) platform speed over water – PL_SOW – and (next page) platform speed over water 2 – PL_SOW2 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

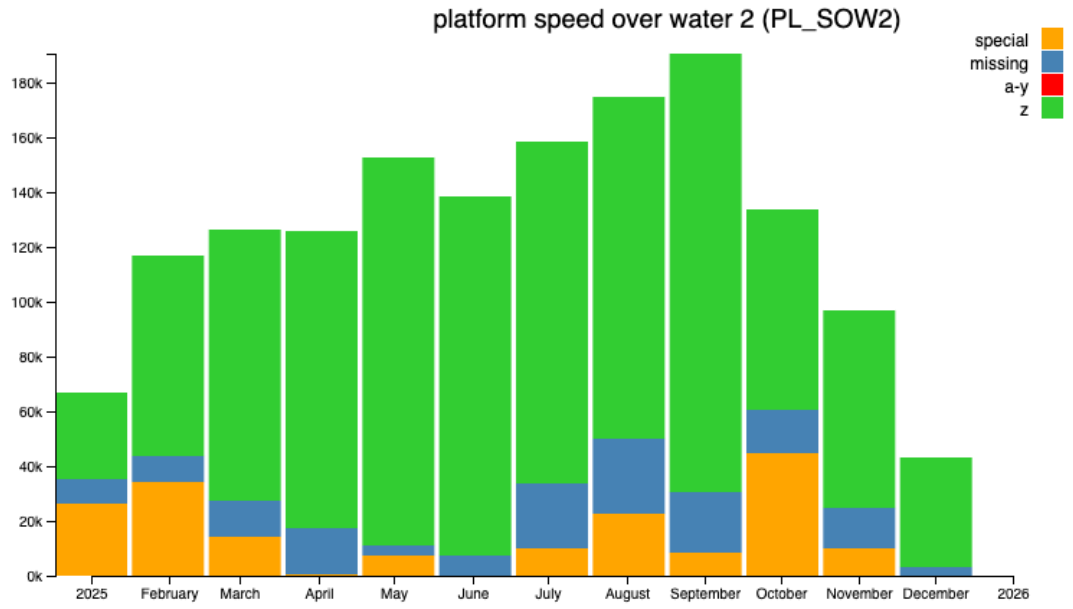


Figure 8: cont'd.

The quality of SAMOS atmospheric pressure data is generally good (Figure 9). The most common problems with the pressure sensors are flow obstruction and barometer response to changes in platform speed. Unwanted pressure response to vessel motion can be avoided by ensuring good exposure of the pressure port to the atmosphere (not in a lab, bridge, or under an overhanging deck) and by using a Gill-type pressure port. We note it is also fairly common to see water collection in cracked pressure port tubing, which affects the pressure data and can contribute to pressure flags during visual QC. We note that, aside from a known case in March wherein *Pisces* reported bogus/flagged P data (see individual vessel description in section 3c. for details), the origins of any upticks in flagging seen below are not immediately clear. For the most part, it likely comes down to several vessels experiencing common sensor issues as described above at the same time.

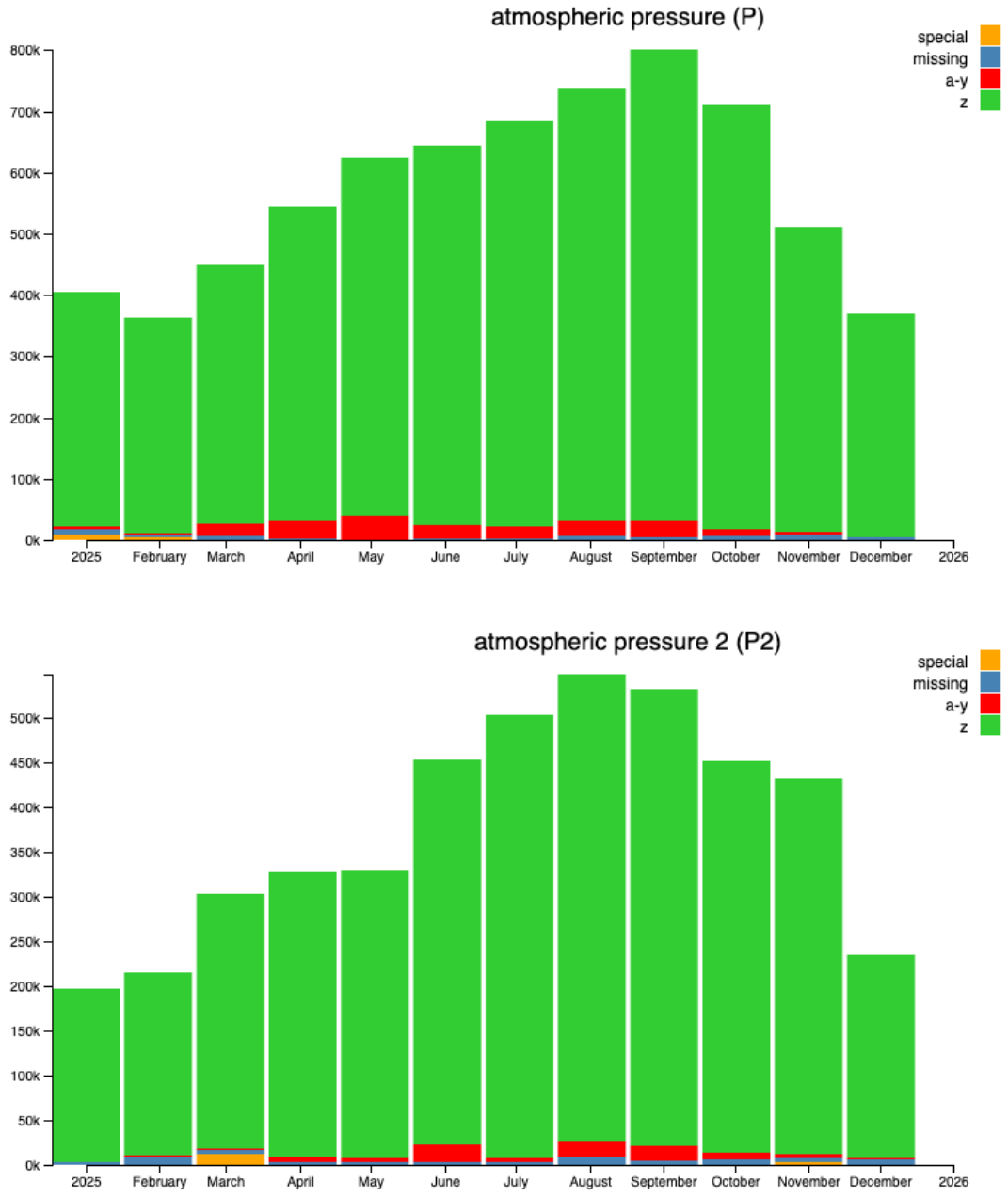
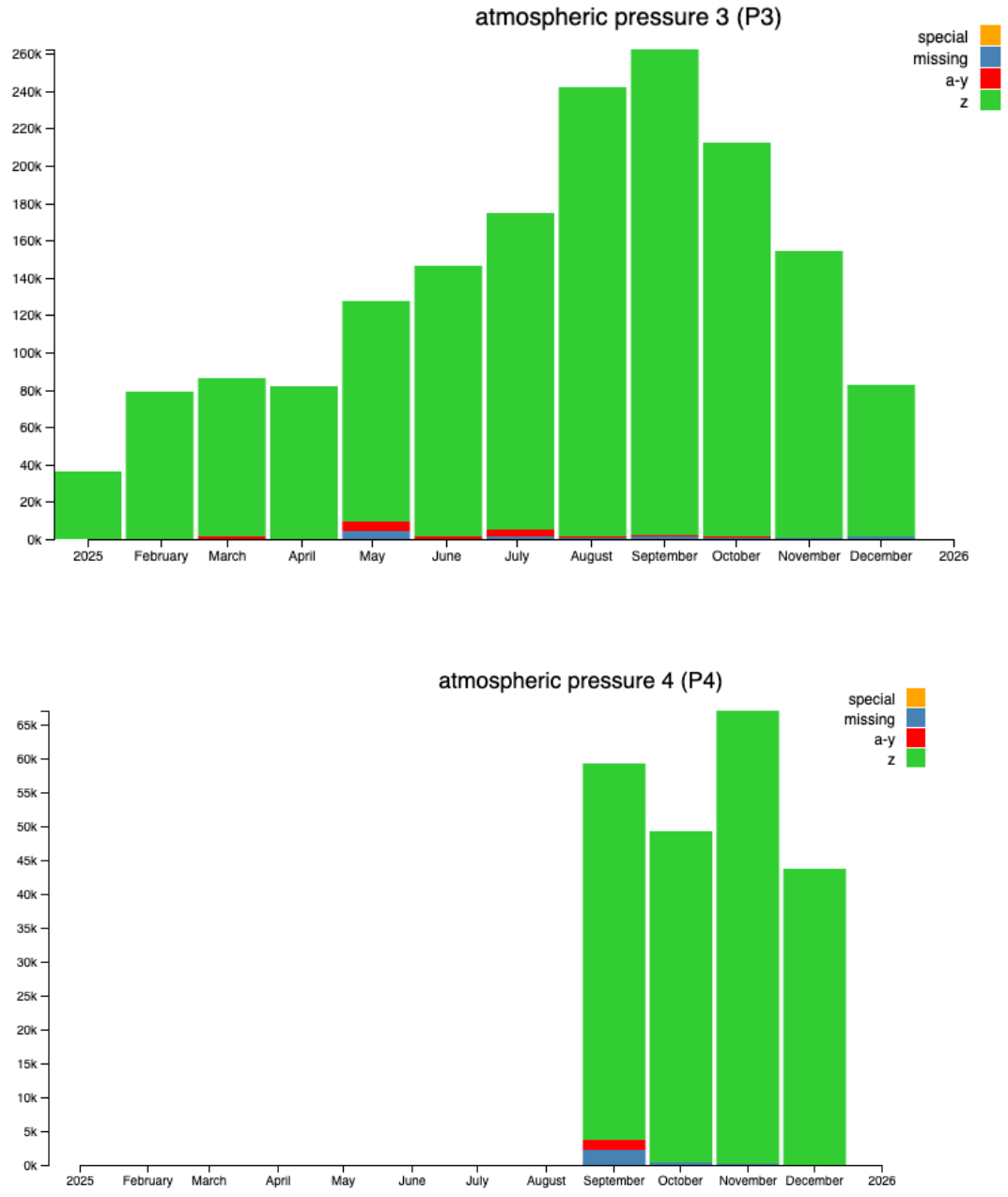


Figure 9: Total number of (this page, top) atmospheric pressure – P – (this page, bottom) atmospheric pressure 2 – P2 – (next page, top) atmospheric pressure 3 – P3 – and (next page, bottom) atmospheric pressure 4 – P4 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 9: cont'd)

Air temperature was also of decent quality (Figure 10). With the air temperature sensors, again flow obstruction is a primary problem. In this case, when the platform relative wind direction is such that regular flow to the sensor is blocked, unnatural heating of the sensor location can occur. Thermal contamination can also occur simply when winds are light, and the sensor is mounted on or near a large structure that easily retains heat (usually metal). Contamination from stack exhaust was also a common problem. In the case of stack exhaust, the authors wish to stress that adequate digital

imagery, when used in combination with platform relative wind data, can facilitate the identification of exhaust contamination and subsequent recommendations to operators to change the exposure of their thermometer.

Several vessels experienced discrete issues with their air temperature (and humidity) sensor data in 2025. Notably, *Sette* and *Fairweather* (T) in April, *Nancy Foster* (T) in May, and *Roger Revelle* (T3) in August and September (all documented, see individual vessel descriptions in section 3c. for details.) These known issues certainly explain some of the flagging seen in the air temperature variables below. Generally speaking, though, the origins of any upticks in flagging of air temperature variables are often not clearly identified as belonging to any specific vessel(s) but tend to be due to several vessels simultaneously experiencing common sensor issues.

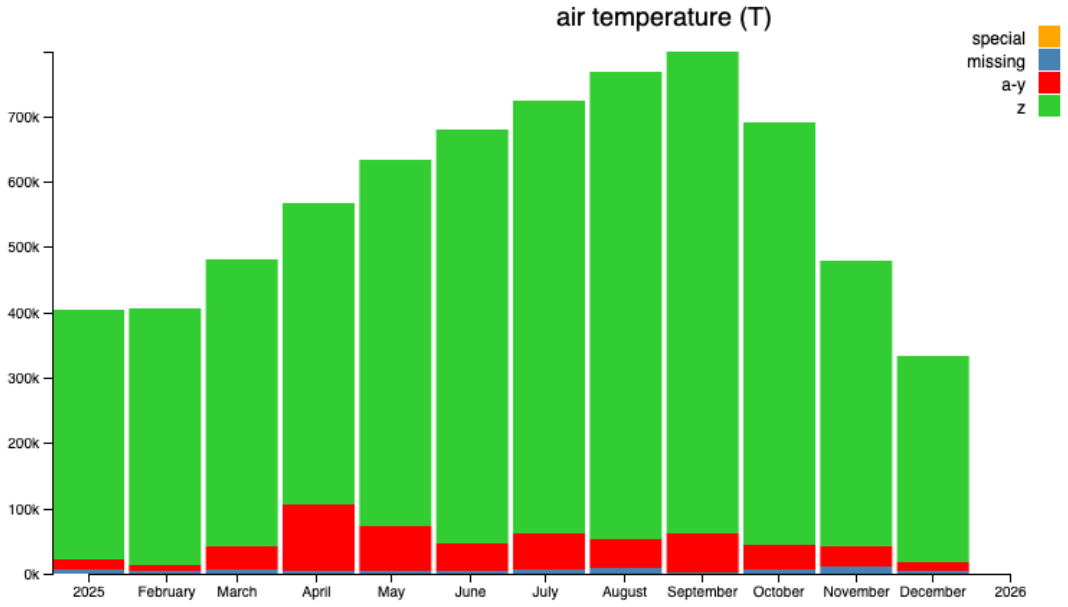
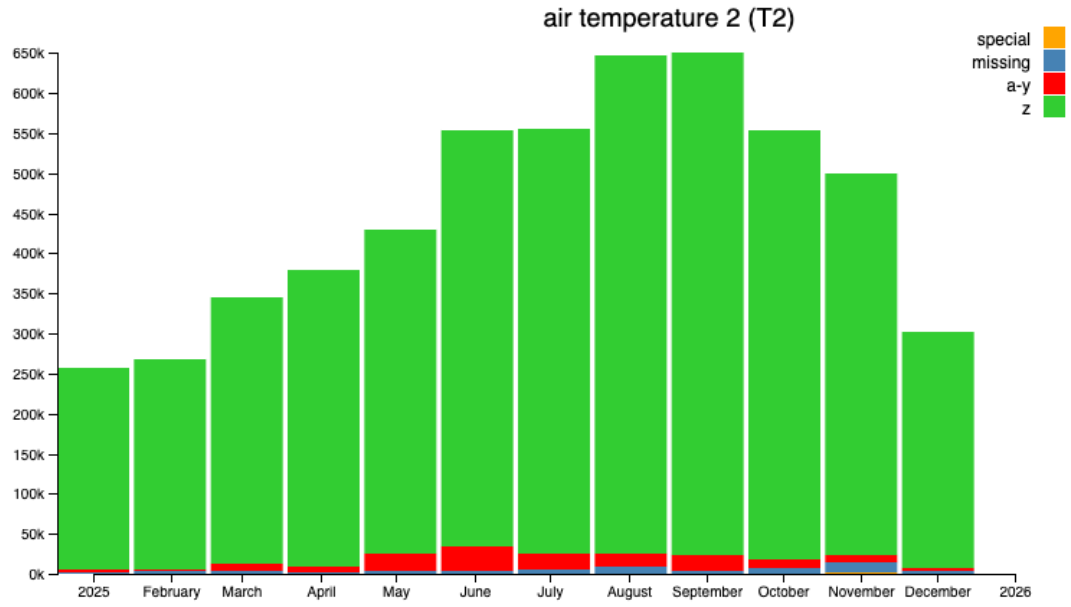
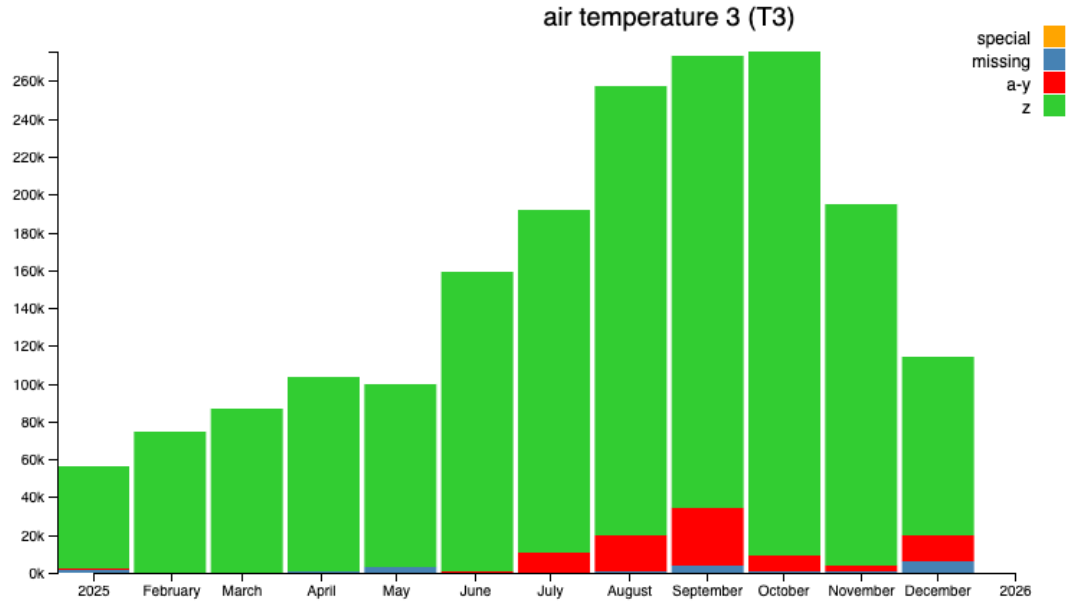
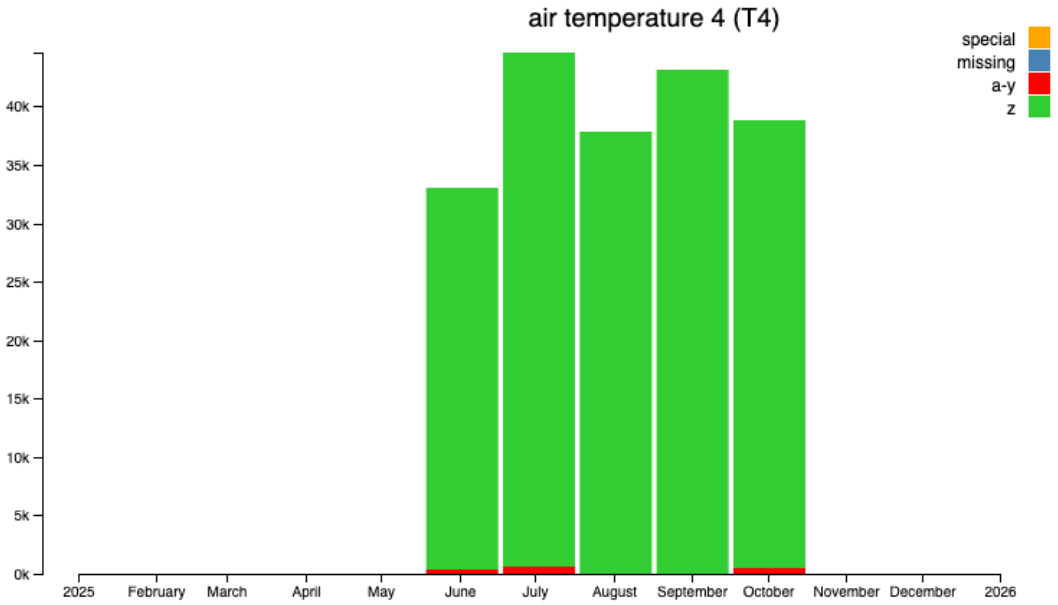


Figure 10: Total number of (this page) air temperature – T – (next page, top) air temperature 2 – T2 – (next page, bottom) air temperature 3 – T3 – and (third page) air temperature 4 – T4 observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.





(Figure 10: cont'd)



(Figure 10: cont'd)

Wet bulb temperature (Figure 11) was reported by eight NOAA vessels in 2025: namely, *Bell M. Shimada*, *Fairweather*, *Nancy Foster*, *Gordon Gunter*, *Oregon II*, *Pisces*, *Rainier* (very briefly), and *Thomas Jefferson*. We note TW from all vessels is a calculated value, rather than being directly measured. With several of these vessels (especially the *Jefferson*), because their relative humidity parameters can top out at just over 100% in saturation (common, see relative humidity topic below) the calculated TW (and TD, below) parameters are often unrealistic, meaning they receive "failed the T>=Tw>=Td test" (D) flags. Additionally, *Fairweather* experienced a discrete issue with T and RH in April, and *Gordon Gunter* saw frequent flagging of RH year-round in 2025, meaning both ships' calculated TW data saw additional flagging by association (see individual vessel description in section 3c for details). Other than these, most flags seen here were likely the result of flow obstruction and/or ship heating.

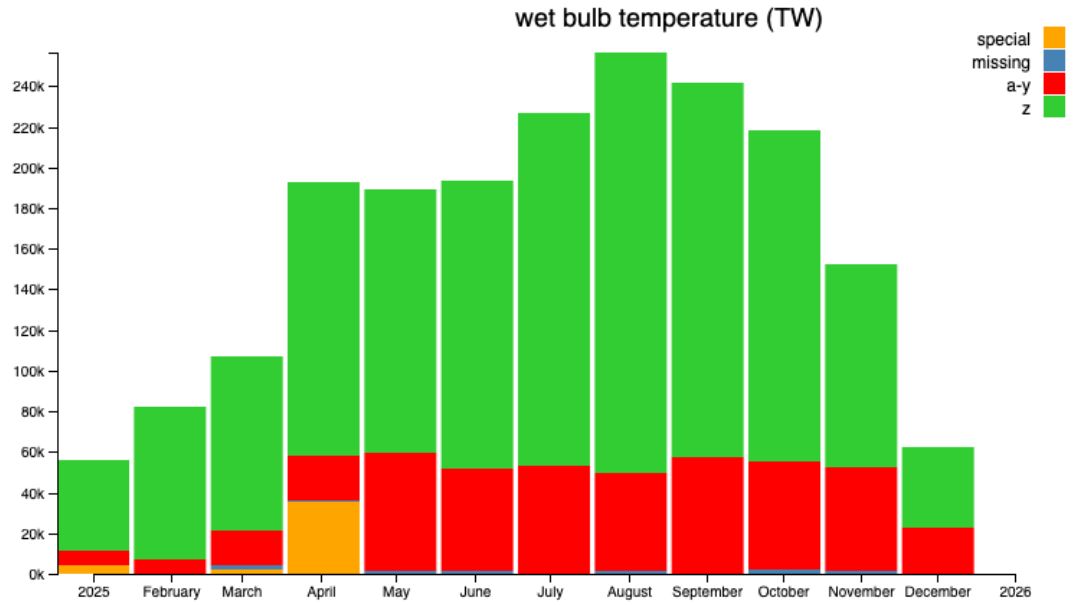


Figure 11: Total number of wet bulb temperature – TW – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

Dew point temperature (Figure 12) was also reported by these eight NOAA vessels in 2025 (again, *Bell M. Shimada*, *Fairweather*, *Gordon Gunter*, *Nancy Foster*, *Oregon II*, *Pisces*, *Rainier* (very briefly), and *Thomas Jefferson*), along with the *Roger Revelle* and *Robert Gordon Sproul*, and, lastly, the *Falkor (too)*, who comprised all of TD2. We reiterate, dew point temperature from all reporting vessels is a calculated value, rather than being directly measured. And again, because many vessels' relative humidity parameters often top out at just over 100% in saturation (common, see relative humidity topic below) the calculated TD (and TW, above) parameters are often unrealistic, meaning they receive "failed the T>=Tw>=Td test" (D) flags (documented; see individual vessel description in section 3c for details). Also, the same note above about discrete issues with *Fairweather's* (April) and *Gunter's* (all year) relative humidity sensors resulting in flagging of TW by association applies here, with TD, as well (see individual vessel description in section 3c for details). Other than these, most flags seen here were likely the result of flow obstruction and/or ship heating.

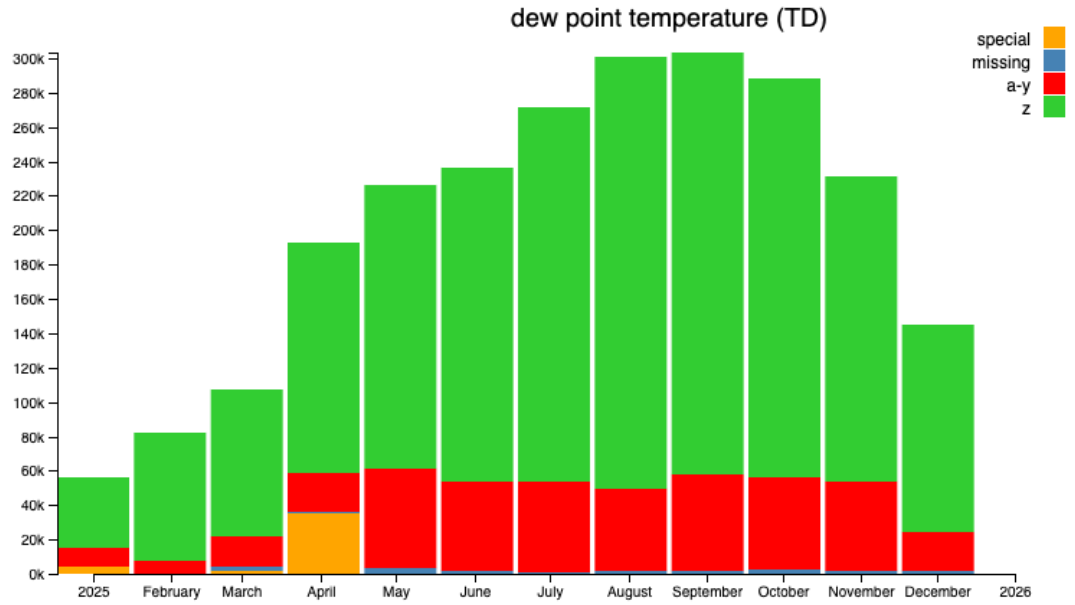


Figure 12: Total number of dew point temperature – TD – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

With relative humidity, the most common issue is readings slightly greater than 100%. If these measurements were sound, they would imply supersaturated conditions, but in fact that scenario is quite rare near the surface of the ocean. When it comes to relative humidity, the mechanics of most types of sensors are such that it is easier to obtain high accuracy over a narrow range than over a broader range, say from 10% to 100% (Wiederhold, 2010). It is often desirable to tune these sensors for the greatest accuracy within ranges of much less than 100%. The offshoot of such tuning, of course, is that when conditions are at or near saturation (e.g., rainy or foggy conditions) the sensor performs with less accuracy and readings over 100% commonly occur. While these readings are not really in grave error, they are nonetheless physically implausible and should not be used, or, as desired by the user, simply set to a value of 100%. Thus, they are B flagged by the automated QC flagger. These B flags likely account for a large portion of the A-Y flagged portions depicted in Figure 13.

As with air temperature, several vessels experienced discrete issues with their humidity sensor data in 2025. Notably, *Sette* and *Fairweather* (RH) in April and *Nancy Foster* (RH) in May (all documented, see individual vessel descriptions in section 3c. for details.) Additionally, both *Reuben Lasker's* and *Gordon Gunter's* RH sensors frequently reported suspect data throughout the year (also documented, see 3c. for details). These known issues likely explain a good deal of the A-Y flagging seen below. Generally speaking, though, the origins of any upticks in flagging in relative humidity are often not clearly identified as belonging to any specific vessel(s) but tend to be due to several vessels simultaneously experiencing common sensor issues. We note some

quantity of the "missing" values noted in the relative humidity variables below is likely tied to the Scripps vessels' (*Robert Gordon Sproul*, *Roger Revelle*, *Sally Ride*) SIO-MET data acquisition software assigning NaN's to humidity values in excess of 100% (again, common enough values in a saturated environment).

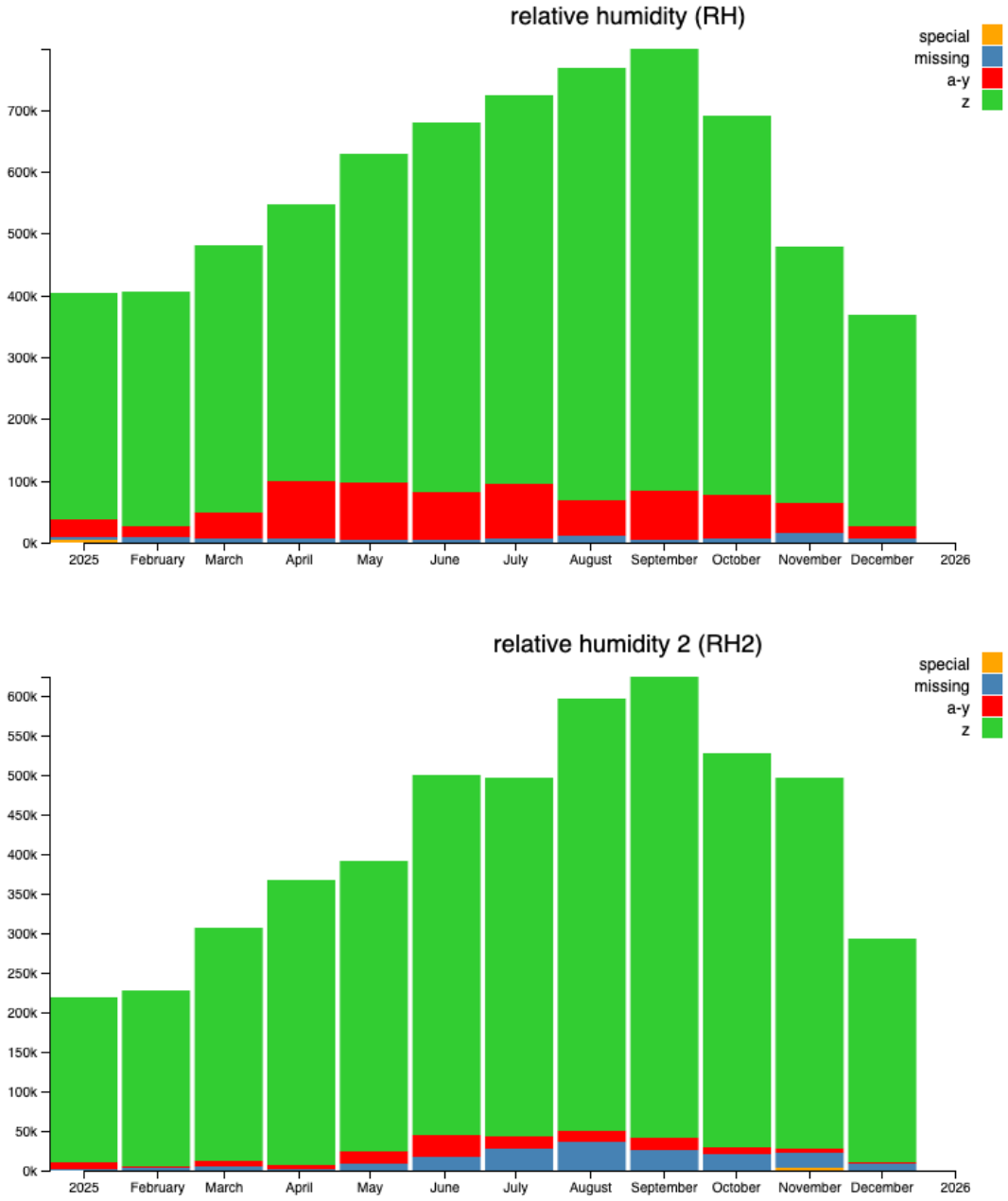
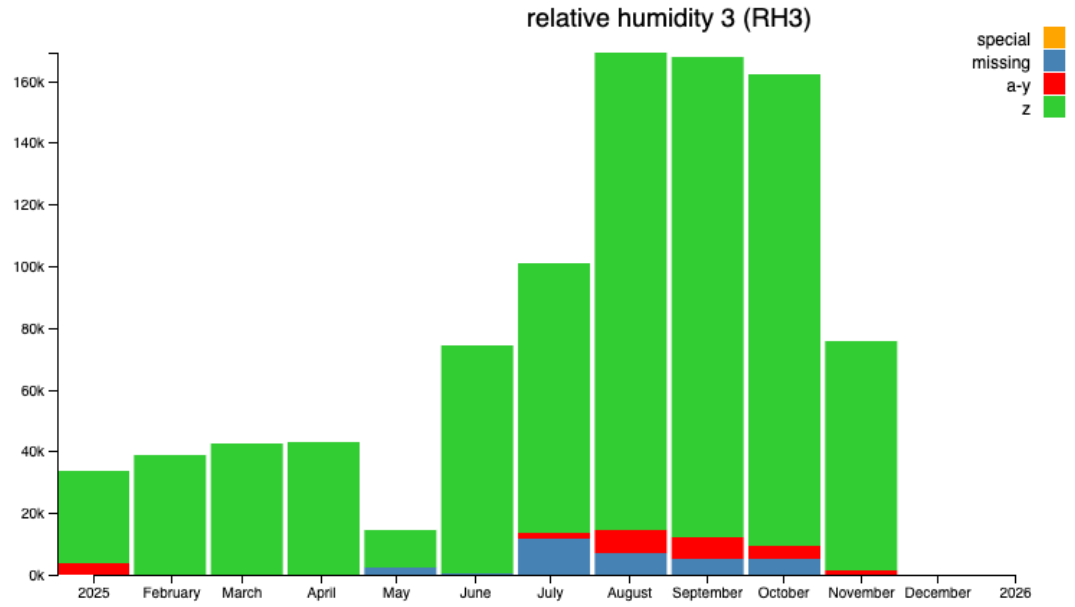


Figure 13: Total number of (this page, top) relative humidity – RH – (this page, bottom) relative humidity 2 – RH2 – and (next page) relative humidity 3 – RH3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 13: cont'd)

Wind sensors, both direction and speed, are arguably the instruments most affected by flow obstruction and changes in platform speed. Because research vessels traditionally carry bulky scientific equipment and typically have multi-level superstructures, it is a challenge to find locations on a research vessel where the sensors will capture the free-circulating atmosphere. Unlike other met sensors such as air temperature and relative humidity that are designed to function more or less independent of the micro scale nuances in airflow surrounding them, nuances in flow are the very thing that wind sensors are intended to measure. This is why obstructed flow is so readily incorporated into wind measurements. These flow-obstructed and platform speed-affected wind data were a common problem across SAMOS vessels in 2025. Where comprehensive metadata and digital imagery exist, flow obstructed platform relative wind bands can often be diagnosed based on the structural configuration of the vessel and recommendations can be made to the vessel operator to improve sensor locations.

The other major problem with earth relative wind data is errors caused by changes in platform speed. Occasionally, a wind direction sensor is also suspected of being "off" by several degrees. Satellite wind products and in-situ data (buoys, pier-based stations, etc.) can sometimes clue data analysts into such a bias, particularly if the bias is very large. But in general, if a technician suspects a wind direction bias it is critical they communicate that suspicion to SAMOS personnel, as otherwise the data analysts often will have no reliable means of discovering the problem themselves. Suspected wind direction biases are typically flagged with K flags, or J flags if the case is extreme and/or verifiable.

In addition to the above, staggered across the whole year, there were a number of vessels that experienced issues with their wind sensor data. The most notable of these that resulted in A-Y flags were: an anemometer that was installed backwards on *Reuben Lasker* in January (DIR, SPD), an unknown failure on *Bell M. Shimada* in March (DIR, DIR2, SPD and SPD2), a translator issue on *Sette* in April (DIR, SPD), an issue with gyro data on *Shimada* in July that filtered down to the calculated true winds (DIR2, DIR3, SPD2, and SPD3), a WXT that came loose from its mount on *Sette* in August (DIR2, SPD2), iced-over or frozen anemometers on *Fairweather* in September (DIR and SPD), and a propellor that fell off *Okeanos Explorer's* anemometer in October (DIR, SPD). In addition, *Rainier's* relative wind data was known to periodically flatline for a few hours at a time in 2025 (and in previous years), which affected downstream DIR and SPD, and *Nuyina's* anemometer (DIR, SPD) is known to suffer from severe flow distortion owing to its "monkey island" location on the ship. (All above are documented, see individual vessel descriptions in section 3c. for details.) All these cases contributed heavily to the A-Y flagging seen in wind directions and speeds below.

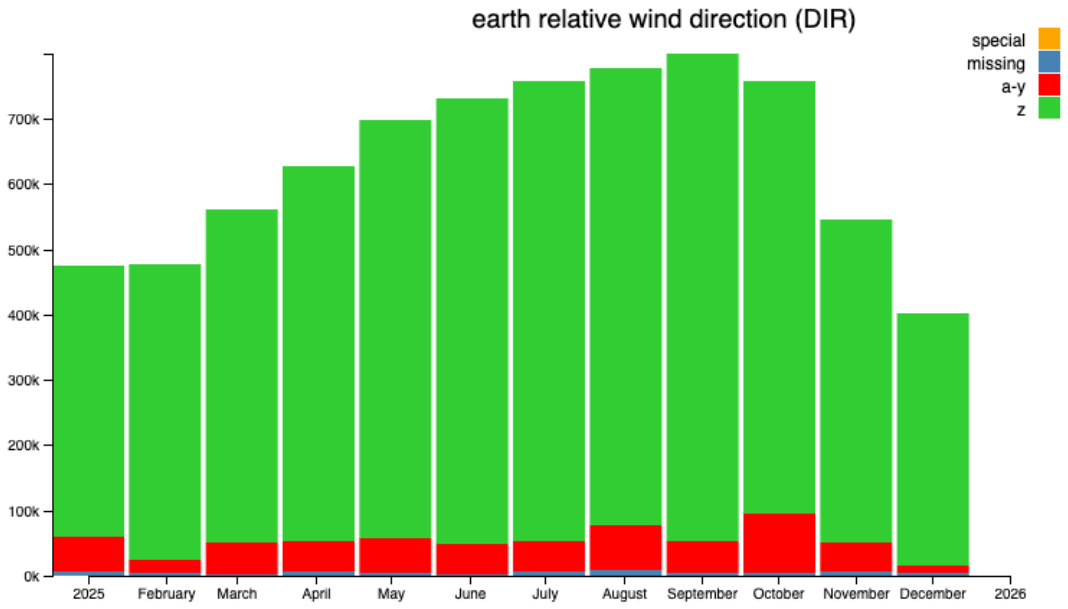
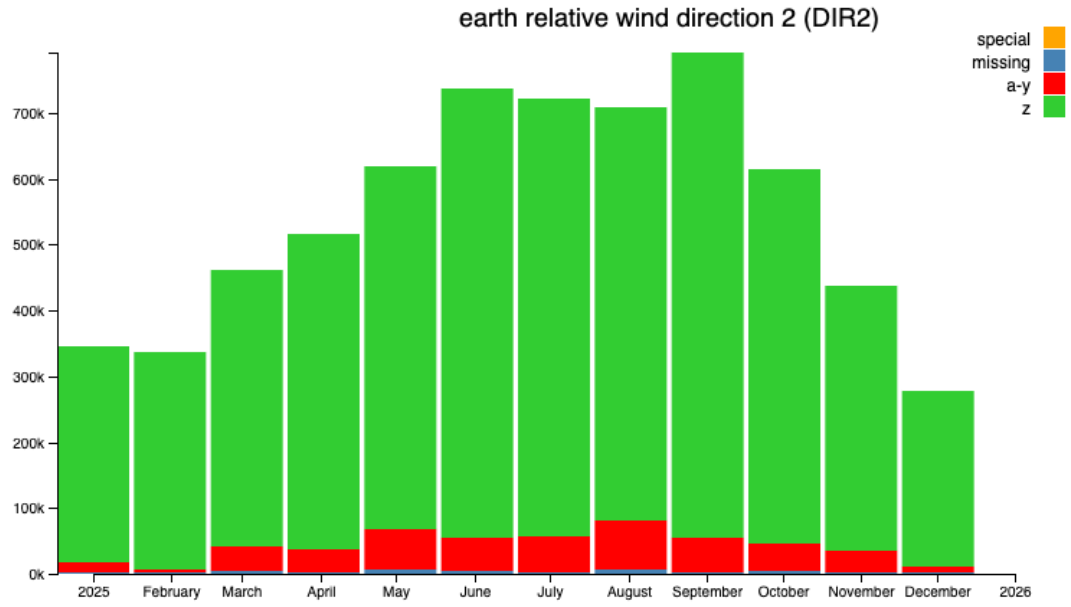
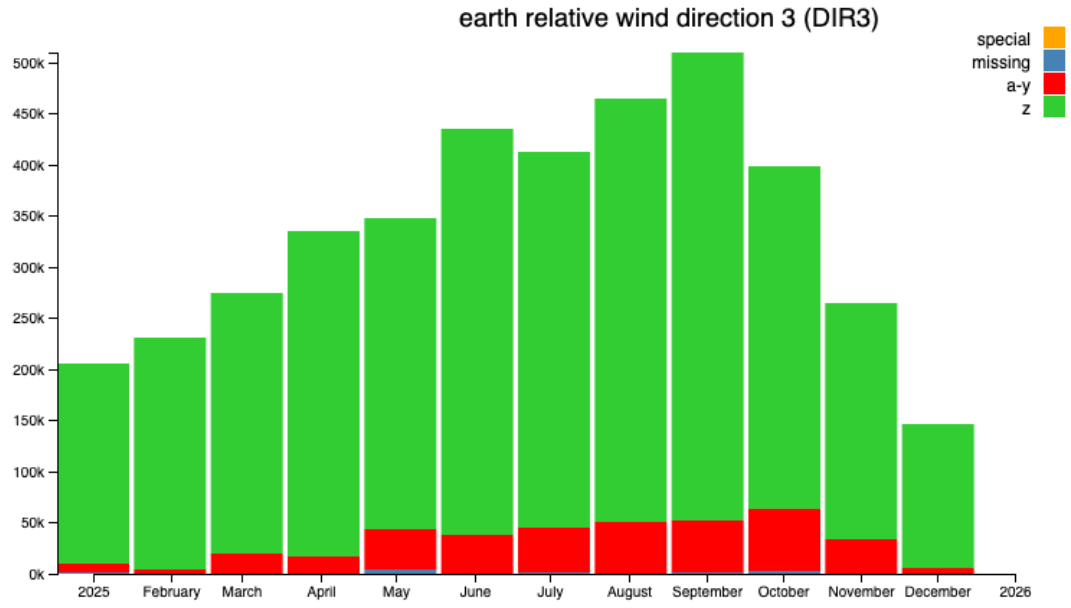


Figure 14: Total number of (this page) earth relative wind direction – DIR – (next page, top) earth relative wind direction 2 – DIR2 – and (next page, bottom) earth relative wind direction 3 – DIR3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.





(Figure 14: cont'd)

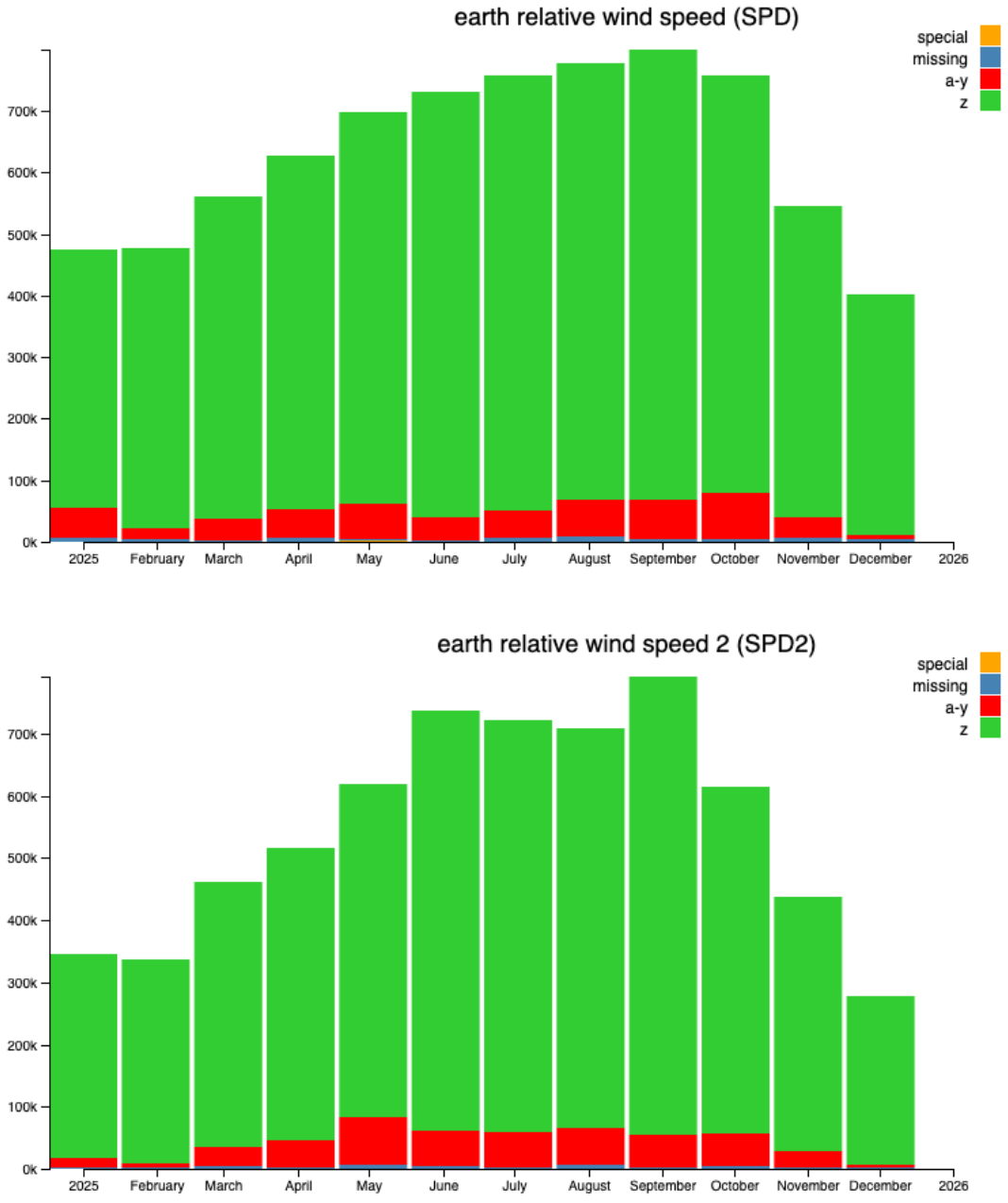
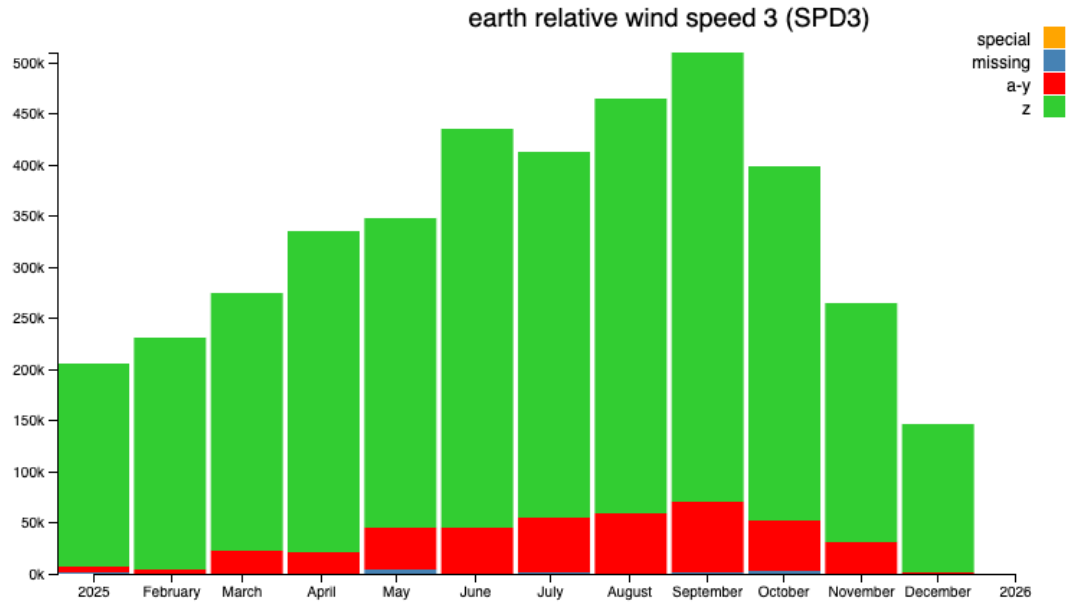


Figure 15: Total number of (this page, top) earth relative wind speed – SPD – (this page, bottom) earth relative wind speed 2 – SPD2 – and (next page) earth relative wind speed 3 – SPD3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 15: cont'd)

The platform relative wind parameters, both direction (Figure 16) and speed (Figure 17), were of overall decent quality in 2025. As noted in the previous true wind parameter discussion, several ships saw issues that resulted in A-Y flagging of the relative wind parameters: *Lasker's* (January, PL_WDIR) and *Sette's* (August, PL_WDIR2) rotated installations, *Fairweather's* iced or frozen anemometers in September (PL_WDIR, PL_WDIR2, PL_WSPD, PL_WSPD2), *Rainier's* periodic data flatline issue (PL_WDIR, PL_WSPD), and *Okeanos Explorer's* lost propellor in October (PL_WDIR, PL_WSPD). The *Explorer* also saw a loose WXT mount in April that affected PL_WDIR2, although in this case there were no downstream true wind effects because no true wind calculation had been configured yet for the WXT. (All above are documented; see individual vessel descriptions in section 3c for details.)

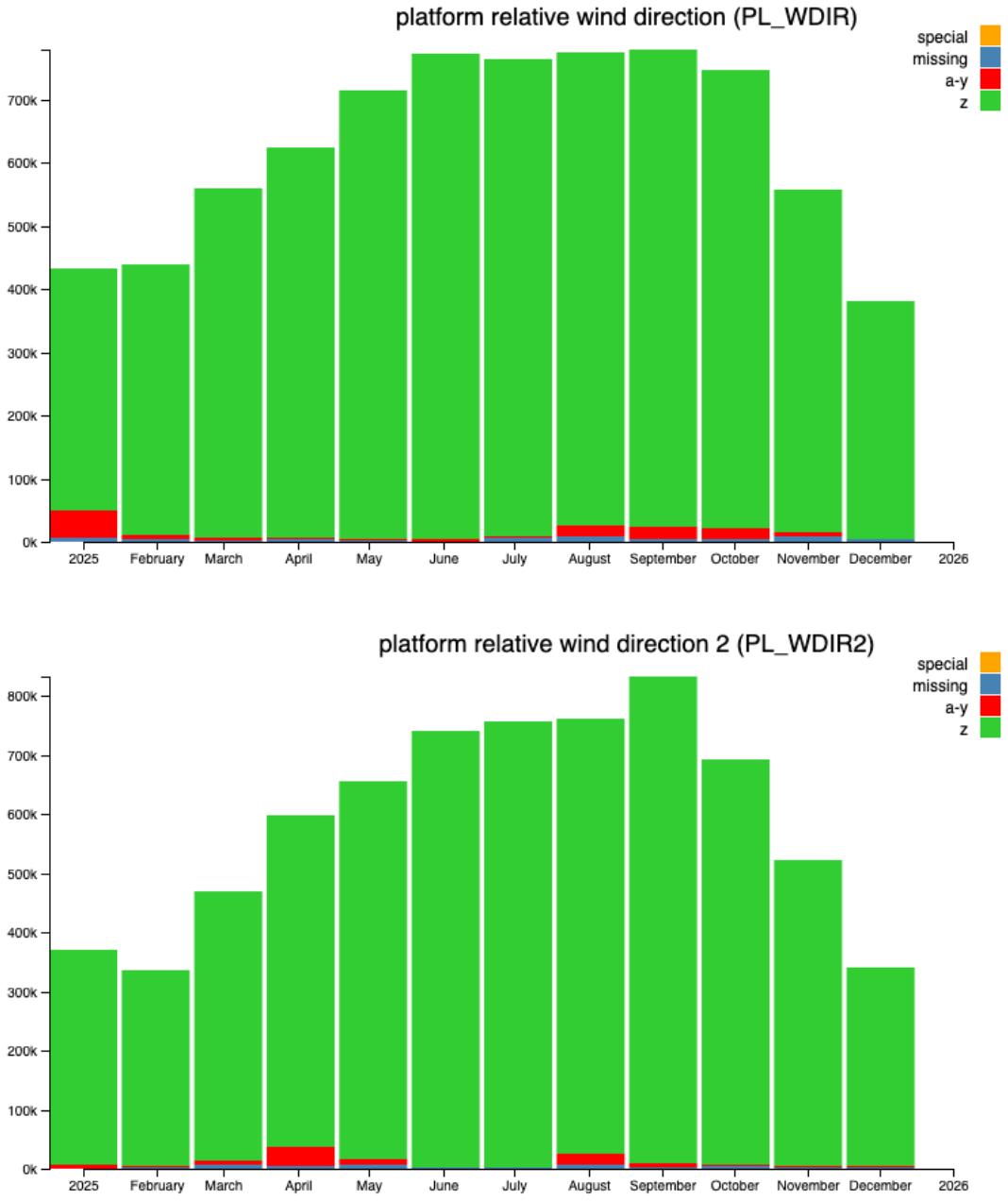
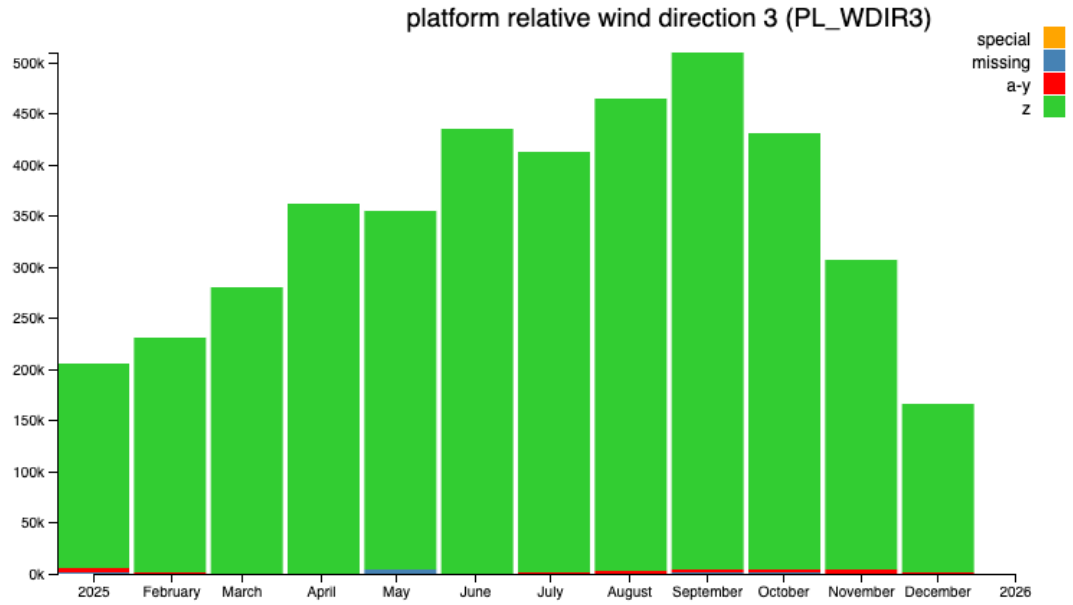


Figure 16: Total number of (this page, top) platform relative wind direction – PL_WDIR – (this page, bottom) platform relative wind direction 2 – PL_WDIR2 – and (next page) platform relative wind direction 3 – PL_WDIR3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 16: cont'd)

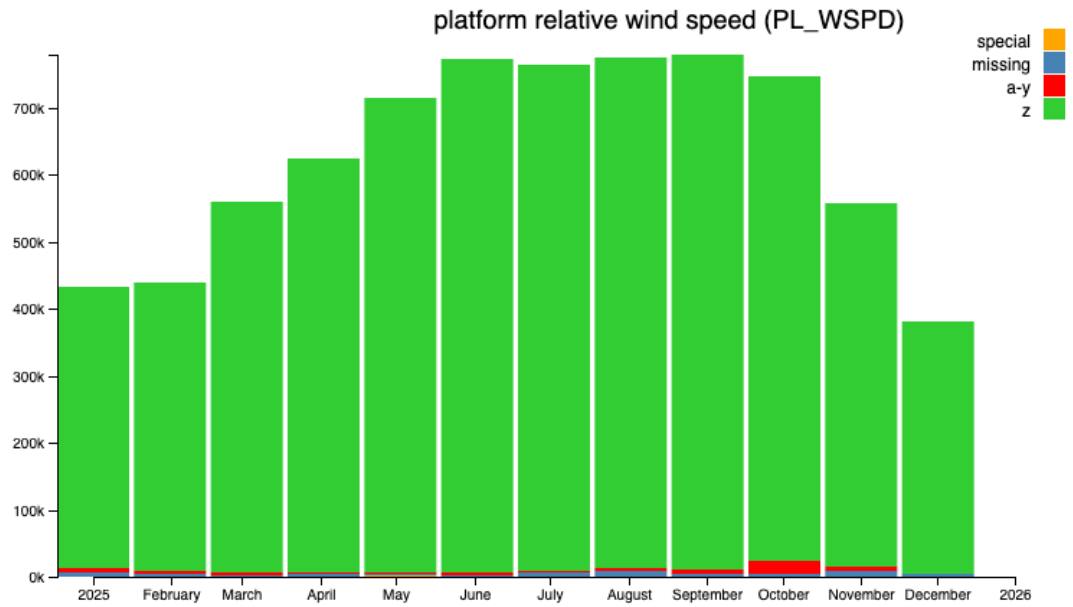
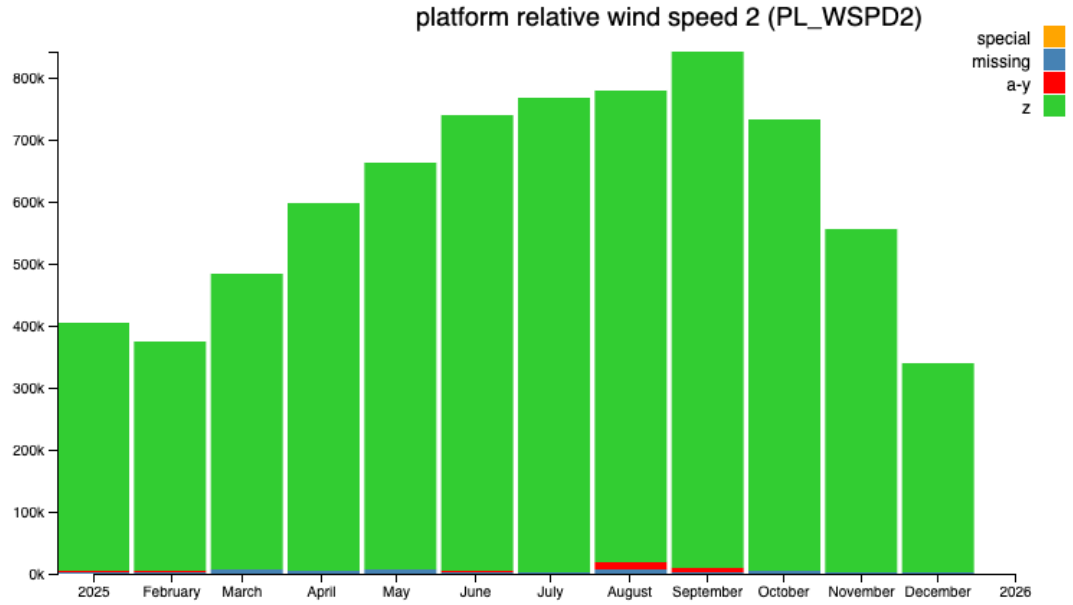
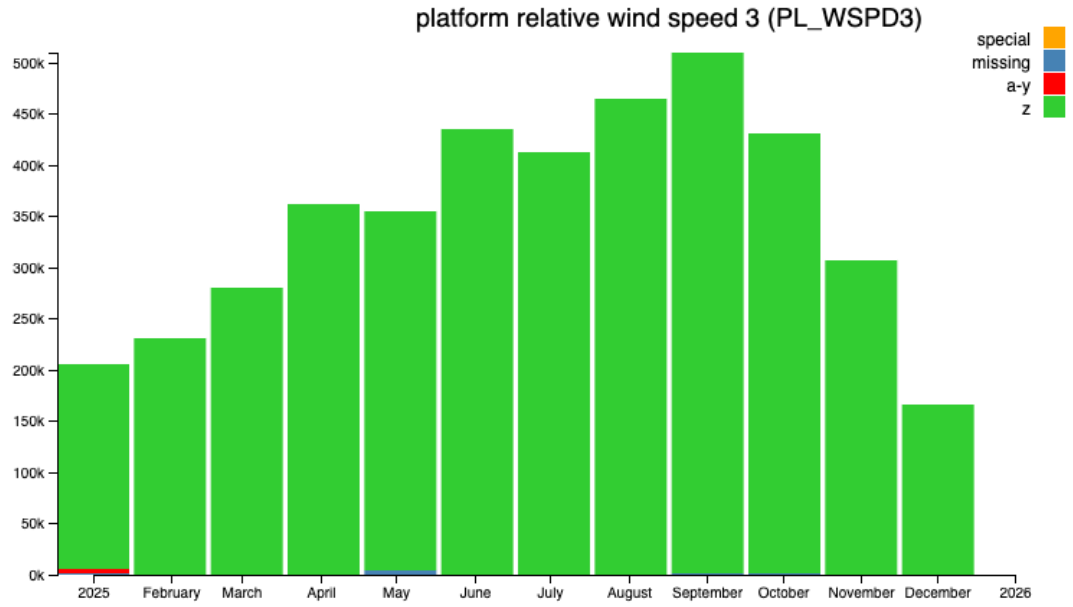


Figure 17: Total number of (this page) platform relative wind speed – PL_WSPD – (next page, top) platform relative wind speed 2 – PL_WSPD2 – and (next page, bottom) platform relative wind speed 3 – PL_WSPD3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.





(Figure 17: cont'd)

Most of the flags applied to the radiation parameters were assigned by the auto flagger, primarily to short wave radiation (Figure 18) and photosynthetically active radiation (Figure 20). Short wave radiation tends to have the largest percentage of data flagged for parameters submitted to SAMOS. Out of bounds (B) flags dominate in this case. Like the relative humidity sensors, this is again a situation where a high degree of accuracy is impossible over a large range of values. As such, short wave (and, similarly,

photosynthetically active aka PAR) radiation sensors are typically tuned to permit greater accuracy at large radiation values. Consequently, short wave and photosynthetically active radiation values near zero (i.e., measured at night) often read slightly below zero. Once again, while these values are not a significant error, they are nonetheless invalid and unsuitable for use as is and should be set to zero by any user of these data. Long wave atmospheric radiation (Figure 19), on the other hand, usually has the smallest percentage of data flagged among the radiation parameters submitted to SAMOS.

With the short wave sensors, the possibility that data may be contaminated by nearby fluorescent lighting also exists. This is actually the known case for *Reuben Lasker*, as their RAD_SW sensor is installed near bright trawl lights that they use nightly. In the September to October period, *Falkor(too)* also experienced some of this while they were sitting with their bow mast (and RAD_SW) directly under some bright dock lights. (Both documented, see individual vessel description in 3c. for details.)

In addition to the above, a few ships experienced discrete issues with their short wave and long wave radiation sensors: In the May to June period, *Roger Revelle's* data processing software misread the usual small, slightly negative nighttime values as huge RAD_SW2 spikes that were well out of bounds. *Neil Armstrong* experienced an off-and-on issue throughout much of the year (until ~mid-September) that resulted in some occasional unrealistically high or unrealistically low RAD_LW values, and *Nuyina* saw several repeat occurrences of RAD_LW flatlining at an unrealistic 0 W/m^2 throughout the year. (All documented; see individual vessel description in 3c for details). The isolated increase in flagging seen in RAD_LW2 in July looks to have come from the *Tangaroa*, although it is not immediately clear what the issue was.

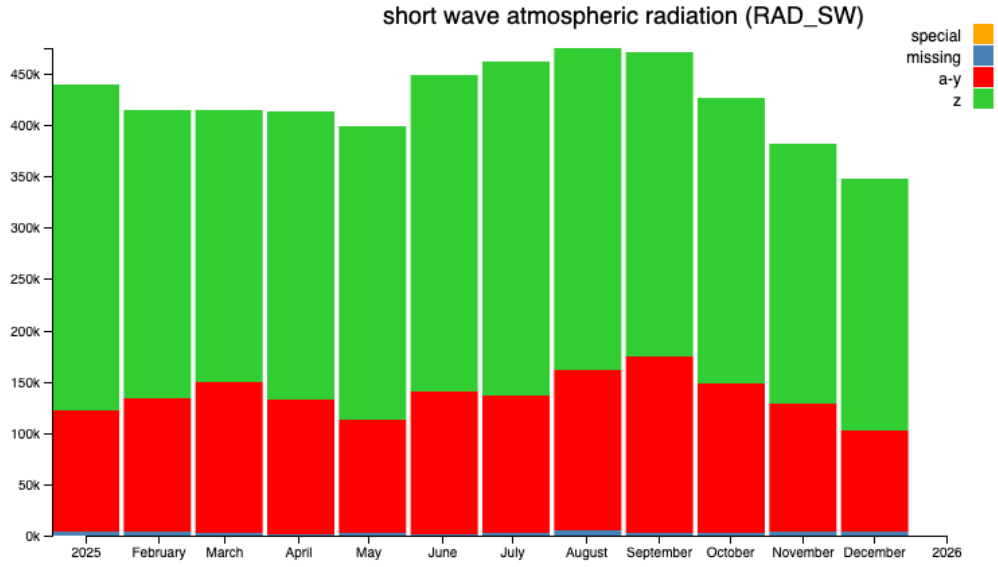
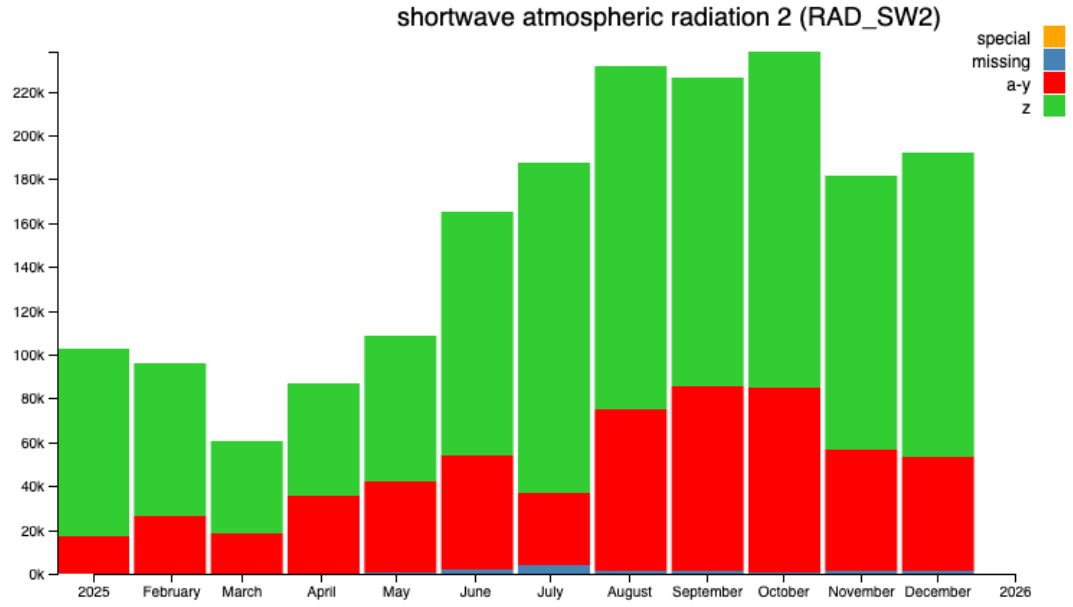


Figure 18: Total number of (this page) shortwave atmospheric radiation – RAD_SW – and (next page) shortwave atmospheric radiation 2 – RAD_SW2 –observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 18: cont'd)

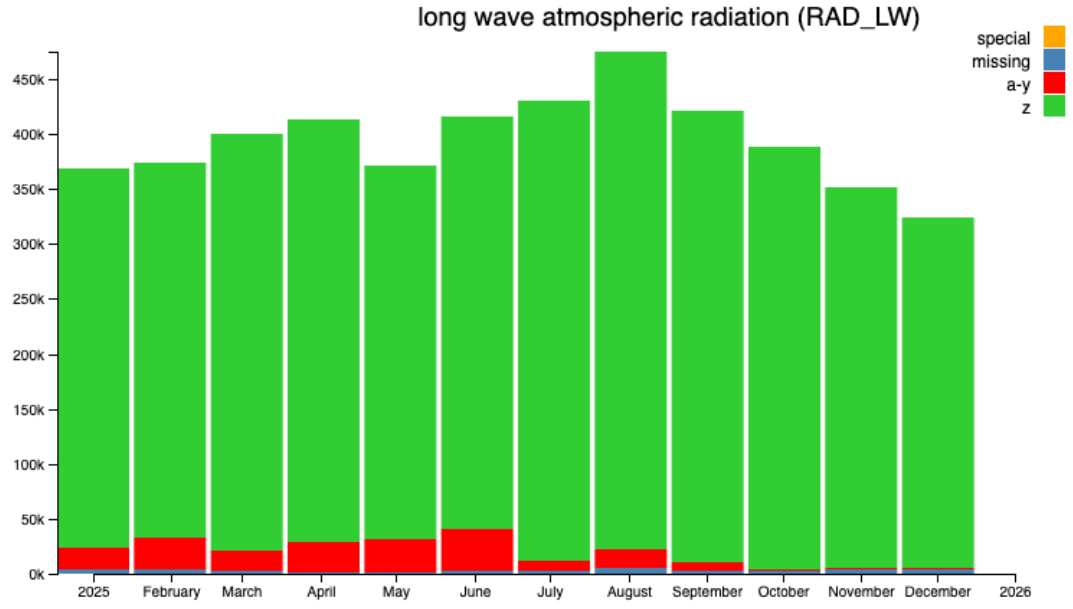
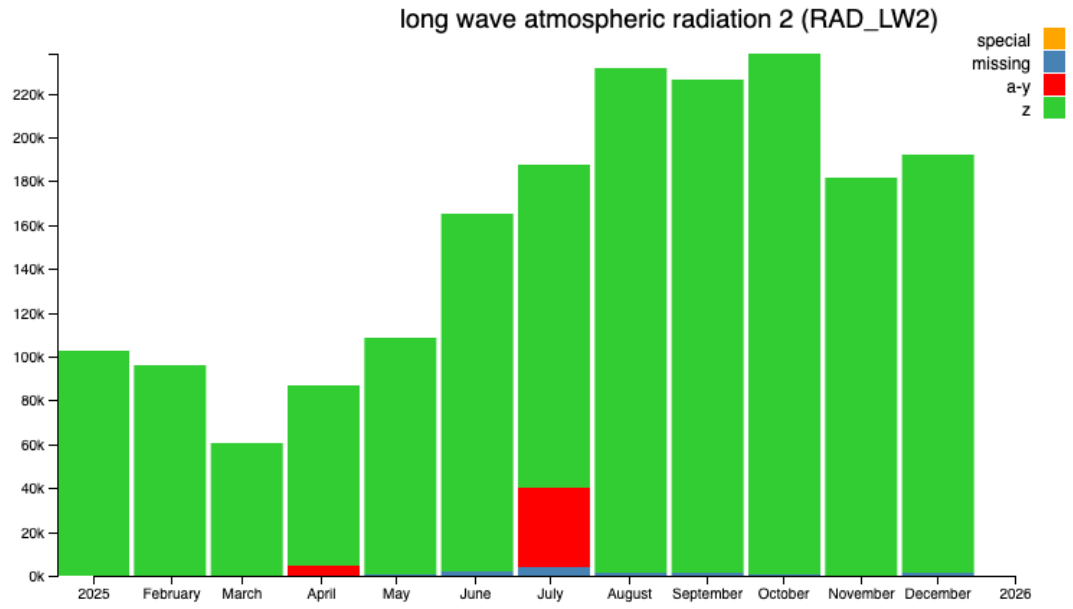


Figure 19: Total number of (this page) long wave atmospheric radiation – RAD_LW – and (next page) long wave atmospheric radiation 2 – RAD_LW2 –observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 19: cont'd)

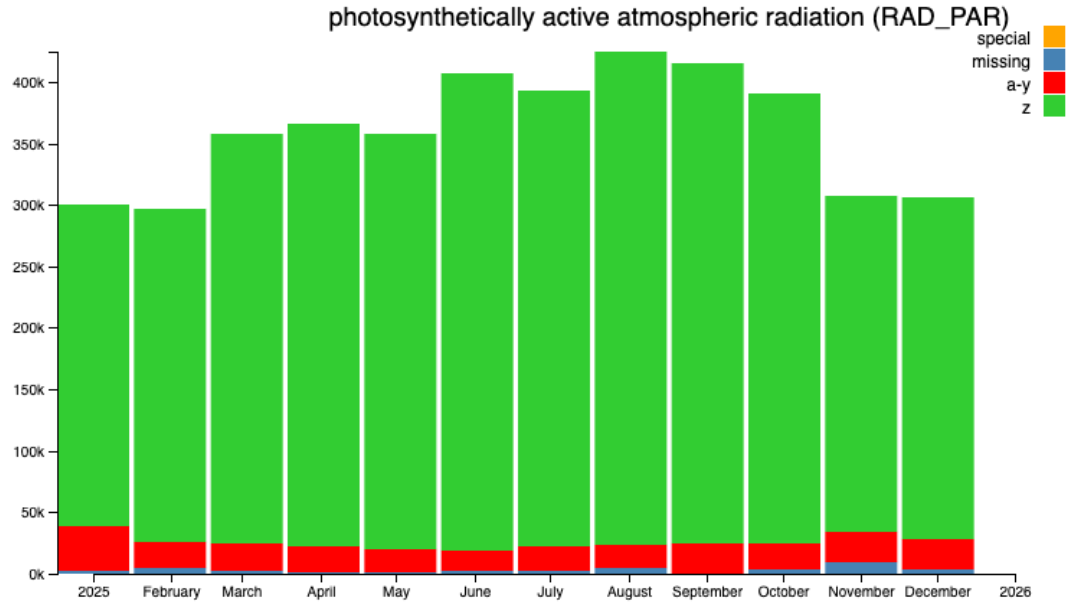
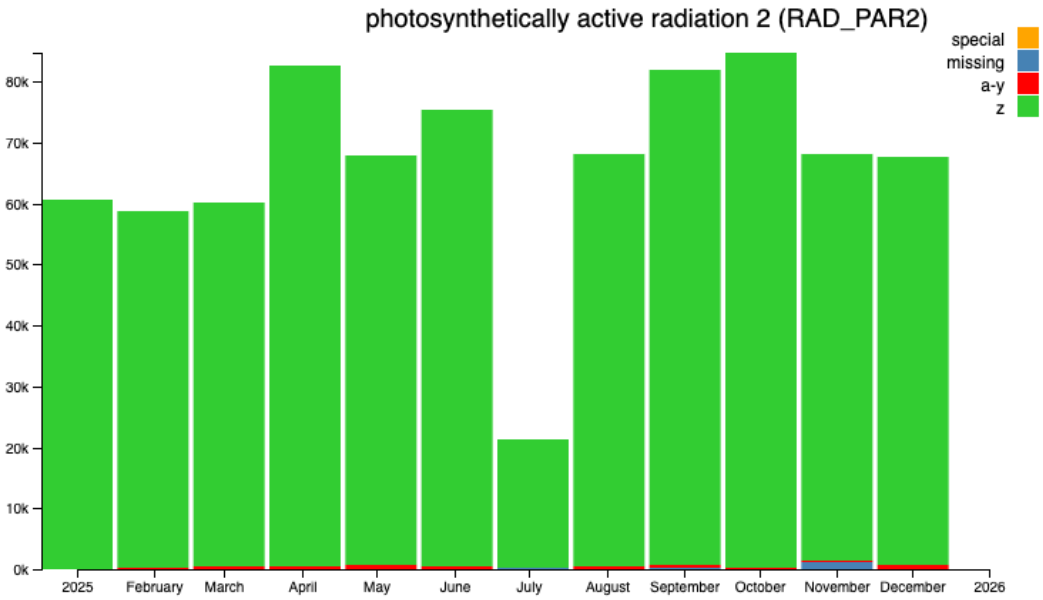


Figure 20: Total number of (this page) photosynthetically active atmospheric radiation – RAD_PAR – and (next page) photosynthetically active atmospheric radiation 2 – RAD_PAR2 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 20: cont'd)

There were no major problems noted for either the rain rate (Figure 21) or precipitation accumulation (Figure 22) parameters. The isolated increase in flagging seen in RRATE in August looks to have come from the *Pisces*, although it is not immediately clear what the issue was. It should be mentioned that some accumulation sensors occasionally exhibit slow leaks and/or evaporation. These data are not typically flagged; nevertheless, frequent emptying of precipitation accumulation sensors is always advisable.

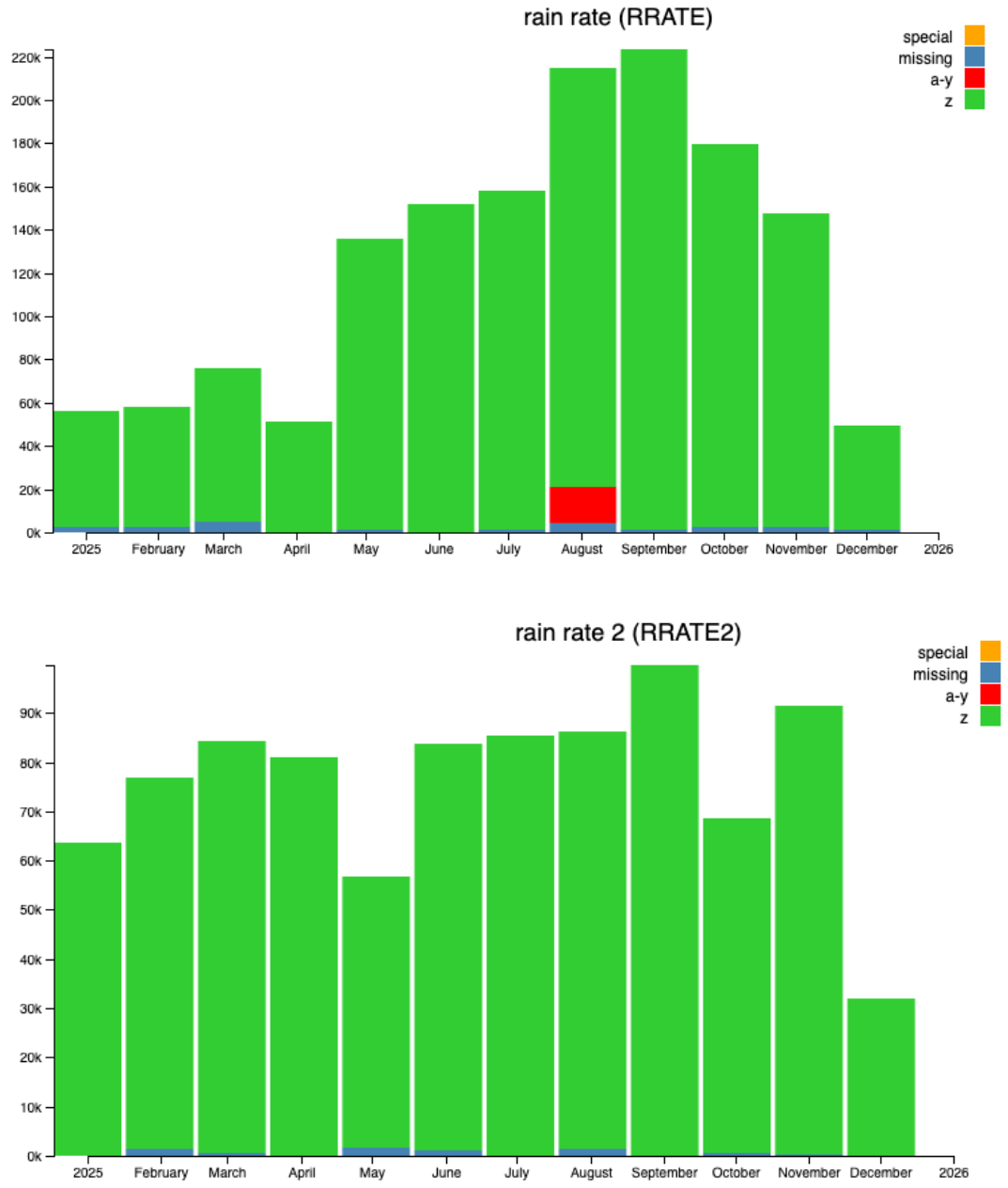
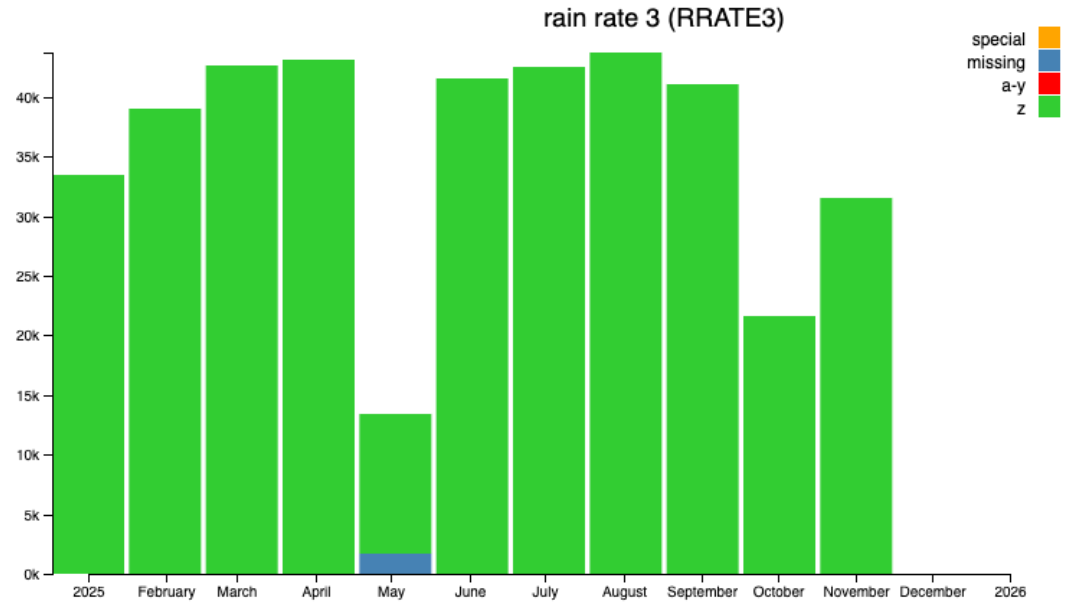


Figure 21: Total number of (this page, top) rain rate – RRATE – (this page, bottom) rain rate 2 – RRATE2 – and (next page) rain rate 3 – RRATE3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 21: cont'd)

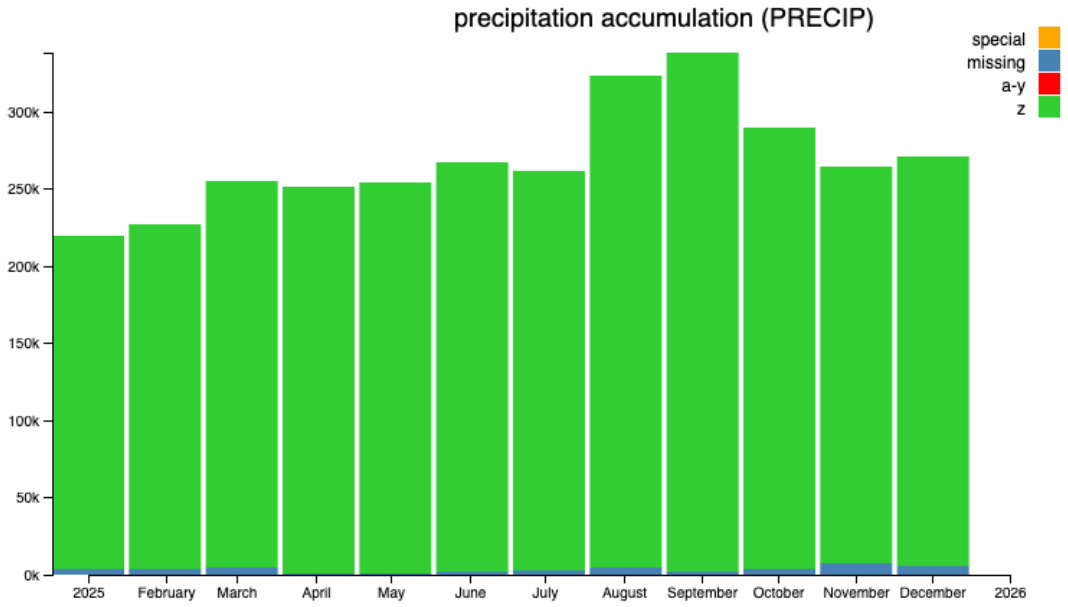
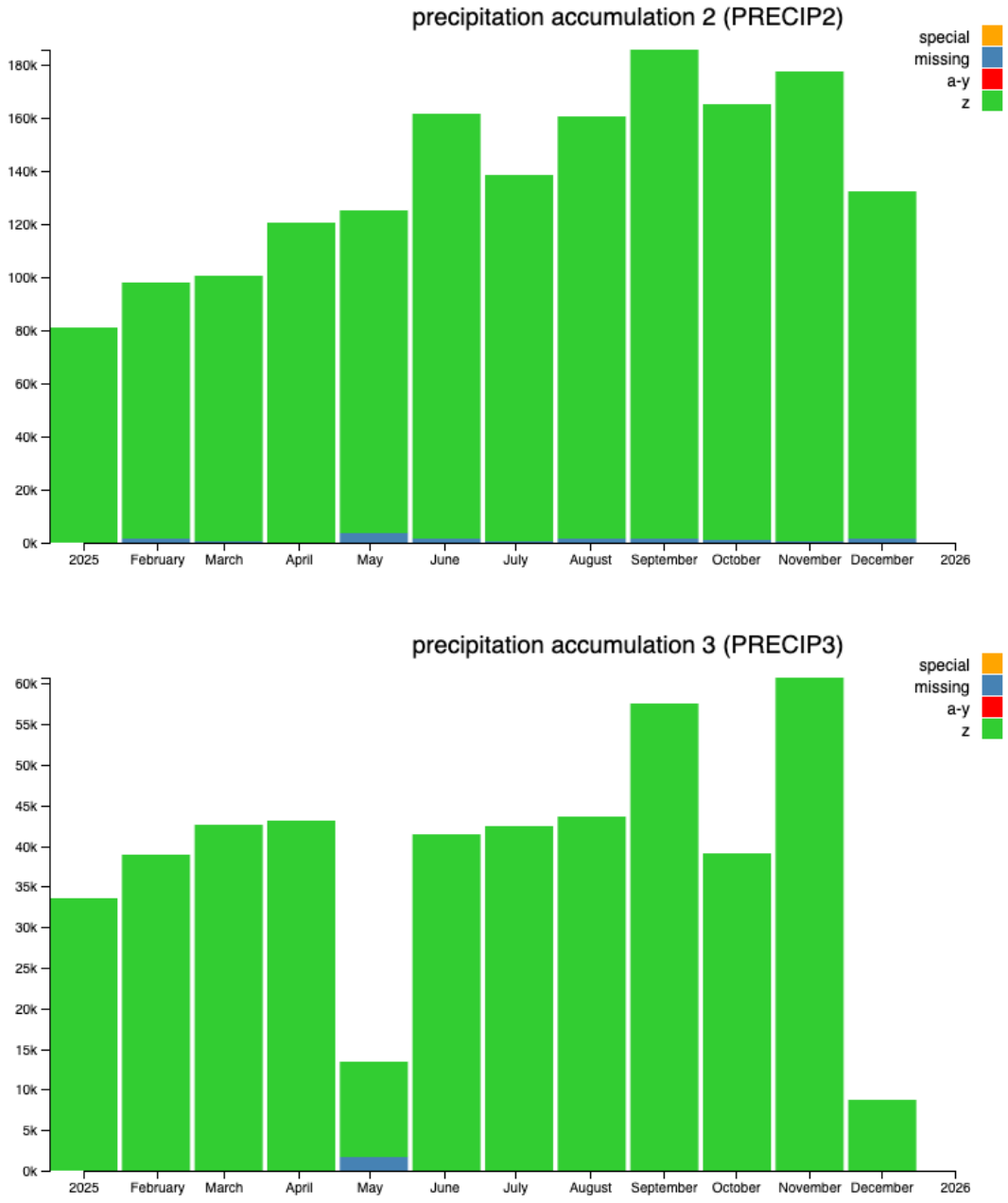


Figure 22: Total number of (this page) precipitation accumulation – PRECIP – (next page, top) precipitation accumulation 2 – PRECIP2 – and (next page, bottom) precipitation accumulation 3 – PRECIP3 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.



(Figure 22: cont'd)

The main problem identified with the sea temperature parameter (Figure 23) occurs when the sensor is denied a continuous supply of seawater. In these situations (in the case of ships that receive visual QC), either the resultant sea temperature values are deemed inappropriate for the region of operation (using gridded SST fields as a guide), in which case they are flagged with suspect/caution (K) flags or occasionally poor quality (J) flags if the readings are extraordinarily high or low, or else the sensor reports a constant value for an extended period, in which case they are unanimously J-flagged. The events are

also frequently extreme enough for the auto flagger to catch them and assign greater than four standard deviations from climatology (G) or out of bounds (B) flags. The authors note that this stagnant seawater scenario often occurs while a vessel is in port, which is anticipated as the normal ship operation practice by SAMOS data analysts. Further, NOAA ships running SCS5 tend to transmit from port more often than they did prior to their v5 transition. This means more stagnant seawater measurements and thus more flags during visual QC. Another issue these oceanographic sensors sometimes run into is air getting into the plumbing, usually under unique circumstances. For example, sailing in high seas that cause the intake to continuously be lifted above the water level, or traveling very slowly against the predominant swell, as with the *Revelle* (documented; see individual vessel description in 3c for details). Infrared sea temperature sensors are also prone to providing suspect or erroneous data if they are pointed elsewhere than the liquid sea surface (e.g., pack ice, or the dock). For vessels not receiving visual QC, many of these water flow issues are documented in Annex A.

Other than these examples, the TS data were generally good in 2025. Discrete data or sensor issues were identified on a few vessels: in January and February an issue with *Falkor (too)'s* secondary seawater system meant that they had to turn off the pump and TS4 were flagged "bad" as a result, in March and April *Oregon II's* TS3 read anomalously high (possibly an installation issue), *Bigelow's* TS also read anomalously high in April (reasons unknown), and in May and June *Gunter's* TS2 values were a static "-99" (possibly a fill value), and *Hassler's* TS and TS2 data (as well as conductivity and salinity) were heavily flagged throughout 2025 (likely installation issue). (All above are documented, see individual vessel descriptions in 3c. for details). But these examples notwithstanding, the origins of most of the A-Y flagging seen in the sea temperature and in fact all the sea water parameters are not clearly identified as belonging to any specific vessel(s). Rather, they were likely due to several vessels simultaneously experiencing the common sensor issues we have mentioned above. We also note it's common for sea water data collection to cease when a vessel is nearing or in port (even while other types of data continue to be transmitted), meaning "missing," or perhaps "special" in the case of SCSv5 ships, values in these sea water parameters are not unexpected.

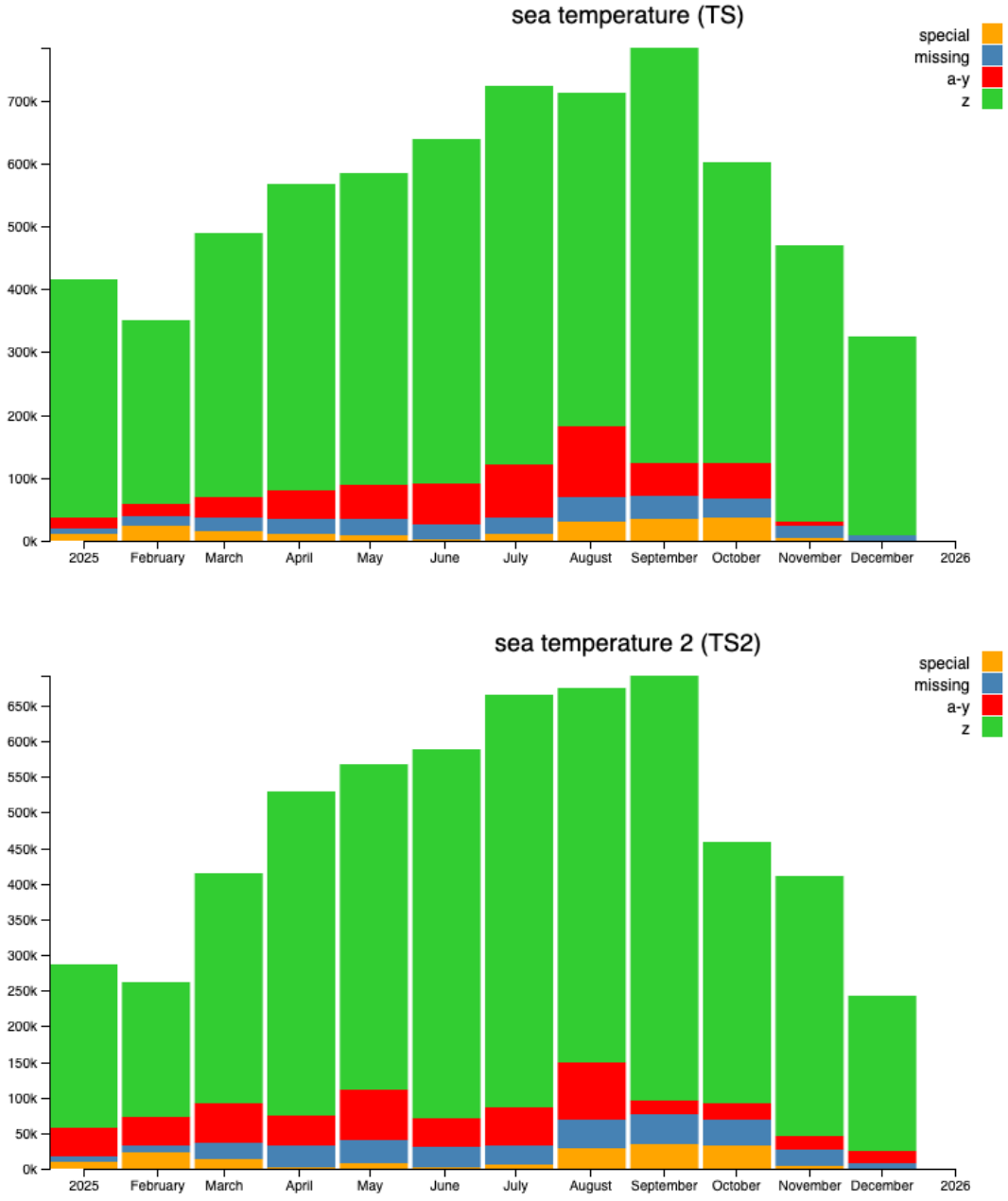
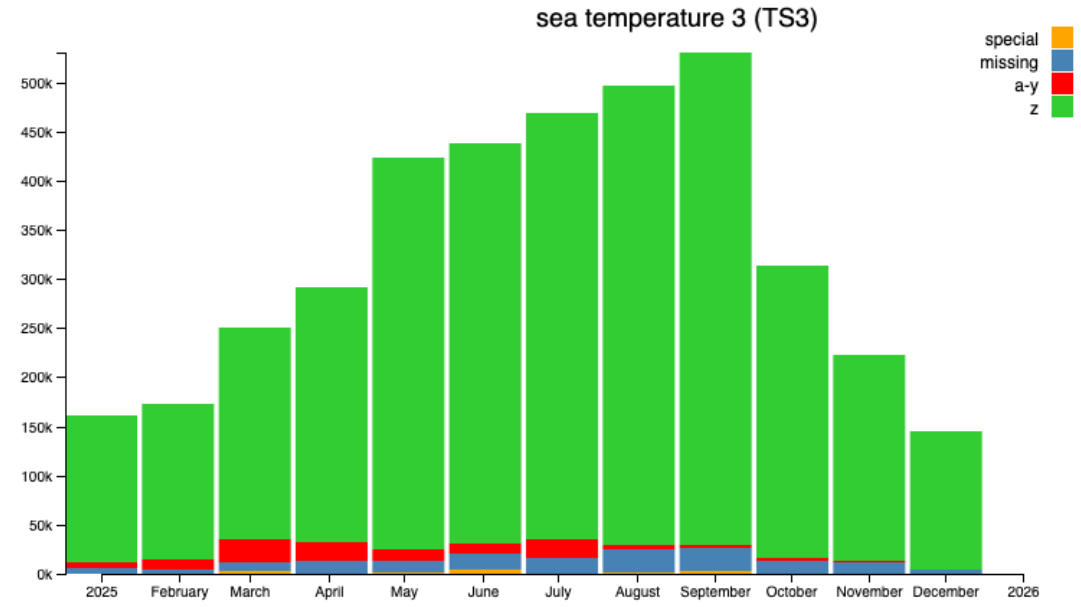
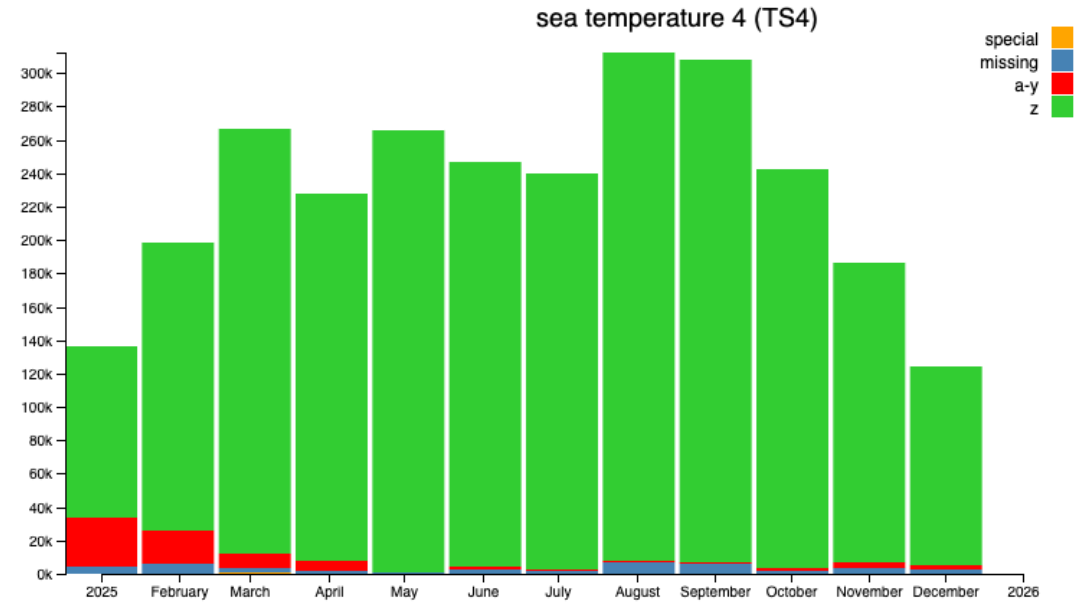
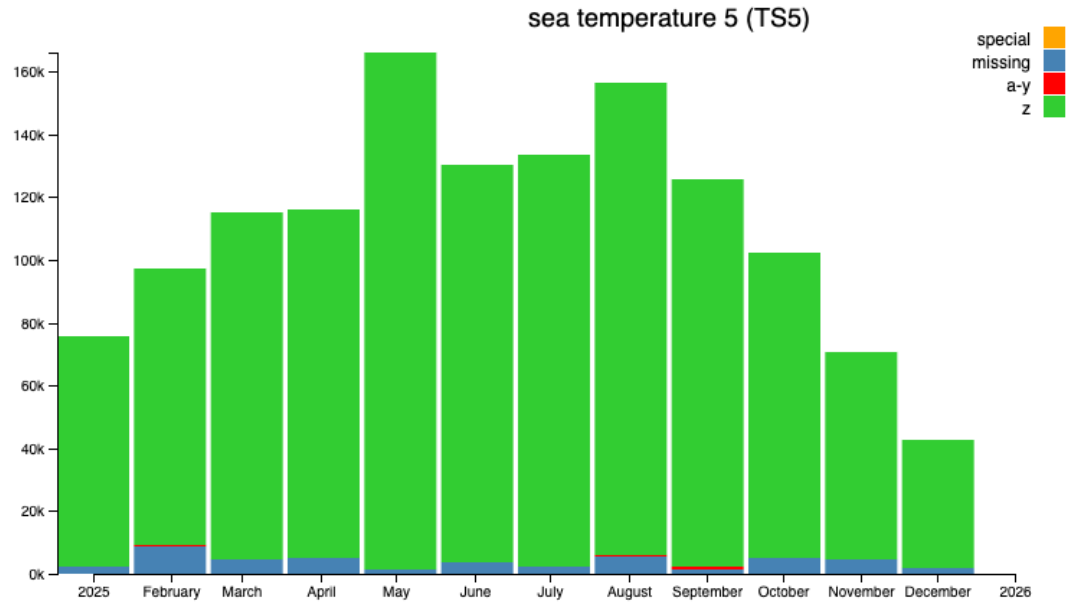


Figure 23: Total number of (this page, top) sea temperature – TS – (this page, bottom) sea temperature 2 – TS2 – (next page, top) sea temperature 3 – TS3 – (next page, bottom) sea temperature 4 – TS4 – and (third page) sea temperature 5 – TS5 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.





(Figure 23: cont'd.)



(Figure 23: cont'd.)

Salinity and conductivity (Figure 24 and Figure 25, respectively) experienced the same major issue as sea temperature; namely, when a vessel was in port or ice or rough seas the flow water system that feeds the probes was usually shut off, resulting in either inappropriate or static values. Like sea temperature, air intrusion is another fairly common issue with salinity and conductivity. When this occurs, the data can be fraught with spikes. Data such as this is typically flagged with either spike (S), suspicious quality (K), or occasionally even poor quality (J) flags during visual quality control, for those vessels that receive it. Despite these issues, though, the quality of salinity and conductivity data in 2025 was still well within reason.

As noted in the sea temperature discussion, *Falkor(too)* had a known issue with their secondary sea water system in the January - February period that necessitated them shutting down the pump, which resulted in "bad"/flagged SSPS2 and CNDC2 data, and *Hassler* is the year-round standout, with all of their sea water data (including SSPS and CNDC) seeing frequent flagging (likely an installation issue). (Both documented, see individual vessel descriptions in 3c. for details.). Other than these, though, once again the origins of any A-Y flagging seen in all the sea water parameters (including conductivity and salinity) are not clearly identified as belonging to any specific vessel(s). Rather, they were likely due to several vessels simultaneously experiencing the common sensor issues we have mentioned above. We also reiterate it's common for sea water data collection to cease when a vessel is nearing or in port (even while other types of data continue to be transmitted), meaning missing or special values in these sea water parameters are not unexpected.

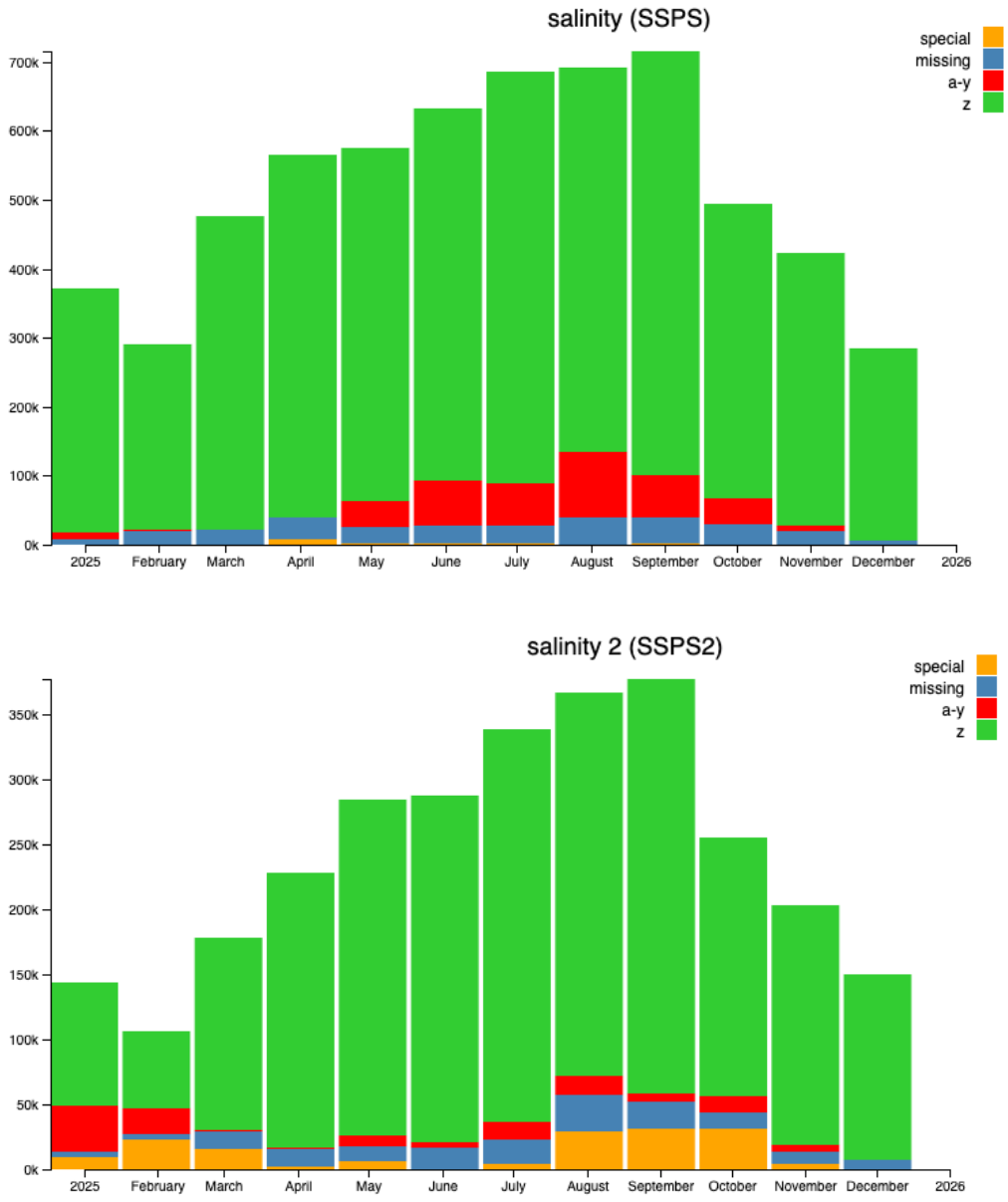


Figure 24: Total number of (top) salinity – SSPS – and (bottom) salinity 2 – SSPS2 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

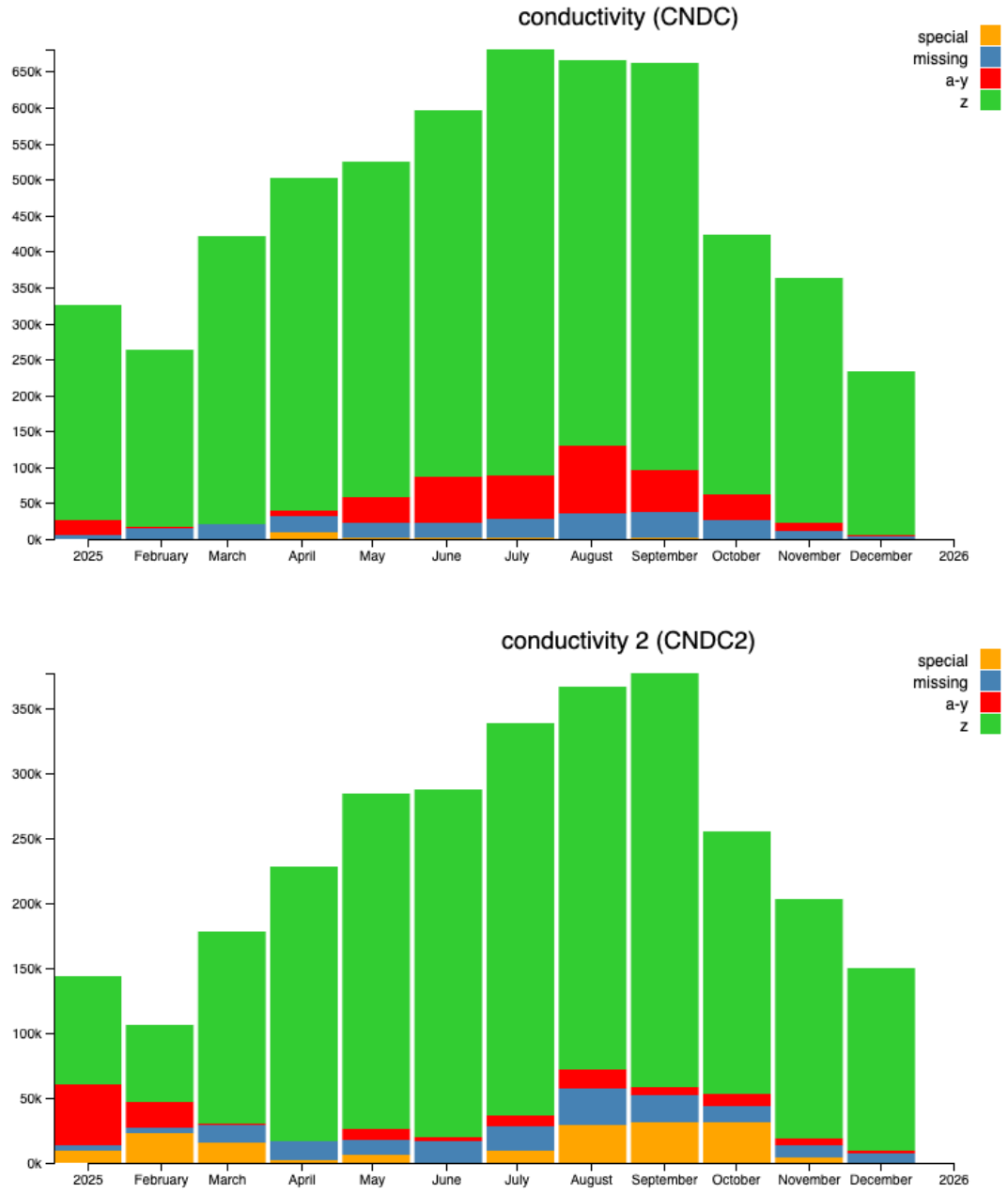


Figure 25: Total number of (top) conductivity – CNDC – and (bottom) conductivity 2 – CNDC2 – observations provided by all ships for each month in 2025. The colors represent the number of good (green) values versus the values that failed one of the SAMOS QC tests (red). Values noted as missing or special values by the SAMOS processing are also marked in blue and orange, respectively.

c. 2025 quality by ship

Atlantic Explorer

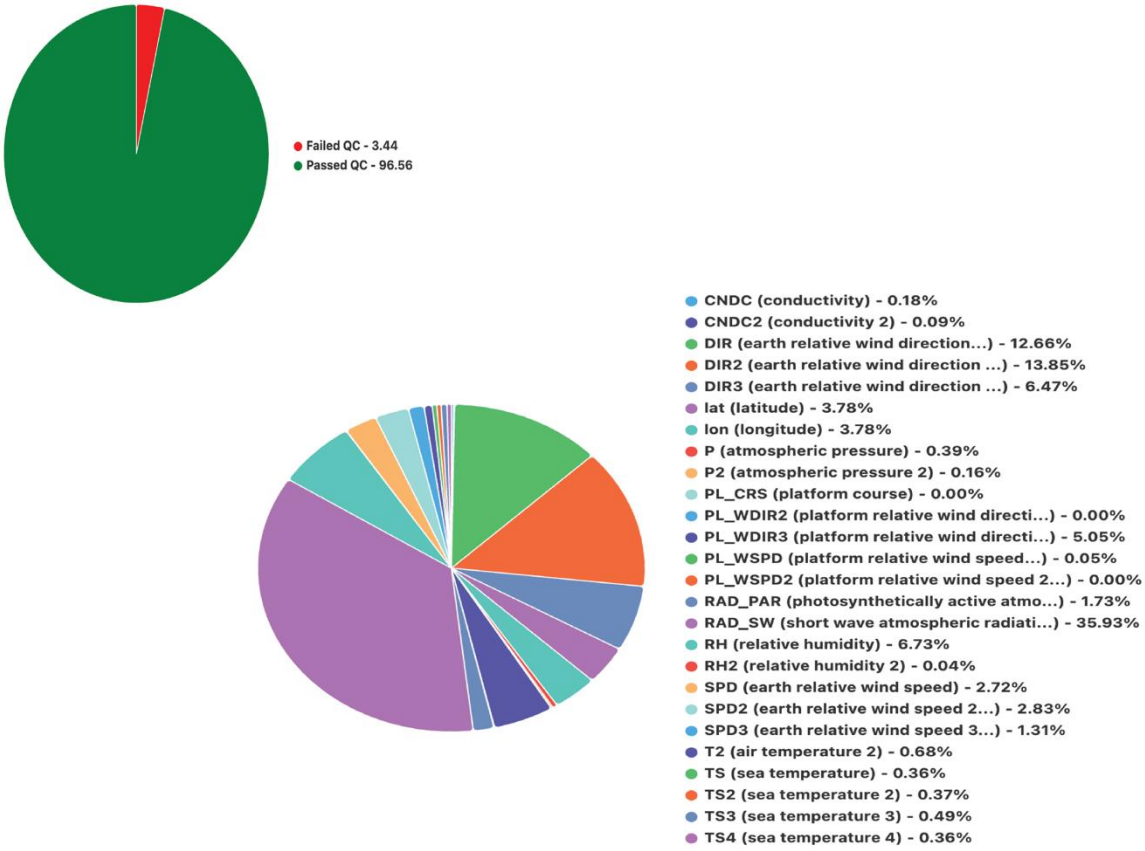


Figure 26: For the Atlantic Explorer from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Atlantic Explorer* provided SAMOS data for 181 ship days, resulting in 7,643,300 distinct data values. After automated QC, 3.4% of the data were flagged using A-Y flags (Figure 26). This is about the same as 2024 (3.8%) and is under the 5% total flagged cutoff regarded by SAMOS to represent "very good" data. NOTE: The *Atlantic Explorer* does not receive visual quality control by the SAMOS DAC, so all the flags are the result of automated QC (no research-level files exist at the SAMOS DAC for the *Atlantic Explorer*).

The primary data issues in 2025 are related to the air temperature and humidity sensors. From 1-22 August 2025, the relative humidity (RH) from the main mast sensor reported very low variability and near saturation conditions. The sensor did not agree with the forward mast (RH2) and on 22 August the main mast hygrometer was replaced. From 25 September to 13 October 2025 and 21 October to 25 November, the two air

temperature sensors did not agree (3-3.5˚C difference), and it was confirmed that the forward mast thermometer (T2) was drifting off calibration. This sensor was replaced on 25 November 2025, and the air temperature (T2) should not be used in this period.

Another item to highlight in 2025 was the sea temperature data (TS, TS2, TS3, and TS4) had B-flags (out of range) applied from ~1200 UTC on 12 July to ~0500 UTC on13 July 2025. The sea temperature values were flagged as out of range for values >30˚C. This occurred when the vessel moved north of 30˚N and entered the mid-latitude bounds range for our SST range check. These >30˚C SSTs have been confirmed to be acceptable by comparing to satellite data, which showed upwards of +3C SST anomalies in the region. These data should be considered good values, but as the AE does not get visual QC, these B-flags will remain in the published netCDF files.

There were no other major issues of note in 2025. Looking to the flag percentages in Figure 26, about 36% of the total flags were applied to the short-wave atmospheric radiation parameter (RAD_SW). Upon inspection the flags, which are unanimously B flags (Figure 27), appear to have been applied mainly to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.) Approximately 33% of the total flags were applied to the earth relative wind directions (DIR, DIR2 and DIR3) parameters, combined. These were entirely “failed the true wind recalculation” (E) flags (Figure 27), which may be indicative of the *Atlantic Explorer* mixing averaged values and spot values across the parameters used in true wind calculation (not confirmed to date). We also note that the Atlantic Explorer’s main mast sonic anemometer continues to report platform-relative wind directions that are slightly above 360 degrees. This is a wrap-around error in the averaging code for this wind parameter and results in B-flags (Figure 27). Finally, there were periods when the sea temperature (TS, TS2, TS3, TS4), conductivity (CNDC, CNDC2), and salinity (SSPS, SSPS2) data showed a smooth time series not representative of real ocean observations. This tends to occur when the pumps to the sea water system are shutdown, particularly when entering or leaving port. This sometimes results in B or G flags being applied to these variables (when the sea water in the pipes is not representative of the surrounding environment), but the autoQC does not flag all occurrences. When noted, the dates of these shutdowns are listed in Annex A.

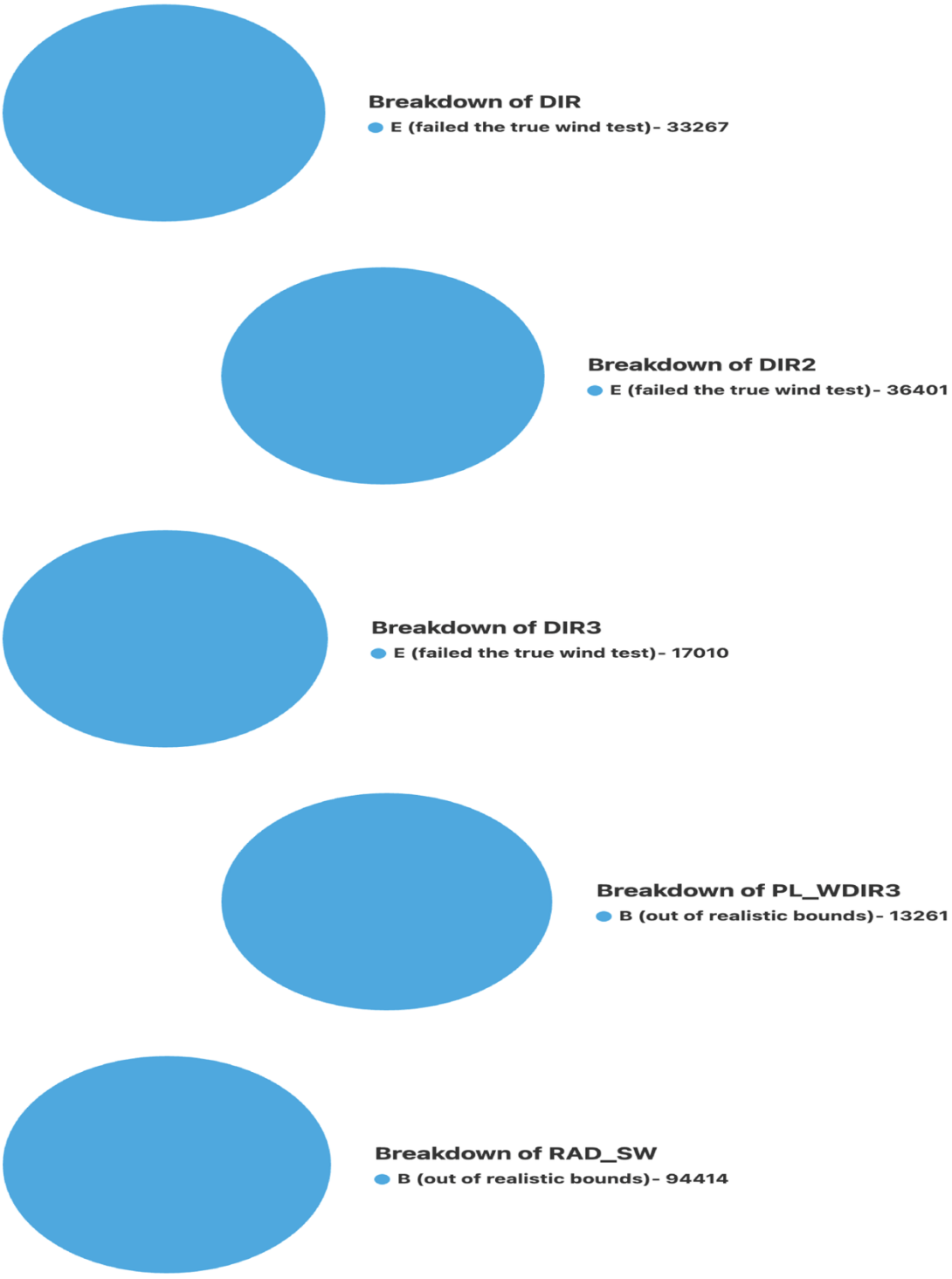


Figure 27: Distribution of SAMOS quality control flags for (first) earth relative wind direction – DIR – (second) earth relative wind direction 2 – DIR2 – (third) earth relative wind direction 3 – DIR3 – (fourth) platform relative wind direction 3 – PL_WDIR3 – and (last) short wave atmospheric radiation – RAD_SW – for the *Atlantic Explorer* in 2025.

Investigator

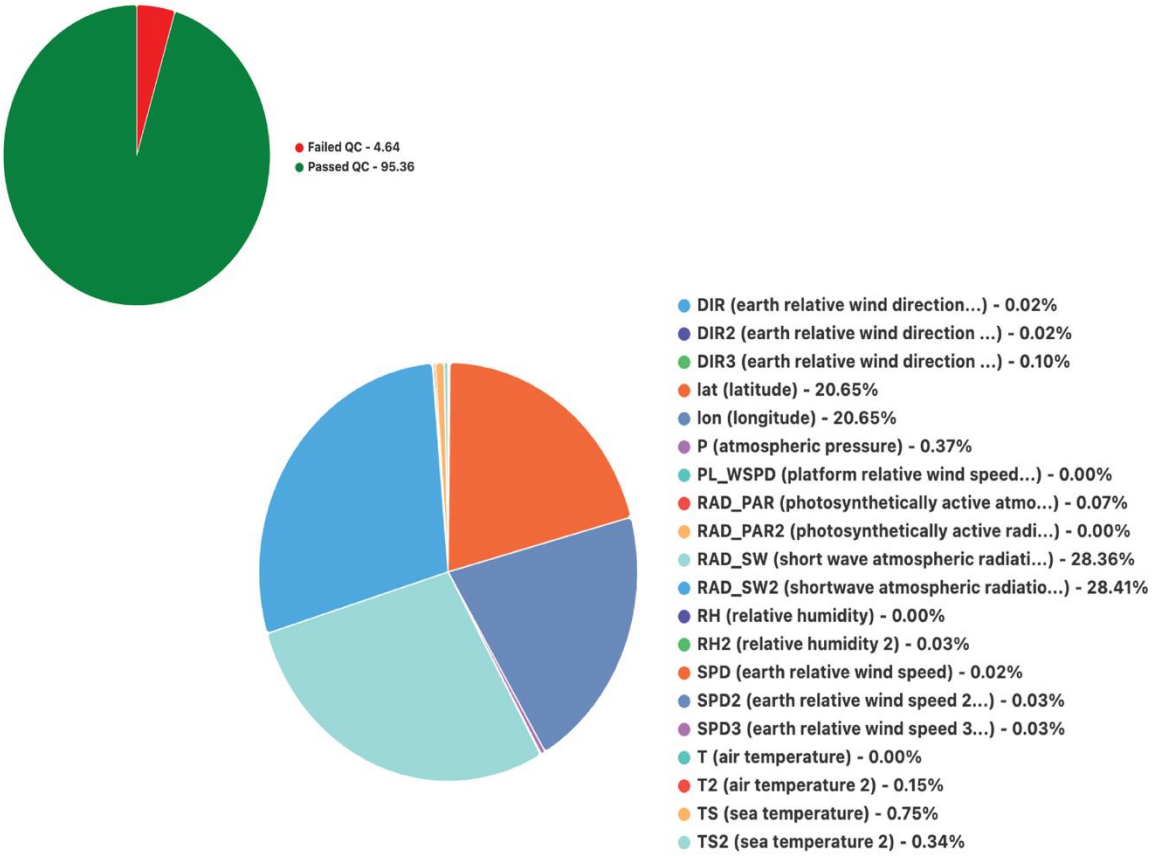


Figure 28: For the *Investigator* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Investigator* provided SAMOS data for 258 ship days, resulting in 11,221,743 distinct data values. After automated QC, 4.6% of the data were flagged using A-Y flags (Figure 28). This a bit more than 2024 (3.3%) and is still under the 5% total flagged cutoff regarded by SAMOS to represent "very good" data. NOTE: The *Investigator* does not receive visual quality control by the SAMOS DAC, so all the flags are the result of automated QC (no research-level files exist at the SAMOS DAC for the *Investigator*).

The main problem that occurred in 2025 was again periodic failures of the port rain sensor (PRECIP2). The data flatlined at zero (no flags) from 1 January to 24 March 2025, a continuation of the failure that started in 2024. The problem was associated with a bad cable in the Aerosol lab and was repaired in March. The port side rain sensor again failed from 5-26 May 2025, with values flatlined at zero and no flags applied. The reason for the failure is unknown, but it was repaired for the next cruise. PRECIP from the starboard sensor should be used in both these periods to identify rain events.

We note the failure of the port anemometer from ~5-26 May 2025, which was confirmed by the operator. Data received from the sensor (SPD2) are about half the magnitude of the other two working anemometers and should not be used.

Though rarely flagged by the autoQC, it is worth noting that the sea temperature (TS2) from the ISAR can differ from the intake sea temperature (TS) by 3˚C or more. The ISAR is designed to measure the skin sea temperature using a radiometer but can be prone to internal electronic noise that increases the sensor bias. The IMOS team conducts post cruise processing of the ISAR data and releases a research quality product that may be of interest to some users (Beggs et al. 2017, https://researchdata.edu.au/rv-investigator-isarsst-2014-onwards/794633) and can be accessed at http://opendap.bom.gov.au/thredds/catalog/imos_isar_archive/catalog.html. When the TS2 values vary from the TS by more than 1˚C, they should be used with caution. Also, the ISAR is not deployed on every cruise of the *Investigator* so TS2 will be missing in these cases.

As a general advisory, it's been noted all of *Investigator's* earth relative winds, meaning both directions and speeds (i.e., DIR, DIR2, DIR3, SPD, SPD2, SPD3), sometimes show steps in the data in association with changes in the ship speed or vessel orientation. Upon inspection and in consultation with the operator, flow distortion caused by the ship's superstructure obstructing the wind is prevalent for some (particularly for winds from abeam) or all (for winds from astern) wind sensors. In all cases, users should take care to choose the true winds from the best exposed anemometer based on the ship-relative wind direction.

Looking at the flag percentages in Figure 28, about 57% of the total flags were applied to the shortwave atmospheric radiation parameters (RAD_SW and RAD_SW2). Upon inspection the flags, which are unanimously "out of bounds" (B) flags (Figure 29), appear to have been applied mainly to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.) A further ~41% of the total flags were applied to latitude (LAT) and longitude (LON). Upon inspection these almost entirely "platform position over land" (L) flags (Figure 29) that appear generally to have been applied when the vessel was in port (often reporting from the dock in Hobart, Tasmania) or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port.

For anyone interested in working with reprocessed, post-cruise data from the *Investigator*, you can access both flux and meteorological observations from the IMOS THREDDS server via http://thredds.aodn.org.au/thredds/catalog/IMOS/SOOP/SOOP-ASF/VLMJ_Investigator/catalog.html. For additional information see Beggs et al. (2017).

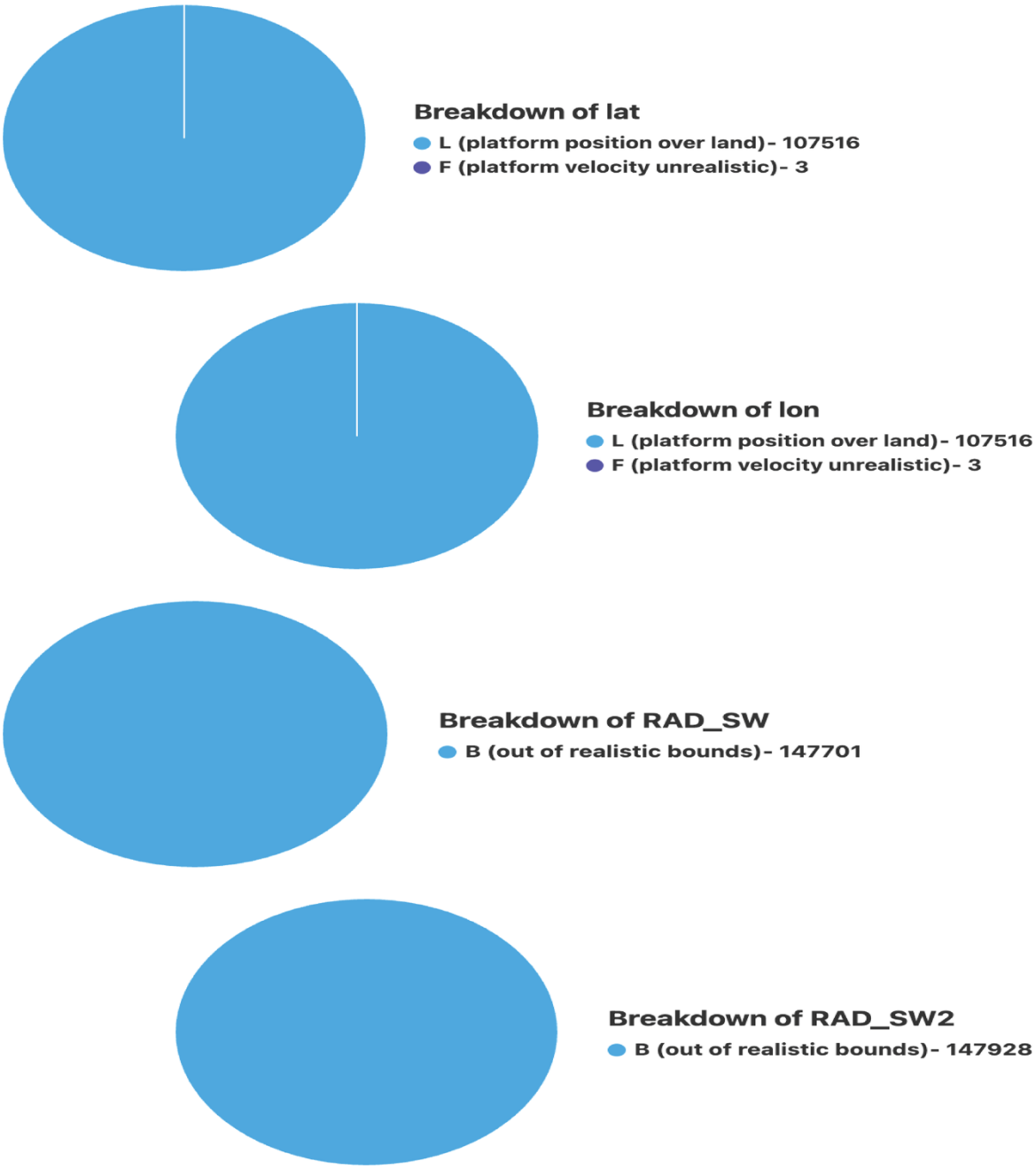


Figure 29: Distribution of SAMOS quality control flags for (first) latitude – LAT – (second) longitude – LON – (third) shortwave atmospheric radiation – RAD_SW – and (last) shortwave atmospheric radiation 2 – RAD_SW2 – for the *Investigator* in 2025.

Nuyina

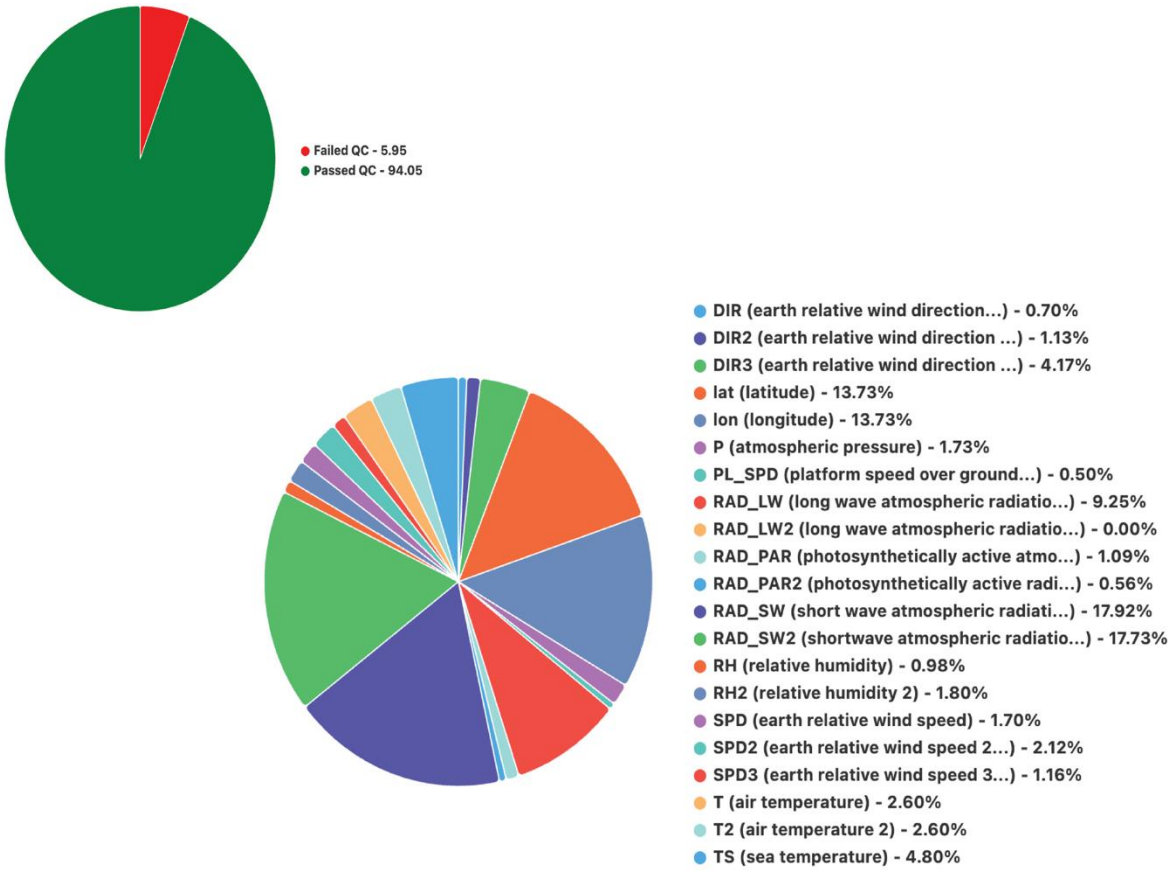


Figure 30: For the *Nuyina* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Nuyina* provided SAMOS data for 331ship days, resulting in 14,230,718 distinct data values. After automated QC, 5.9% of the data were flagged using A-Y flags (Figure 30). This an improvement in the data quality since 2024 (7.3%) and places the *Nuyina* in the range of "good" SAMOS data quality. NOTE: the *Nuyina* does not receive visual quality control by the SAMOS DAC, so all flags are the result of automated QC (no research-level files exist at the SAMOS DAC for the *Nuyina*).

One notable event at the end of 2025 occurred on 29 December when the *Nuyina* was operating in the southern Indian Ocean. According to the techs onboard, both foremast wind sensors were lost during a storm. "We lost fore_1 anemometer at 2025-21-29 04:25 and fore_2 slightly beforehand at 2025-21-29 04:04. ...For a short period of time, [the techs] were conducting a test which resulted in data coming through fore_2 from 2025-12-31 01:42 to 08:48 on the same day, this data is actually from another wind sensor so best to ignore it." The loss was the result of the vessel being hit by an extreme wave (~13

m) during a storm. The sensors were not replaced until February 2026, so any data between their loss and that date should not be used as it is an electronic artifact.

The other major problem in 2025 affected the longwave radiometers. Several times during the year, the port side radiometer (RAD_LW) would flatline at an unrealistic 0 Wm^{-2}, resulting in numerous out of range (B) flags (Figure 31). The problem was traced to a cable issue. Later in the year, the starboard radiometer (RAD_LW2) would periodically start exhibiting 30-60 minute oscillations in the values that did not mirror the more reasonable LW trace of the port radiometer. This issue rarely resulted in any flags being added by the automated QC, but the user should select RAD_LW when RAD_LW2 was impacted. Again, the operator believes this is a cable issue, but re-terminating the cable did not end this periodic behaviour, and it continues to appear from time to time into 2026. Users should check Annex A for dates when RAD_LW and RAD_LW2 were impacted by these malfunctions.

The pressure (P) has two issues to note. First, throughout the year, the pressure data will have random small steps in the data (typically less than 1hPa in magnitude) that look like some type of wind flow pressure distortion; however, there is no clear relationship to ship-relative wind speed or direction. Users should be aware of this issue as these steps are not flagged (*Nuyina* data does not undergo visual QC). Second, the Bureau of Meteorology in Australia informed SAMOS that they applied an offset of -2.88 hPa to Nuyina's underway pressure data from 2024-12-20 to 2025-03-03. This temporary solution was responding to a suspicious pressure overestimation at that time. It was removed following another test which shows that this offset is not necessary. The offset is included in the pressure (P) data supplied in the SAMOS files, so use with caution.

Another item to note is the aft wind sensor data (DIR3, SPD3, PL_WDIR3, PL_WSPD3) come from a location on the port side of the monkey island. These data are severely affected by air flow distortion around the vessel's superstructure. As such, the true wind data (DIR3) tend to receive a lot of true wind recomputation (E) flags (Figure 31), should be used with some caution, and compared closely with the bow sensor winds prior to application.

Finally, many of the parameters (e.g., P, T, RH, TS) from the *Nuyina* include values that failed a comparison to the da Silva climatology used in the SAMOS QC (G flags). In most cases, these extreme values are likely correct, since the *Nuyina* operates in the Southern Ocean and near Antarctica, where the weather is extreme and the da Silva climatology likely does not represent the range of atmospheric conditions in the region. Users should check G-flagged data prior to discarding them as they are likely from real, extreme events.

Looking at the flag percentages in Figure 30, about 36% of the total flags were applied to the shortwave atmospheric radiation parameters (RAD_SW and RAD_SW2). Upon inspection the flags, which are unanimously "out of bounds" (B) flags (Figure 31), appear to have been applied mainly to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.) A further ~28% of the total flags were applied to latitude (LAT) and longitude (LON). Upon inspection these were mostly "platform position over land" (L) flags (Figure 31, only LAT shown) that appear generally to have been applied when the vessel was in port (often reporting from

the dock in Hobart, Tasmania) or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port.

For anyone interested in working with reprocessed, post-cruise data from the *Investigator*, you can access both flux and meteorological observations from the IMOS THREDDS server via https://thredds.aodn.org.au/thredds/catalog/IMOS/SOOP/SOOP-ASF/VMIC_Nuyina/catalog.html. Users may also want to explore the Australian Antarctic Division's post cruise data from the *Nuyina*, searchable from https://data.aad.gov.au/ or from the Nuyina Dashboard https://data.aad.gov.au/nuyina/current.

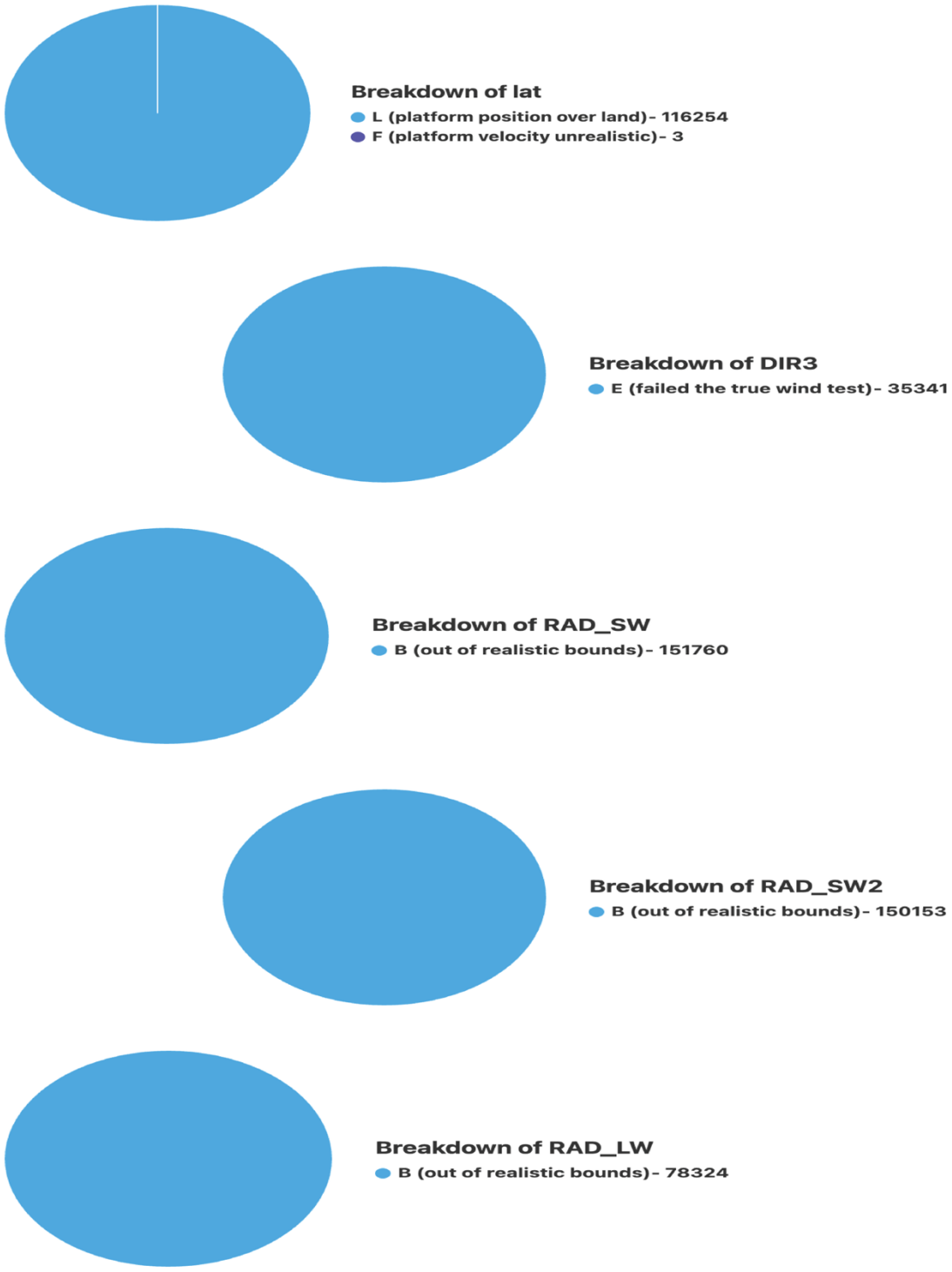


Figure 31: Distribution of SAMOS quality control flags for (first) latitude – LAT – (second) earth relative wind direction 3 – DIR3 – (third) shortwave atmospheric radiation – RAD_SW – (fourth) shortwave atmospheric radiation 2 – RAD_SW2 – and (last) longwave atmospheric radiation – RAD_LW – for the *Nuyina* in 2025.

Tangaroa

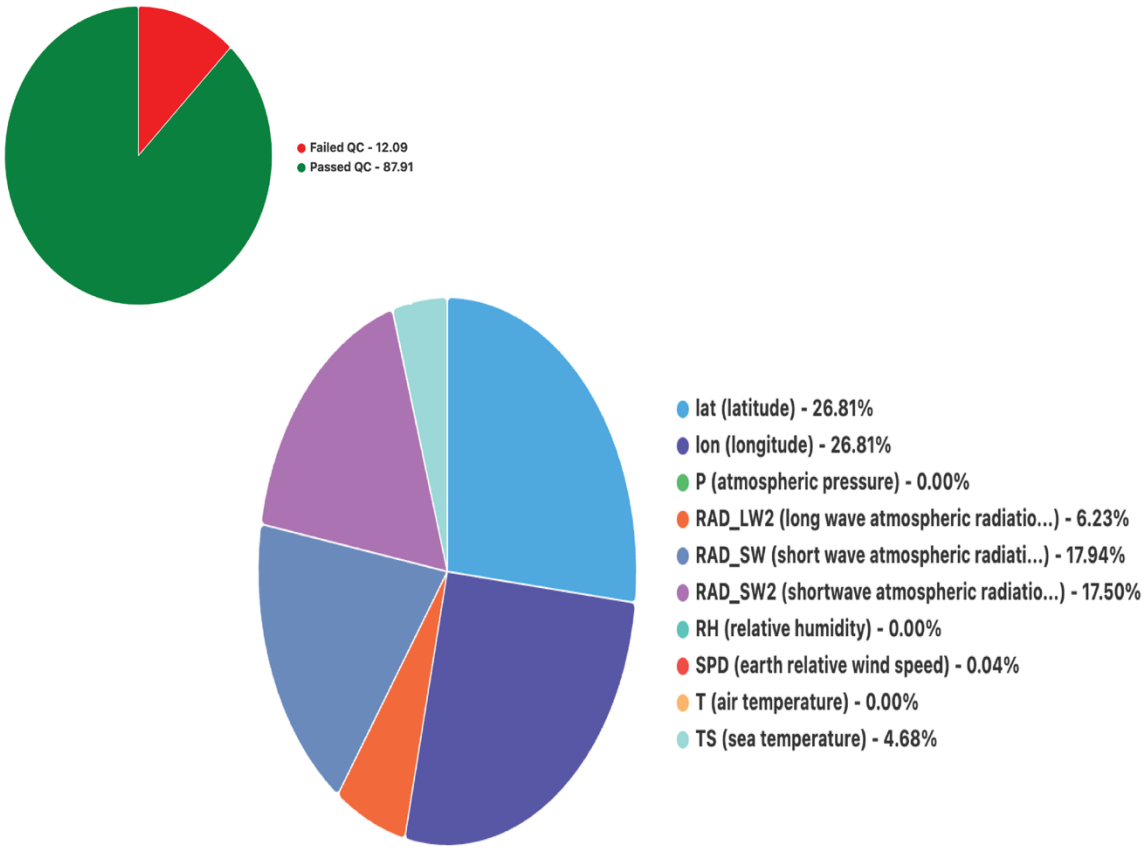


Figure 32: For the *Tangaroa* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Tangaroa* provided SAMOS data for 229 ship days, resulting in 5,398,960 distinct data values. After automated QC, 12.0% of the data were flagged using A-Y flags (Figure 32). This is significantly more than 2024 (8.6%); however, many of the flags are the result of common problems that are not representative of poor quality meteorological data. NOTE: the *Tangaroa* does not receive visual quality control by the SAMOS DAC, so all flags are the result of automated QC (no research-level files exist at the SAMOS DAC for the *Tangaroa*).

There were two notable issues with the *Tangaroa* data in 2025. First, the sea temperature data (TS) periodically show discontinuities, “shark fin” steps, or other indications that the flow through the system was not ideal or was off. The operator confirmed that there are periodic restrictions in sea water flow to the thermosalinograph (some of which are noted in Annex A). This results in several out of range (B) or climatology (G) flags on the data (Figure 33), though not all occurrences may be flagged, so users should carefully examine the TS data before use. The second issue was with the

RM Young rain gauge. There are several periods (Annex A) where the precipitation (PRECIP) values are not representative of the volume of water in the sensor. There were times the values dropped for no reason, and for most of December the values were negative (completely unrealistic). The latter period was when the sensor was removed for cleaning/repairs, but stray voltage on the cable was still resulting in PRECIP values being logged. The 2025 precipitation data should generally be used with caution, and the December 2025 precipitation data should not be used at all.

Otherwise, looking to the flag percentages in Figure 32, about 36% of the total flags were applied to the shortwave atmospheric radiation parameters (RAD_SW and RAD_SW2). Upon inspection the flags, which are unanimously "out of bounds" (B) flags (Figure 33), appear to have been applied mainly to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.) A further ~54% of the total flags were applied to latitude (LAT) and longitude (LON). Upon inspection these were entirely "platform position over land" (L) flags (Figure 33) that appear generally to have been applied when the vessel was in port (often reporting from the dock in Wellington, NZ) or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port.

For anyone interested in working with reprocessed, post-cruise data from the *Tangaroa*, you can access both flux and meteorological observations from the IMOS THREDDS server via http://thredds.aodn.org.au/thredds/catalog/IMOS/SOOP/SOOP-ASF/ZMFR_Tangaroa/catalog.html.

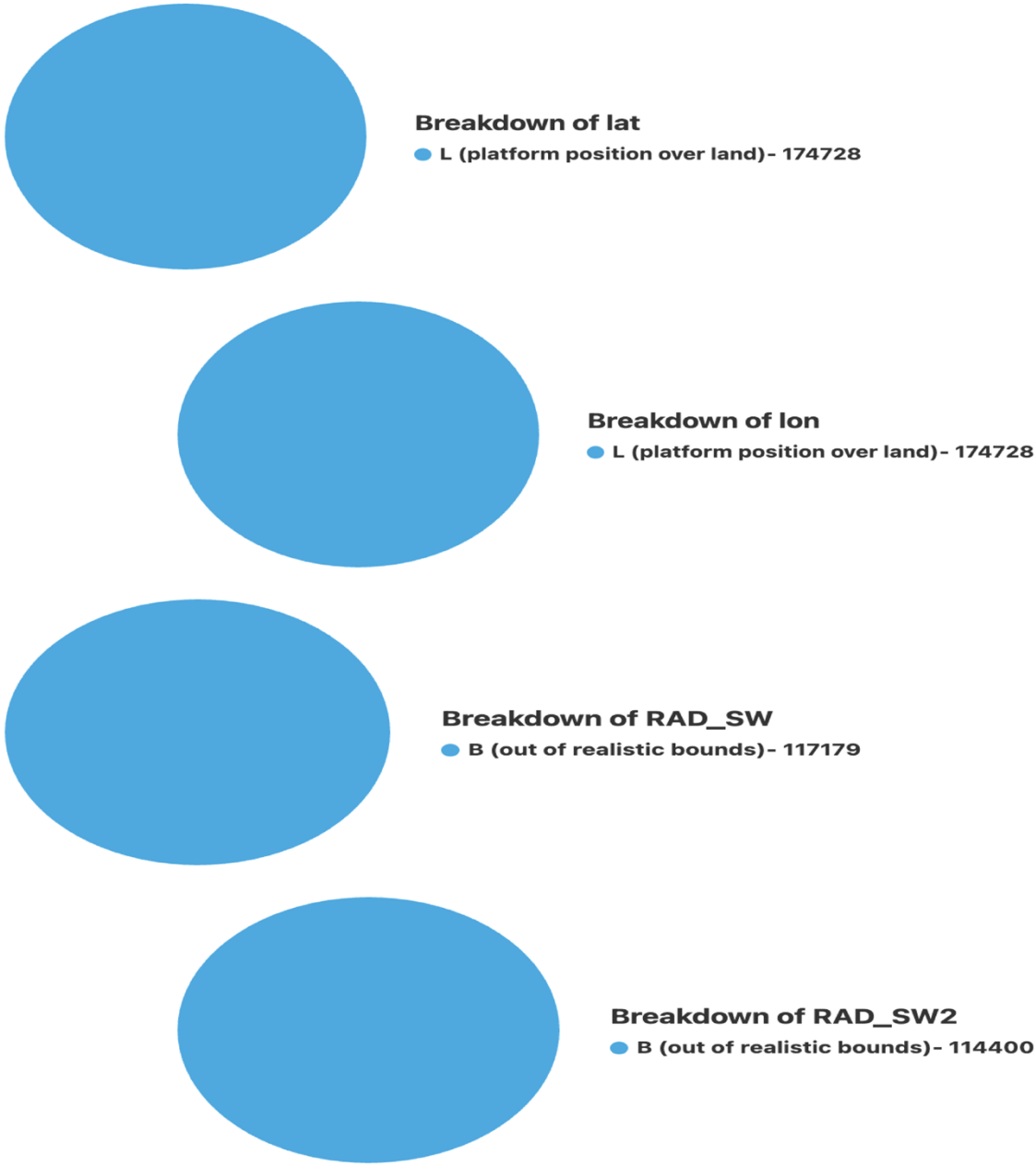


Figure 33: Distribution of SAMOS quality control flags for (first) latitude – LAT – (second) longitude – LON – (third) short wave radiation – RAD_SW – and (last) short wave radiation 2 – RAD_SW2 – for the *Tangaroa* in 2025.

Bell M. Shimada

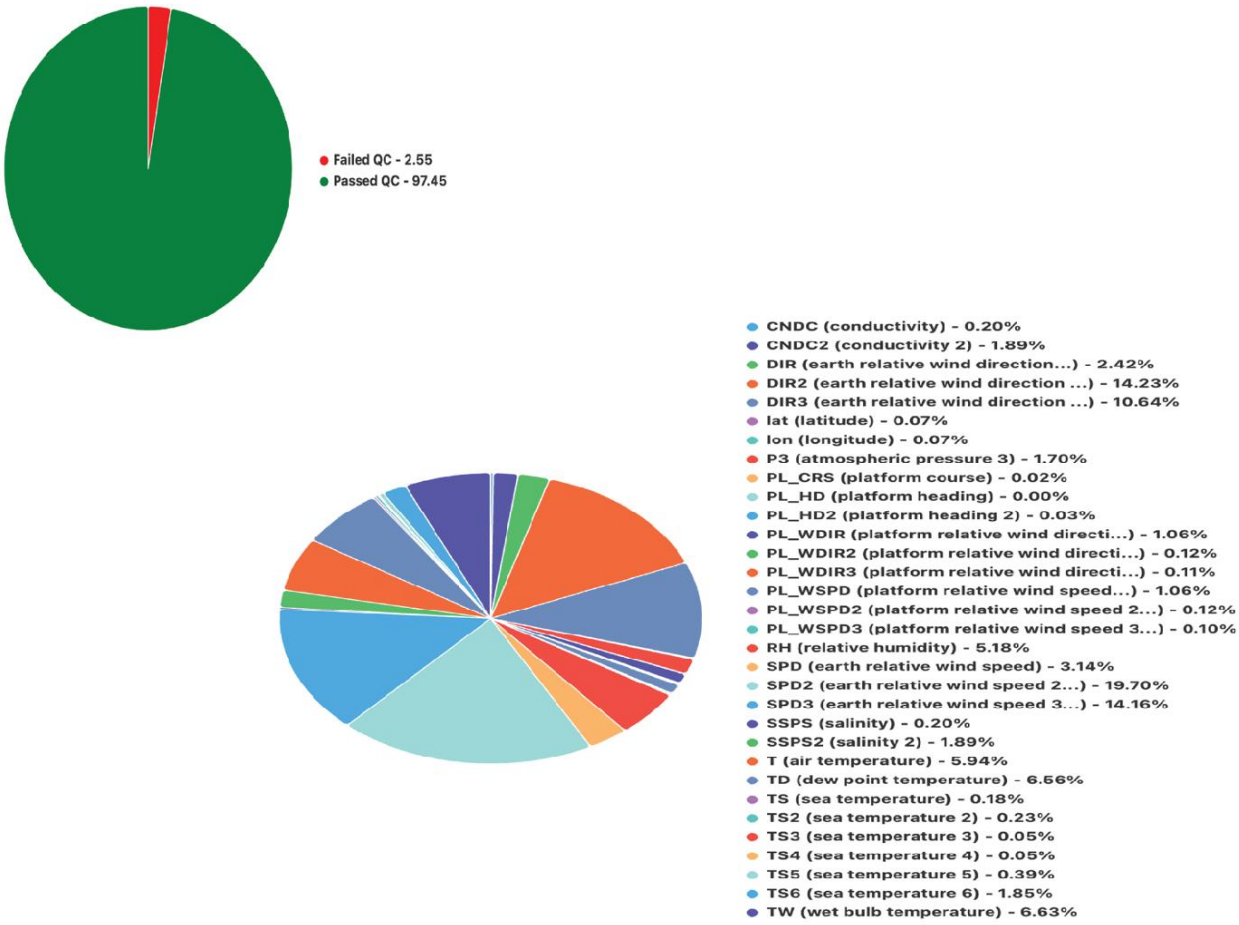


Figure 34: For the *Bell M. Shimada* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The Bell M. Shimada provided SAMOS data for 227 ship days, resulting in 10,067,709 distinct data values. After both automated and visual QC, 2.5% of the data were flagged using A-Y flags (Figure 34). This is two and a half percentage points lower than in 2024 (5.0% total flagged) and brings Shimada well inside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

The first issue of note in 2025 involved poor quality (J) and malfunction (M) flagging of the true and relative wind data (DIR, SPD, PL_WDIR, PL_WSPD) from the jack staff anemometer (Figure 35, only DIR shown). Late in the day on 17 March, the jack staff anemometer suddenly began exhibiting poor directional agreement (of varying amounts) with the ship's other anemometers, and simultaneously the jack staff anemometer speed values began to appear significantly reduced. Within a day, DIR, SPD, PL_WDIR, and PL_WSPD had all basically dropped to zero. Upon contacting the ship, the operators

confirmed our suspicion the jack staff itself had been lowered on or around the 18th. However, they stated it had since been returned to the upright position and the anemometer propellor looked to be spinning normally, despite continuing bad wind data values being reported. Further communication revealed that when the jack staff anemometer was replaced after the recent dry dock period it was never "zeroed out". Additionally, the cable for the anemometer was reported to be in rough shape. Either or both of these factors may have contributed to the continuing bad wind data. In any case, since the operators were unable to address the issue while underway, the decision was made to suspend transmission of the jack staff anemometer data as of 22 March 2025. A plan was made to replace the anemometer, but this ultimately did not take place in 2025 and thus no more DIR, SPD, PL_WDIR, or PL_WSPD data were reported until 2026.

The second issue of note involved bad true wind data (DIR2, SPD2, DIR3, SPD3) being reported from the port and starboard anemometers as a consequence of missing platform heading data from the primary gyro, on which *Shimada's* true wind calculations are based. In this case, a hard reset of the ship's SCSv5 data acquisition system (after a software freeze) inexplicably resulted in the gyro input being interpreted by SCS as computer mouse data. After switching COM ports for the gyro a few times, the issues with the gyro and port and starboard true wind data were eventually resolved. In the meantime, between 13 and 20 July 2025, DIR2, SPD2, DIR3, and SPD3 all received malfunction (M) flags (Figure 35, only DIR2 and DIR3 shown).

The last issue of note seems somehow related to the gyro COM port switching. On 20 July, at the precise moment gyro data resumed logging, the POS MV system began throwing off isolated unrealistic latitude and longitude (LAT, LON) values. Because SAMOS cannot process data records without a valid LAT/LON, this was resulting in around an hour's worth total SAMOS data loss per day. The operators inspected the cables and sockets for the POS MV but found that all connections looked solid. On their next cruise leg, on or around 5 August, a POS MV GAMS calibration and a GNSS reset were performed, and, perhaps most notably, the serial connection for the primary gyro was reverted to its original COM port (i.e., from before the gyro issues started). It's not entirely clear which of these actions contributed, but the end result was that the issue with LAT and LON was resolved (and the gyro issue did not recur).

There were no other noteworthy issues for the *Shimada* in 2025. In general *Shimada's* various meteorological sensors (wind, pressure, air temperature, humidity) are known, like most vessels, to exhibit some data distortion that is dependent on the vessel relative wind direction and, in the case of air temperature, likely ship heating. Where appropriate, these data are generally assigned caution/suspect (K) flags (Figure 35, not all shown).

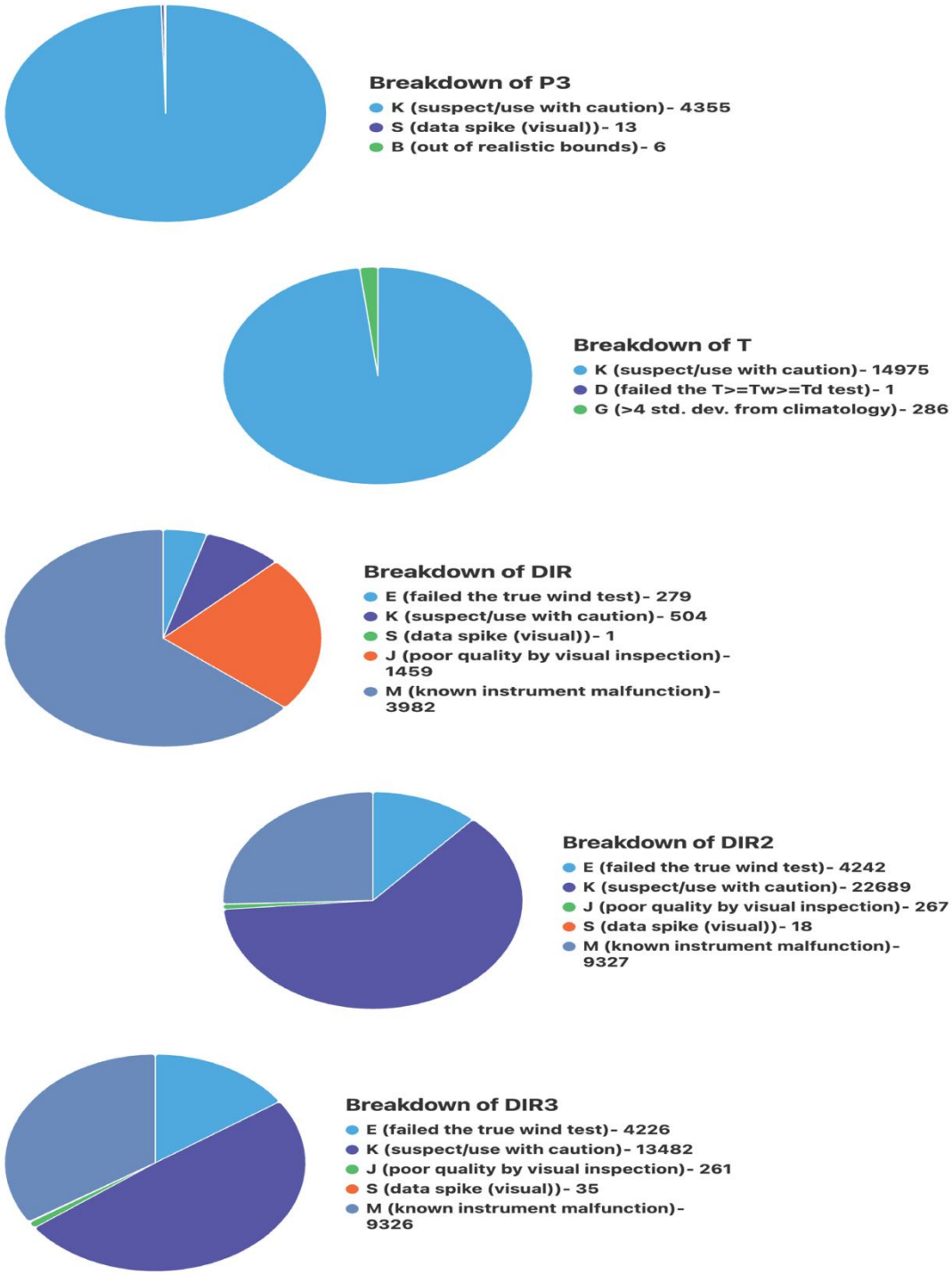


Figure 35: Distribution of SAMOS quality control flags for (first) atmospheric pressure 3 – P3– (second) air temperature – T – (third) earth relative wind direction – DIR – (fourth) earth relative wind direction 2 – DIR2 – and (last) earth relative wind direction 3 – for the *Bell M. Shimada* in 2025.

Fairweather

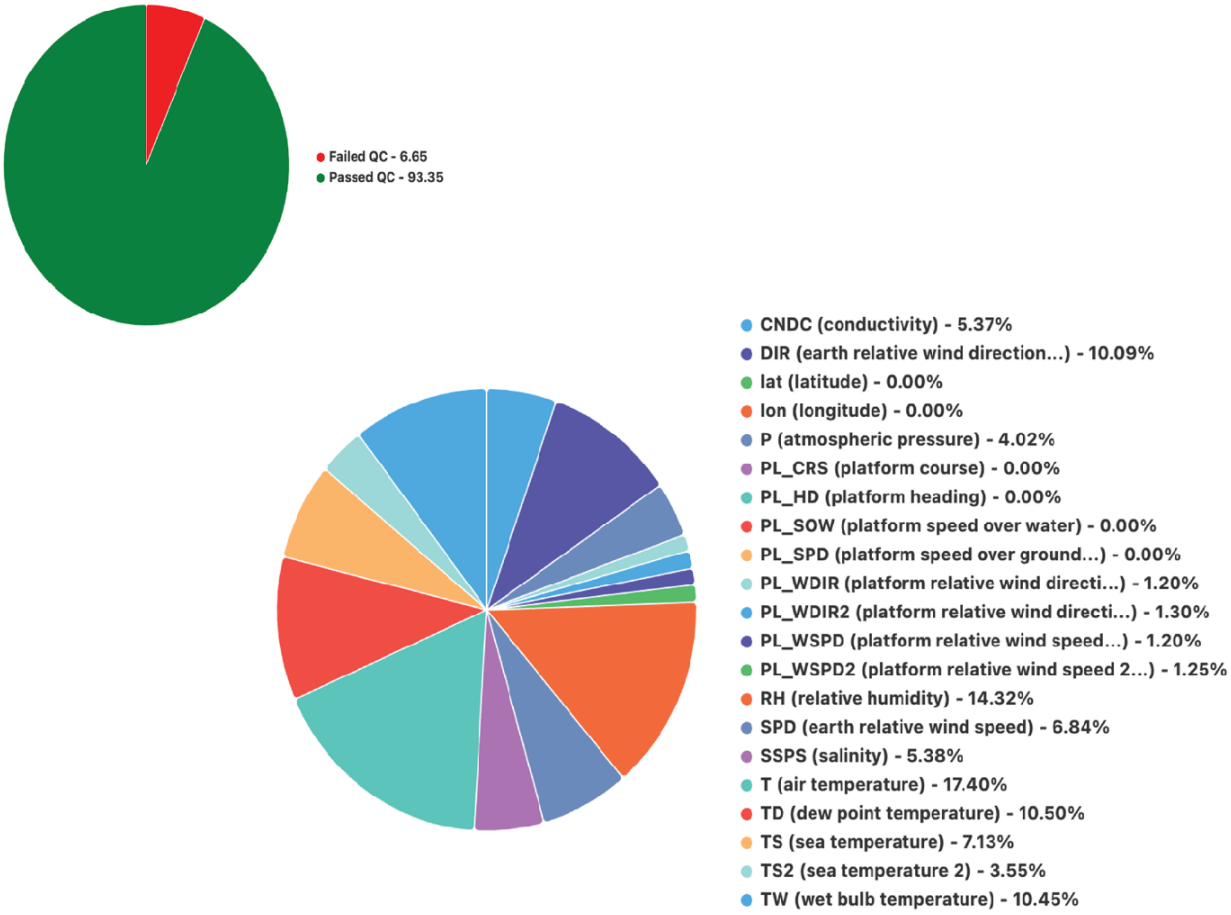


Figure 36: For the *Fairweather* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Fairweather* provided SAMOS data for 283 ship days, resulting in 7,915,030 distinct data values. After both automated and visual QC, 6.6% of the data were flagged using A-Y flags (Figure 36). This is a sizable increase in flags added as compared to 2024, when the total flagged percentage was 1.2%. This places the *Fairweather* over the 5% total flagged cutoff regarded by SAMOS to represent "good" data.

For the first few weeks in 2025, all reported air temperature, humidity, and (calculated) wet bulb and dew point temperature data (T, RH, TW, and TD) were static/bad values or else missing. The temperature and humidity sensor itself was not actually installed, having not yet arrived back from calibration, so the data being reported by the ship's acquisition system was merely an electronic artifact. As such, all T, TW, TD, and RH data between 31 March and 25 April received malfunction (M) flags (Figure 37, only T shown).

The other item of note involves *Fairweather's* port and starboard sonic anemometers, which in 2025 were not a heated model, and the fact the ship typically operates in Alaskan waters somewhat prone to harsh conditions. When the air temperature approaches/drops below freezing, the anemometers can freeze up or ice over, especially if there is some form of precipitation going on. Such conditions occurred off and on in September, resulting in some unrealistic true and relative wind speed values as well as flatlined relative wind direction and, by consequence, bad true wind direction values from both anemometers. These unrealistic/bad data (port DIR, SPD, PL_WDIR, PL_WSPD, and starboard PL_WDIR2, PL_WSPD2, note no starboard true winds in 2025) were assigned malfunction (M) flags (Figure 37, only DIR and SPD shown). It is anticipated the operators will eventually trade their existing sonic anemometers for a heated model. (As of mid 2026, this sensor upgrade has not yet taken place, as there are significant wiring and other peripheral concerns to account for first. In short, the existing ship infrastructure will not support the installation of heated wind sensors.)

There were no other issues noted in 2025. In general, *Fairweather's* various meteorological sensors (wind, pressure, air temperature, humidity) are known, like most vessels, to exhibit some data distortion that is dependent on the vessel relative wind direction and, in the case of air temperature, likely ship heating. Where appropriate, these data are generally assigned caution/suspect (K) flags (Figure 37, not all shown). *Fairweather's* near-surface sea water data (TS, TS2, SSPS, CNDC) also routinely receive quality flags whenever the underway flow through system appears to be restricted, usually because the vessel is either in port or is in rough or inland/murky water conditions. This typically translates to either caution/suspect (K) or poor quality (J) flags, depending on the severity of the sea temp drift imparted by the ambient air temperature within the ship (Figure 37, only TS shown). J flags are also applied whenever the sea water sensors appear to be switched off and static/0 values are reported by the data acquisition system.

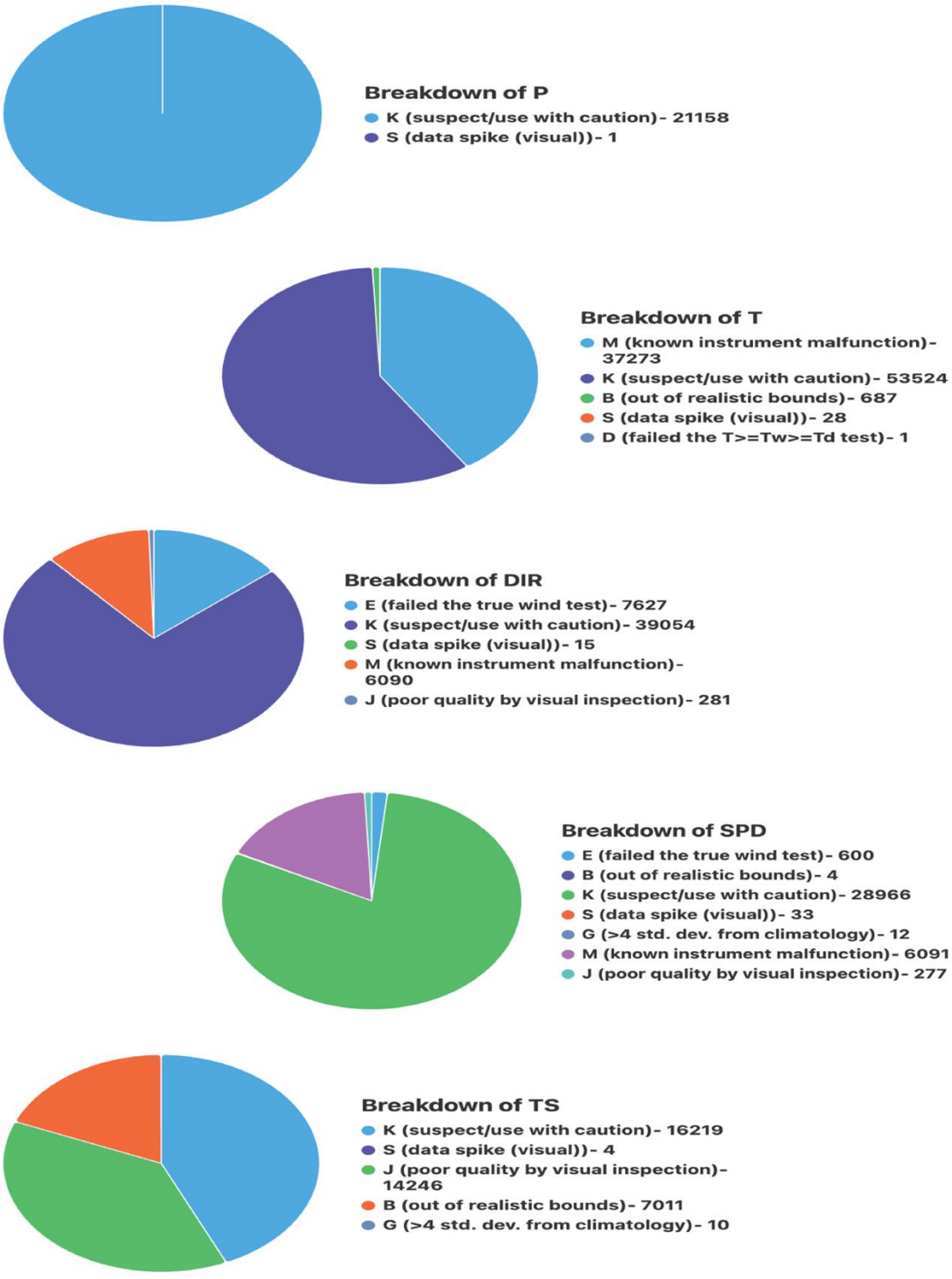


Figure 37: Distribution of SAMOS quality control flags for (first) atmospheric pressure – P– (second) air temperature – T – (third) earth relative wind direction – DIR – (fourth) earth relative wind speed– SPD2 – and (last) sea temperature – TS – for the *Fairweather* in 2025.

Ferdinand Hassler

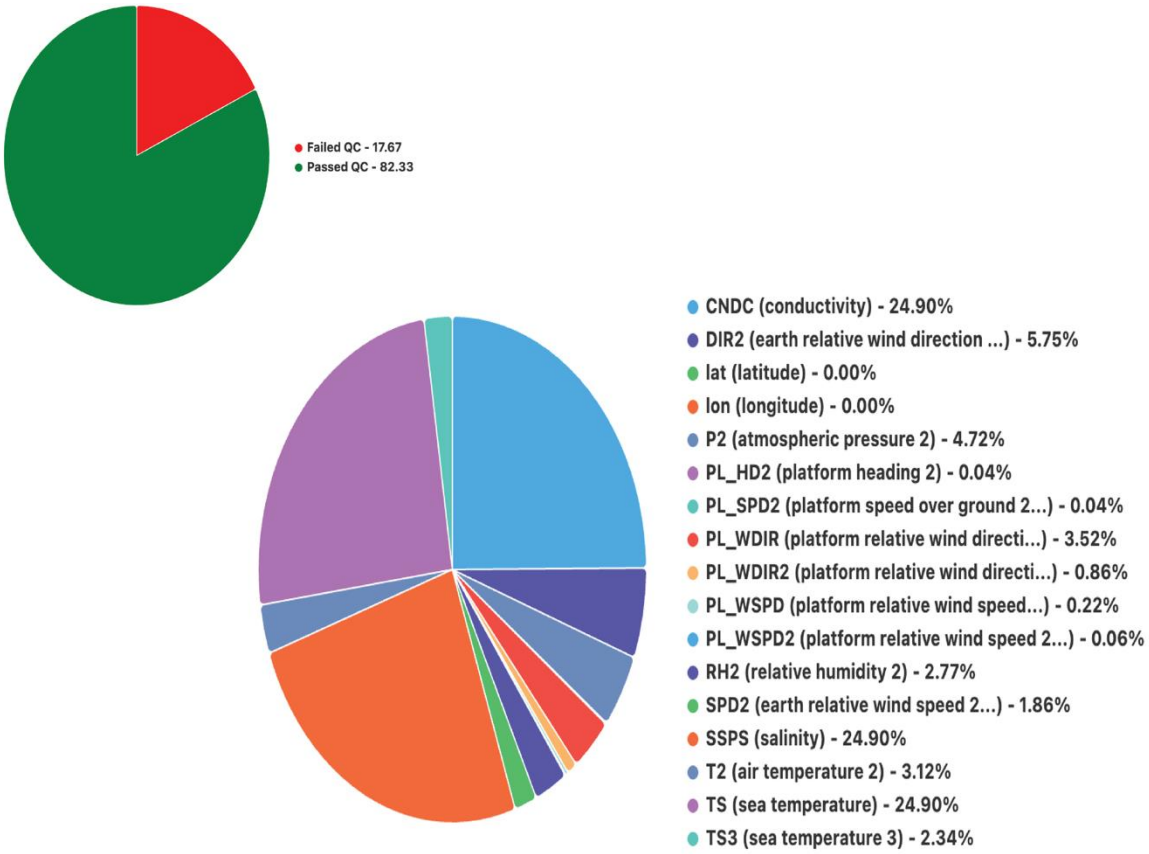


Figure 38: For the *Ferdinand Hassler* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Ferdinand Hassler* provided SAMOS data for 190 ship days, resulting in 4,883,320 distinct data values. After both automated and visual QC, 17.8% of the data were flagged using A-Y flags (Figure 38). This is significantly higher than in 2024 (9.3%) and pushes *Hassler* into the realm of poor quality data.

Looking to the flag percentages in Figure 38, nearly three quarters of the total flags were assigned to the three thermosalinograph parameters, meaning sea temperature (TS), salinity (SSPS), and conductivity (CNDC). The flags here are mainly caution/suspect (K) and, in the case of TS, out of bounds (B) flags (Figure 39). While some of these would have been applied while the vessel was in port and flow to the sensors appeared restricted, many more were likely applied while the vessel was underway. We note *Hassler* had a longstanding history of not transmitting any oceanographic data to SAMOS, reportedly due to ongoing hardware issues. Beginning on 1 October 2024, TS, SSPS, and CNDC data transmission resumed after a yearslong hiatus. However, these data generally appear smoothed and frequently are unrepresentative of the environment. It was initially suspected it was common for the flow to the sensors to be restricted even

while underway. But the suspicion today is that the seawater intake for the thermosalinograph exists in the port canard space in between *Hassler's* double hulls. To date, this has not been confirmed, but, if true, it seems probable the underwater area between the two hulls experiences both heating from the ship directly above it and dynamic flow aberrations imposed by water channeling through the essentially walled-in space. Additionally, it is suspected the route the water takes from intake to thermosalinograph may be long and/or pass through significantly warmed areas of the ship (e.g., engine room). All of this would conceivably contribute to the odd/unrepresentative underway data routinely observed in TS/SSPS/CNDC.

In general, *Hassler's* various meteorological sensors (air temperature, pressure, humidity, winds) are known, like most vessels, to exhibit some data distortion that is dependent on the vessel relative wind direction. Where appropriate, these data are generally assigned K flags (not shown).

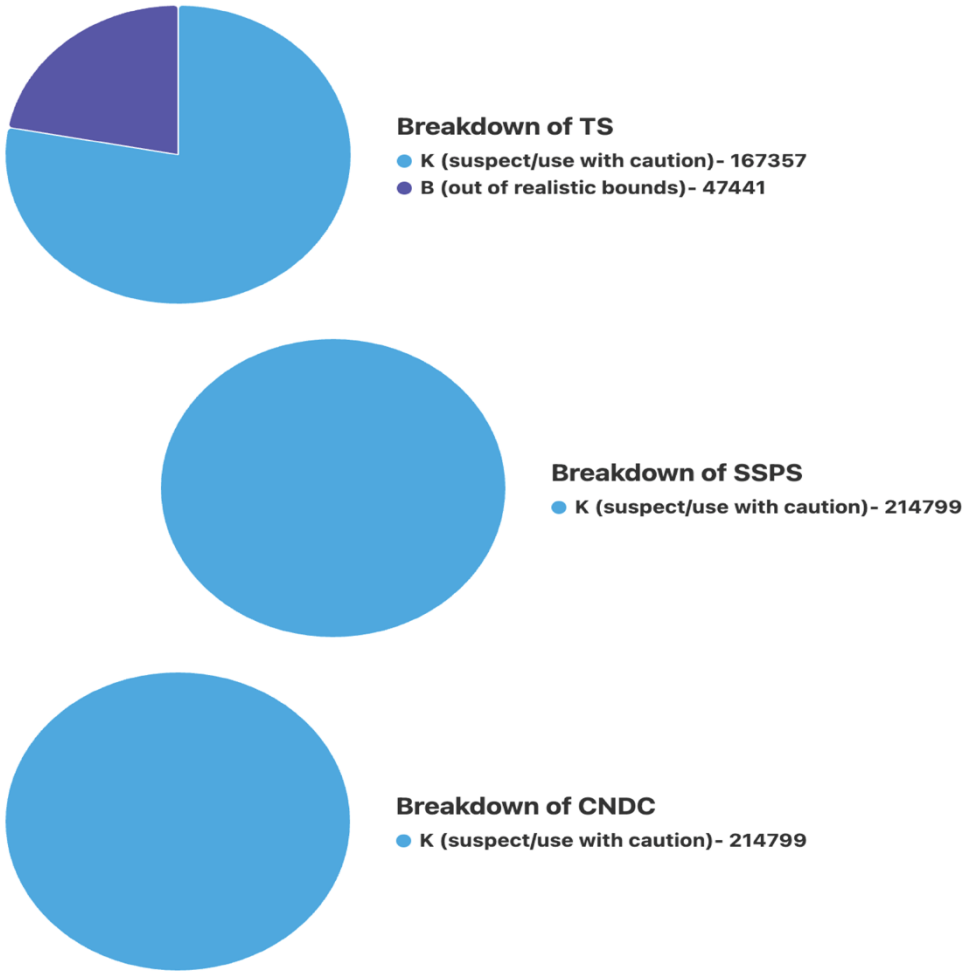


Figure 39: Distribution of SAMOS quality control flags for (top) sea temperature – TS – (middle) salinity – SSPS – and (bottom) conductivity – CNDC – for the *Ferdinand Hassler* in 2025.

Gordon Gunter

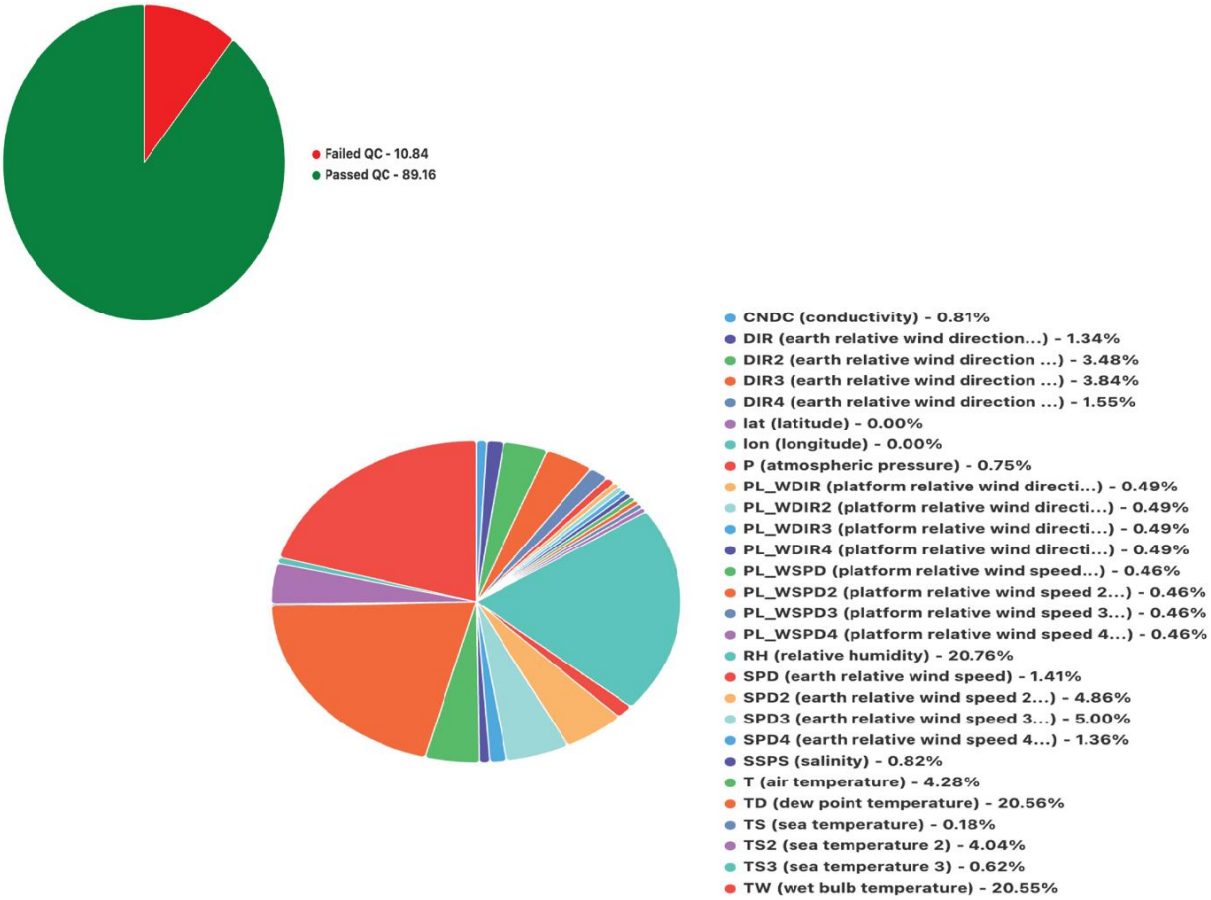


Figure 40: For the *Gordon Gunter* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Gordon Gunter* provided SAMOS data for 210 ship days, resulting in 9,587,535 distinct data values. After both automated and visual QC, 10.8% of the data were flagged using A-Y flags (Figure 40). This is an increase of ~3% in total flags as compared to 2024 (7.1%) and pushes the *Gordon Gunter* further away from the 5% total flagged cutoff regarded by SAMOS to represent "very good" data.

In a repeat of previous years, throughout the operating period *Gunter's* relative humidity data (RH) frequently displayed large, unrealistic swings (changes of 20-30% humidity over a few minutes) whenever the relative wind direction was from roughly starboard. Coincident response in the air temperature data (T) was generally muted or not observable. The ongoing suspicion has been that the RH disturbances are due to more than just localized heating (note, evident both day and night), although this has never been confirmed. Swings in RH and the calculated wet bulb and dew point temperatures

(TW and TD) as well as any concurrent smaller bumps in T all received caution/suspect (K) flags (Figure 41, not all shown). We note this T/RH sensor has been expected to be supplanted by a Vaisala WXT536 all-in-one weather system and a (mechanically/dynamically superior) Paroscientific MET4A pressure/temp/humidity sensor. And, although as of mid 2026 these upgrades are still awaiting, it is anticipated that the unrealistic swings observed in *Gunter's* relative humidity data will resolve once these new instruments are put into service.

A second, brief issue of note occurred that resulted in poor quality (J) and/or out of bounds (B) flags being applied to any atmospheric data that were transmitted between 9 – 12 January 2025 (Figure 41, not all shown). After the 2024 field season ended, *Gunter* continued transmitting data daily from the dock leading up to the noted period. Then on January 9th it was suspected any remaining atmospheric sensors that were installed had been removed for eventual dry dock and/or calibrations, as evidenced by sudden static/out of bounds data values for all. We requested data transmission be suspended until after the ship's dry dock period was complete, and this request was granted as of the 13th.

A third issue of note occurred a few months later, at the actual start of the 2025 field season, with the Sea-Bird SBE38 external sea temperature sensor (TS2). Between 30 April and 11 June 2025, any TS2 data that were transmitted had a value of "-99". The cause is not known, but it is suspected this may have been a "missing value" indicator from somewhere in the sensor>>>SCS5 data acquisition software loop. Any values of -99 were automatically assigned out of bounds (B) flags by SAMOS automated QC (Figure 41).

There are no other items of note for *Gunter* in 2025. Generally speaking, beyond the T/RH/TW/TD issue already described, *Gunter's* pressure and, especially, all four wind sensors are also known (like most vessels) to exhibit some data distortion that is dependent on the vessel relative wind direction. Where appropriate, these data are generally assigned K flags (Figure 41, not all shown).

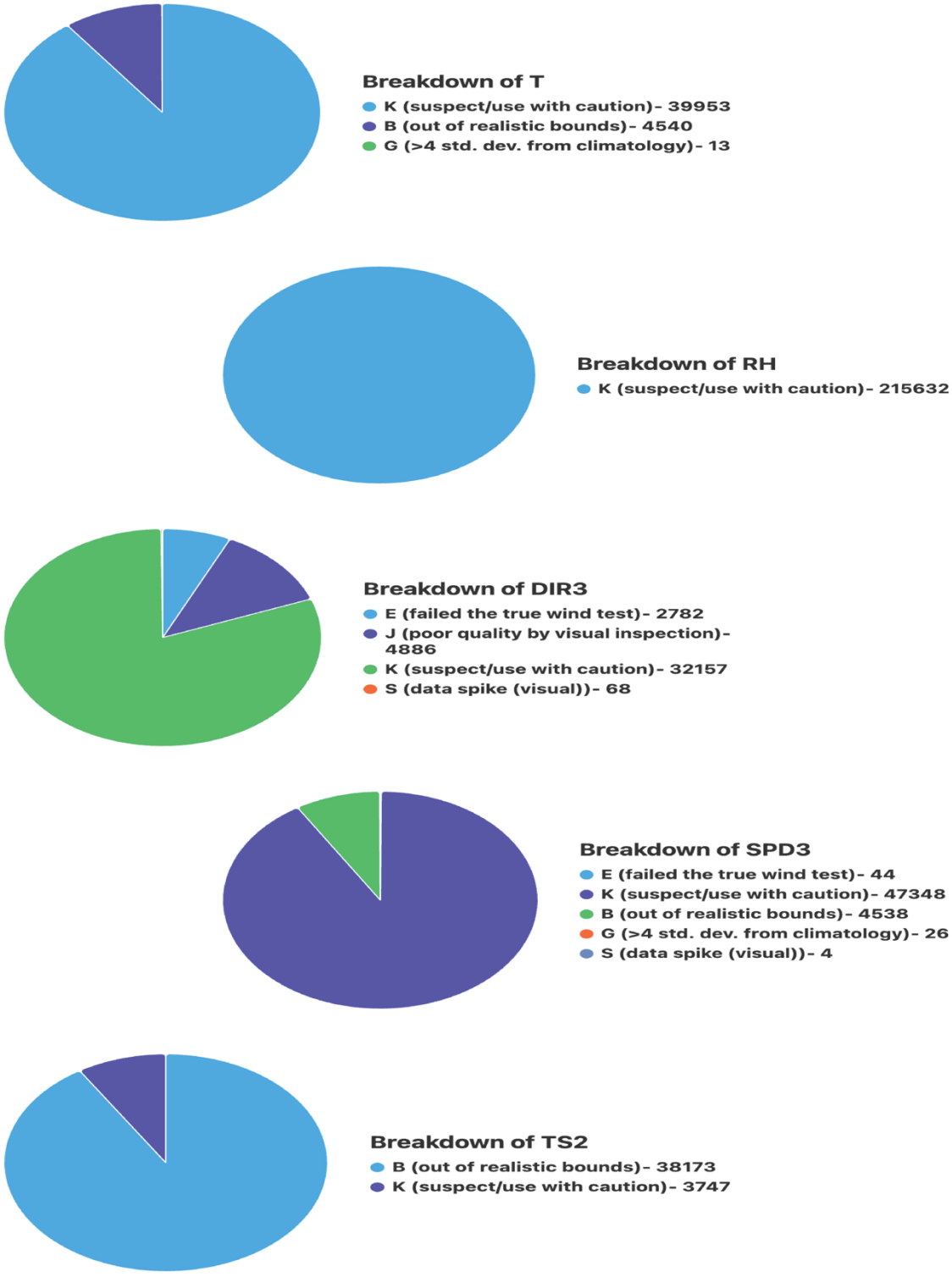


Figure 41: Distribution of SAMOS quality control flags for (first) air temperature – T – (second) relative humidity – RH – (third) earth relative wind direction 3 – DIR3 – (fourth) earth relative wind speed 3 – SPD3 – and (last) sea temperature 2 – TS2 – for the *Gordon Gunter* in 2025.

Henry B. Bigelow

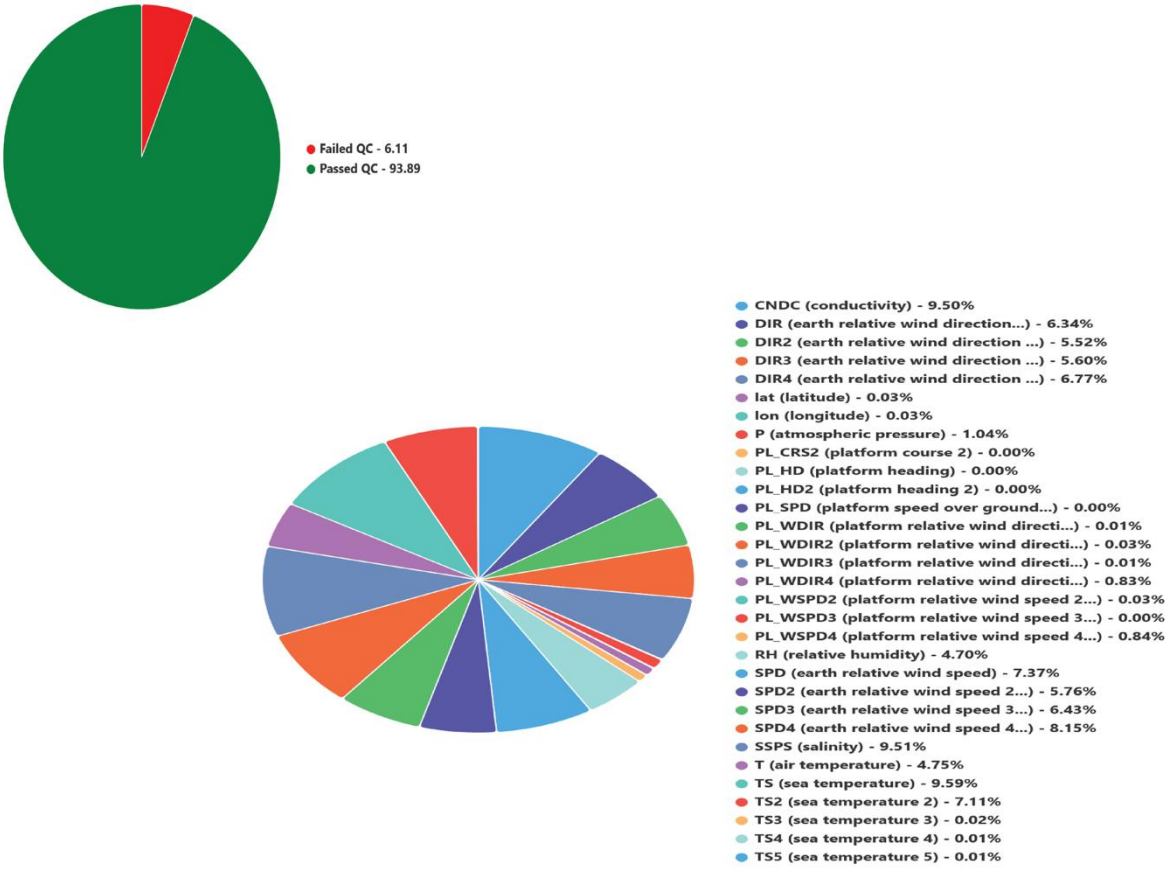


Figure 42: For the *Henry B. Bigelow* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Henry Bigelow* provided SAMOS data for 271ship days, resulting in 14,561,325 distinct data values. After both automated and visual QC, 6.1% of the data were flagged using A-Y flags (Figure 42). This is about the same as in 2024 (5.9%) and keeps the *Bigelow* slightly above the < 5% total flagged cutoff regarded by SAMOS to represent "very good" data.

An issue with wind data flatlining began in conjunction with three of the *Bigelow's* four anemometers on 4 February and, shortly thereafter, continued on for only the fourth anemometer for the rest the year. At its onset, at seemingly random times of the day, relative wind data from one or another anemometer (PL_WDIR2, PL_WDIR3, PL_WDIR4, PL_WSPD2, PL_WSPD3, PL_WSPD4) would flatline at an arbitrary value for approximately an hour and then would return back to normal. The corresponding earth relative wind variables (DIR2, DIR3, DIR4, SPD2, SPD3, SPD4) were distorted as a result. Ship techs have not yet found a cause for the issue, and it persists (for only the

fourth anemometer) in 2026. When this issue appears in the data, it is J-flagged ("poor quality") to ensure users do not use the data (Figure 43).

Additionally, from 6 to 21 April, the intake sea temperature sensor (TS) reported values about 1-2 degrees Celsius higher than the thermoslinograph (TS2) and the three hull mounted sea temp sensors (TS3, TS4, TS5), while also showing increased variability as compared with the other four sensors. It's unclear what was causing the discrepancy, but TS came closer in line with the other sea temperatures once a sensor swap was completed. TS was mainly assigned caution/suspect (K) flags for the noted period (Figure 43).

There were no other issues of note for the *Bigelow* in 2025. In general *Bigelow's* various meteorological sensors, especially all four wind sensors, are known (like most vessels) to exhibit some data distortion that is dependent on the vessel relative wind direction and, in the case of air temperature and humidity (and by extension the calculated wet bulb and dew point temperatures), likely ship heating. Where the data appear affected, they are generally assigned "caution/suspect" K flags (Figure 43, not all shown). Like the other NOAA vessels, *Bigelow* is due to receive sensor upgrades in 2026, namely a Vaisala WXT536 all-in-one weather station and a Paroscientific MET4A pressure/temp/humidity sensor. It is guessed SAMOS will be invited to participate in the decision-making process about where to install these new sensors, and we hope some of the flow issues noted above will be able to be mitigated by securing new or modified locations on the ship (always a tough undertaking on a technologically busy vessel, though!) We note the most affected sensors, the standalone anemometers, are not expected to be upgraded until at least 2026.

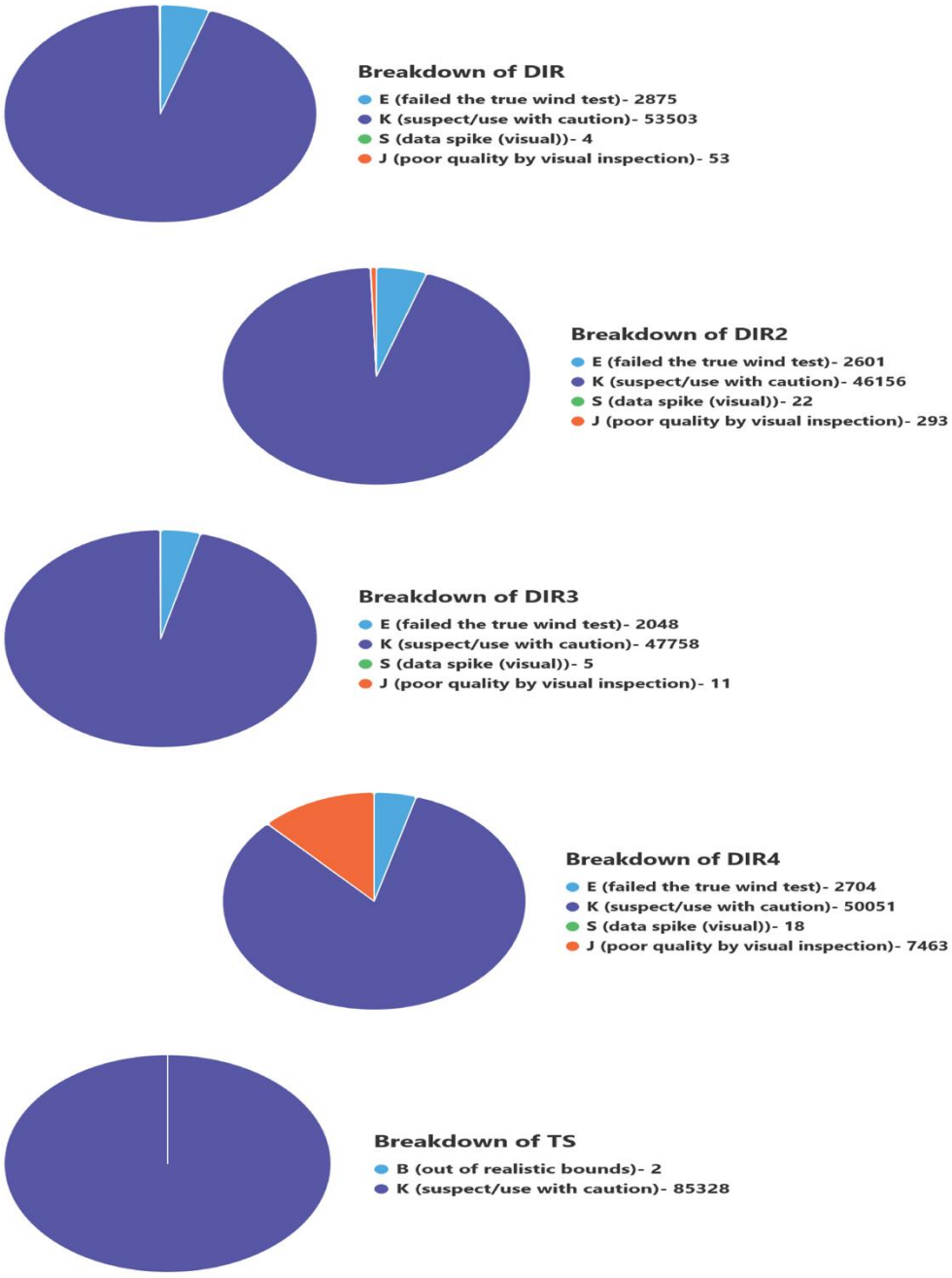


Figure 43: Distribution of SAMOS quality control flags for (first) earth relative wind direction – DIR – (second) earth relative wind direction – DIR2 – (third) earth relative wind direction – DIR3 – (fourth) earth relative wind direction – DIR4 – and (last) sea temperature –TS – for the *Henry B. Bigelow* in 2025.

Nancy Foster

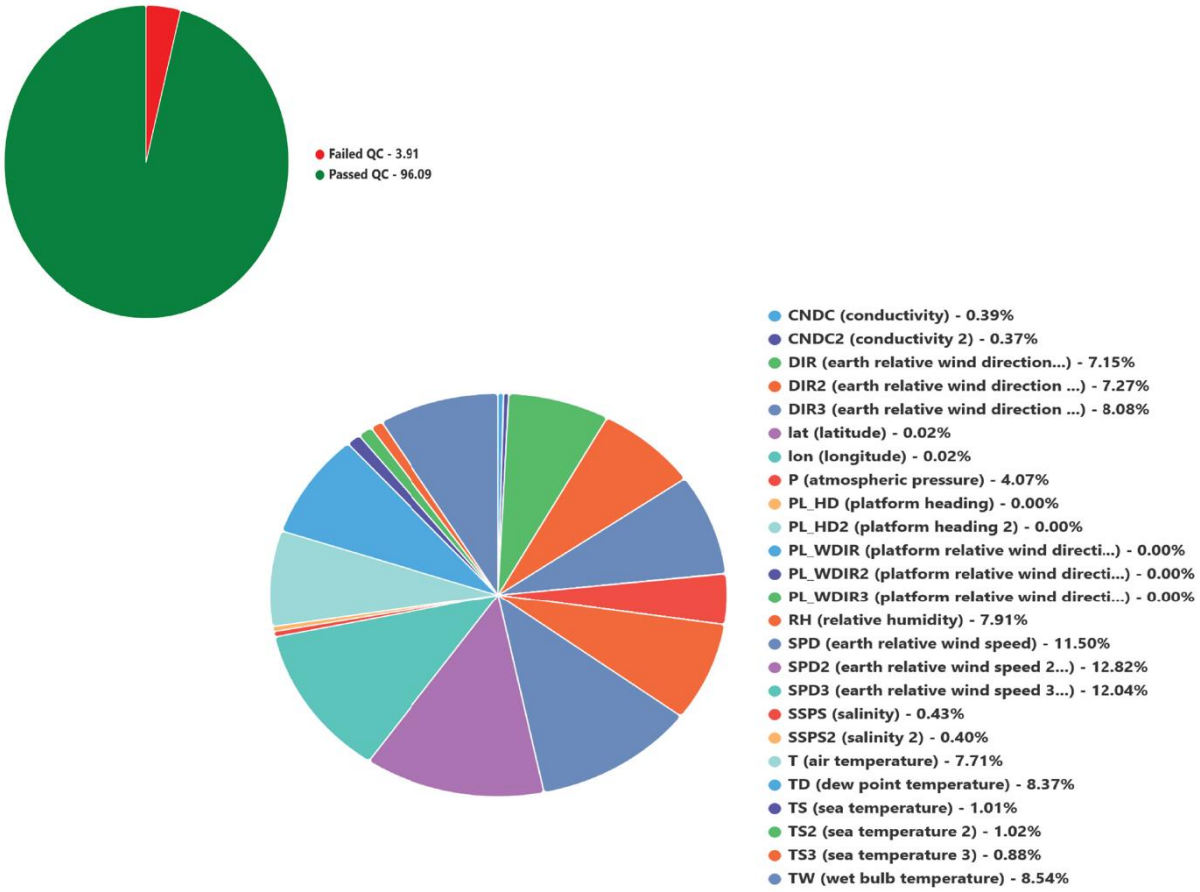


Figure 44: For the *Nancy Foster* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Nancy Foster* provided SAMOS data for 228 ship days, resulting in 10,586,477 distinct data values. After both automated and visual QC, 3.9% of the data were flagged using A-Y flags (Figure 44). This is about a percentage point and a half higher than in 2024 (2.3%) but maintains *Foster's* standing inside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

Only one notable issue occurred in 2025: on 9 May, the sensor recording air temperature and humidity (T and RH) appeared to have failed, with RH flatlining at ~98% and T being questionable after a small, discontinuous/stepwise increase. The ship techs confirmed sensor failure but were unable to swap out the sensor until the 24th, although they were at least able to temporarily stop logging data from the sensor as of 21 May. As a result, T and RH, along with the calculated dew point (TD) and wet bulb (TW) temperatures, received M flags between 10-20 May (Figure 45). On 25 May, when

logging resumed after the sensor replacement, T, TD, TW, and RH data were back to normal and flagging stopped.

There were no other specific issues of note for the *Nancy Foster* in 2025. Like most vessels, the *Foster's* various meteorological sensors are sometimes subject to flow distortion that is dependent on the vessel relative wind direction, as well as possible heating imparted on the air temperature and humidity sensor (and by extension the calculated wet bulb and dew point temperatures) either from the stacks or from the ship itself when the relative flow at the sensor is near zero. These effects on the sensors are, however, notably smaller on the *Foster* than on many other vessels, suggesting their sensors' exposure to the free atmosphere is generally less obstructed than is common on research ships. Where appropriate, affected data are generally assigned "caution/suspect" (K) flags (Figure 45, not all shown).

Figure 45: Distribution of SAMOS quality control flags for (first) air temperature – T – (second) wet bulb temperature – TW – (third) dew point temperature – TD – and (last) relative humidity – RH – for the *Nancy Foste*r in 2025.

Okeanos Explorer

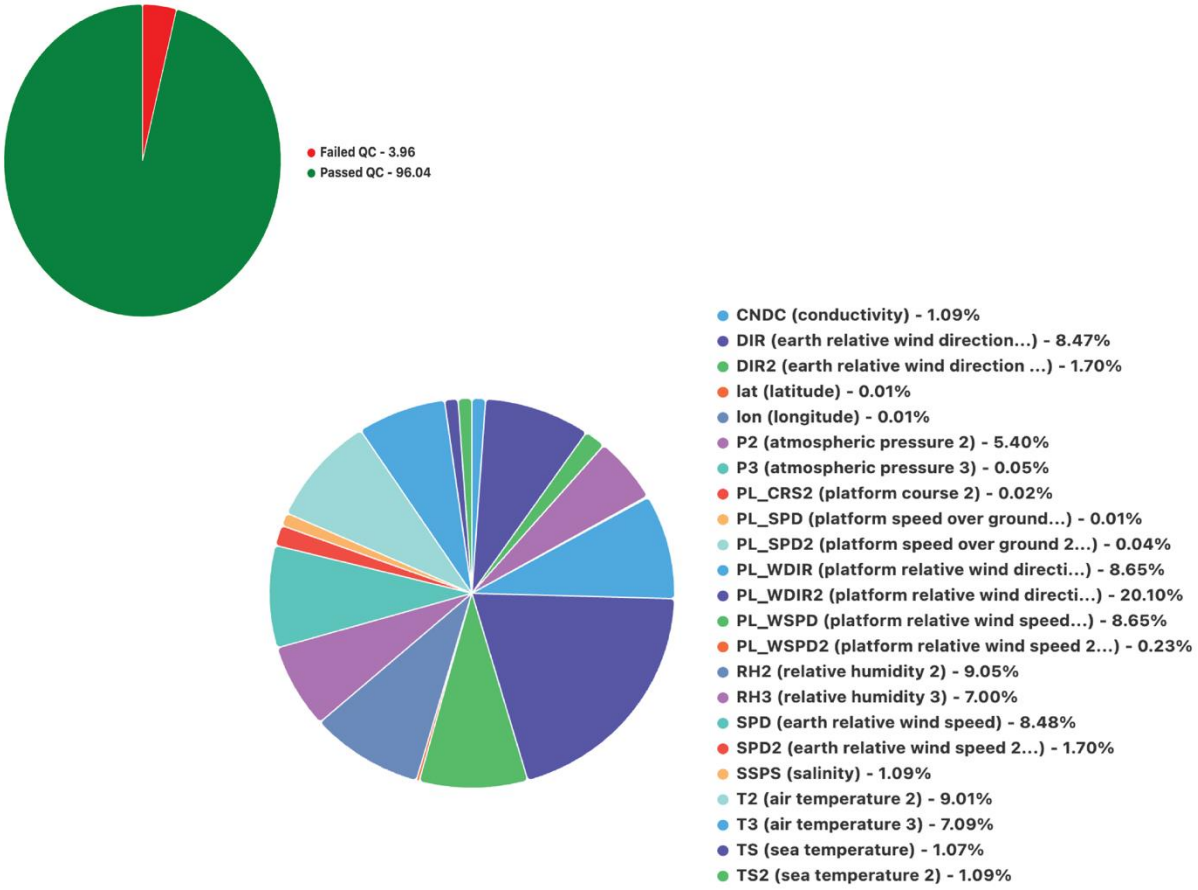


Figure 46: For the *Okeanos Explorer* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Okeanos Explorer* provided SAMOS data for 196 ship days, resulting in 6,253,640 distinct data values. After both automated and visual QC, 3.9% of the data were flagged using A-Y flags (Figure 46). This is about one percentage point higher than in 2024 (2.9%) but maintains *Explorer's* standing inside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

In March 2025, prior to the start of the field season, the *Explorer's* existing SAMOS meteorological sensors (wind, pressure, air temperature, humidity) were replaced with a Vaisala WXT536 all-in-one sensor suite (and later augmented with a Paroscientific MET4A pressure, air temp, and humidity sensor). Being the first ship of the NOAA fleet to install and run the WXT, there were, not surprisingly, a handful of sensor install, setup, integration, etc. issues experienced over the year.

The most substantial of these involved the raw/relative wind measurements (PL_WDIR2 and PL_WSPD2) and the calculated true winds (briefly, DIR2 and SPD2). First, as soon as *Explorer* began transmitting data to SAMOS in late March, PL_WDIR2 was noted to be about 90 degrees off when compared to the ship's Dynamic Positioning ("DP") system's RM Young mechanical anemometer (PL_WDIR, PL_WSPD) and nearby station data. No explanation was immediately obvious, but once operators were able to climb up the mast a few weeks later it was noted the pole mount that holds the WXT had loosened and the WXT had rotated. (Side note, this has since become a known risk with WXT ship installations, and it is now recommended to drive a bolt through the mount to secure it, rather than rely solely on the mount's set screw.) These affected data were assigned caution/suspect (K) flags at first, and malfunction (M) flags later after the mount rotation was confirmed (Figure 47). Once the mount was retightened, PL_WDIR2 came into closer alignment with PL_WDIR, but there was still a ~20 degree bias existing between the two. Though data transmission for the DP system RMY anemometer was subsequently suspended for a good stretch of the field season (due to a misplaced lack of confidence in its calibration), it ultimately seems safe to say this ~20 degree bias existed in WXT PL_WDIR2 data all the way up until the PL_WDIR2 data stream itself was suspended, in late September. Certainly, the bias was confirmed both before and immediately after the comparison RMY data outage. Our suspicion remains that the WXT's "North" mark was misaligned in 2025, and in fact when the orientation was physically checked and adjusted in early 2026 the direction data were suddenly (and for the first time) in line with expectations. While comparison RMY PL_WDIR were available as a check on the direction bias, PL_WDIR2 was flagged with caution/suspect (K) flags (Figure 47). Armed now with hindsight, though, we would advise users to avoid all PL_WDIR2 data in 2025. The second major (though operationally short-lived) issue with the WXT wind data centered around the true winds and various missteps involved in their calculation. In the first place, the use of biased PL_WDIR2 values would naturally mean the calculated true winds did not represent actual conditions, either. In the second place, though, miscommunications/misunderstandings about what relative wind speed units were required for the true wind calculation, along with problems encountered programming the WXT translator, meant that the WXT DIR2 and SPD2 calculation itself was faulty for most or all of the year. Fortunately, SAMOS only operationally processed DIR2 and SPD2 for three days in April. The DIR2 and SPD2 data that were operationally processed were flagged with a mix of caution/suspect (K), poor quality (J), and a few true wind recomputation failure (E) flags (Figure 47, only DIR2 shown). But, again, in retrospect, use of these three days' worth of DIR2 and SPD2 data should be entirely avoided.

The other notable issue with the WXT involved numerous "spikes" in the pressure (P2), air temperature (T2), and humidity (RH2) data early on in the installation, which resulted in some spike (S) flags being applied to those variables (Figure 47, only T2 shown). This was fortunately resolved within days. Unfortunately, though, it's not clear which of three actions taken played a part in the resolution. We will nevertheless describe them here, as other operators working with the WXT may find them useful: Firstly, the COM connection protocol for the WXT was changed from RS-422 to RS-232; secondly, the baud rate was changed from 19200 to 4800; and, lastly, the buffer box for

the WXT was replaced with a different one, as the original was known to have caused overflow issues with other sensors' feeds in the past.

The only other issue of note for *Explorer* in 2025 occurred late in the season. On 20 October the RMY relative wind feeds PL_WDIR and PL_WSPD suddenly flatlined, and consequently the RMY true wind feeds DIR and SPD began unrealistically tracking with the navigation feeds (PL_CRS, PL_HD). Upon contacting the ship, operators stated that the propellor had fallen off the RMY wind bird. With only limited/augmenting hands on deck, the RMY data feeds were left running for the broken sensor until senior survey personnel returned and suspended them on 3 November. The field season wrapped shortly thereafter, so no more PL_WDIR, PL_WSPD, DIR, or SPD were transmitted for the year. These affected 20 October – 3 November RMY wind data were uniformly assigned malfunction (M) flags (Figure 47, only PL_WDIR shown).

There were no other issues of note for the *Okeanos Explorer* in 2025. In general, like most vessels, the *Explorer's* various meteorological sensors (meaning the Vaisala WXT and Paroscientific MET4A, beginning in 2025) are sometimes subject to flow distortion that is dependent on the vessel relative wind direction, as well as stack and, possibly, ship heating imparted on the air temperature and humidity from the WXT (T2, RH2) and MET4A (T3, RH3). But these effects on the sensors are relatively minor, as evidenced by the low overall flagged percentage. Both instruments appear to be about as well exposed as they can be on this ship, high up on the main mast. Where appropriate, affected data are usually assigned "caution/suspect" (K) flags (Figure 47, only T2 and T3 shown).

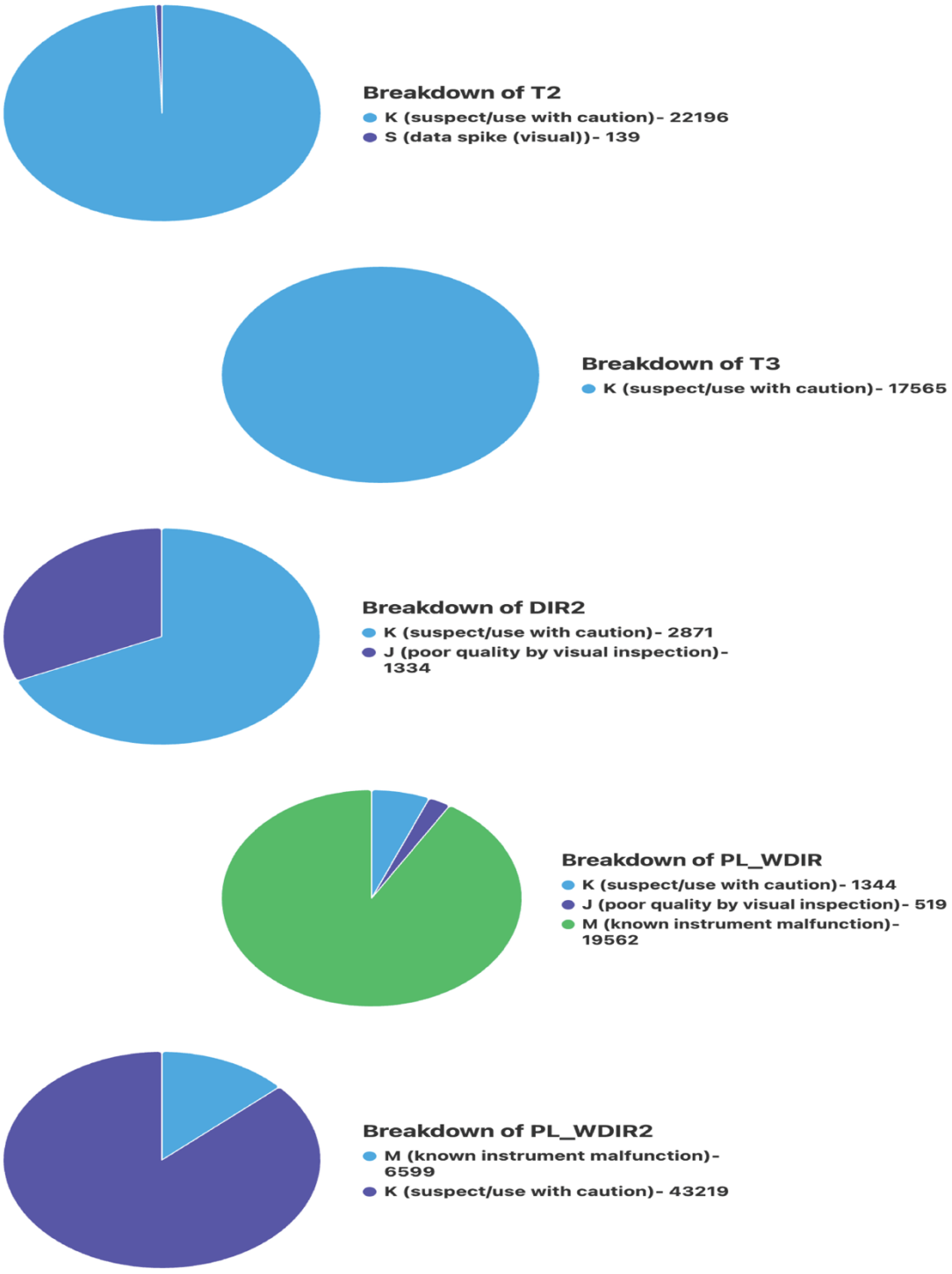


Figure 47: Distribution of SAMOS quality control flags for (first) air temperature 2 – T2 – (second) air temperature 3 – T3 – (third) earth relative wind direction 2 – DIR2 – (fourth) platform relative wind direction – PL_WDIR – and (last) platform relative wind direction 2 – PL_WDIR2 – for the *Okeanos Explorer* in 2025.

Oregon II

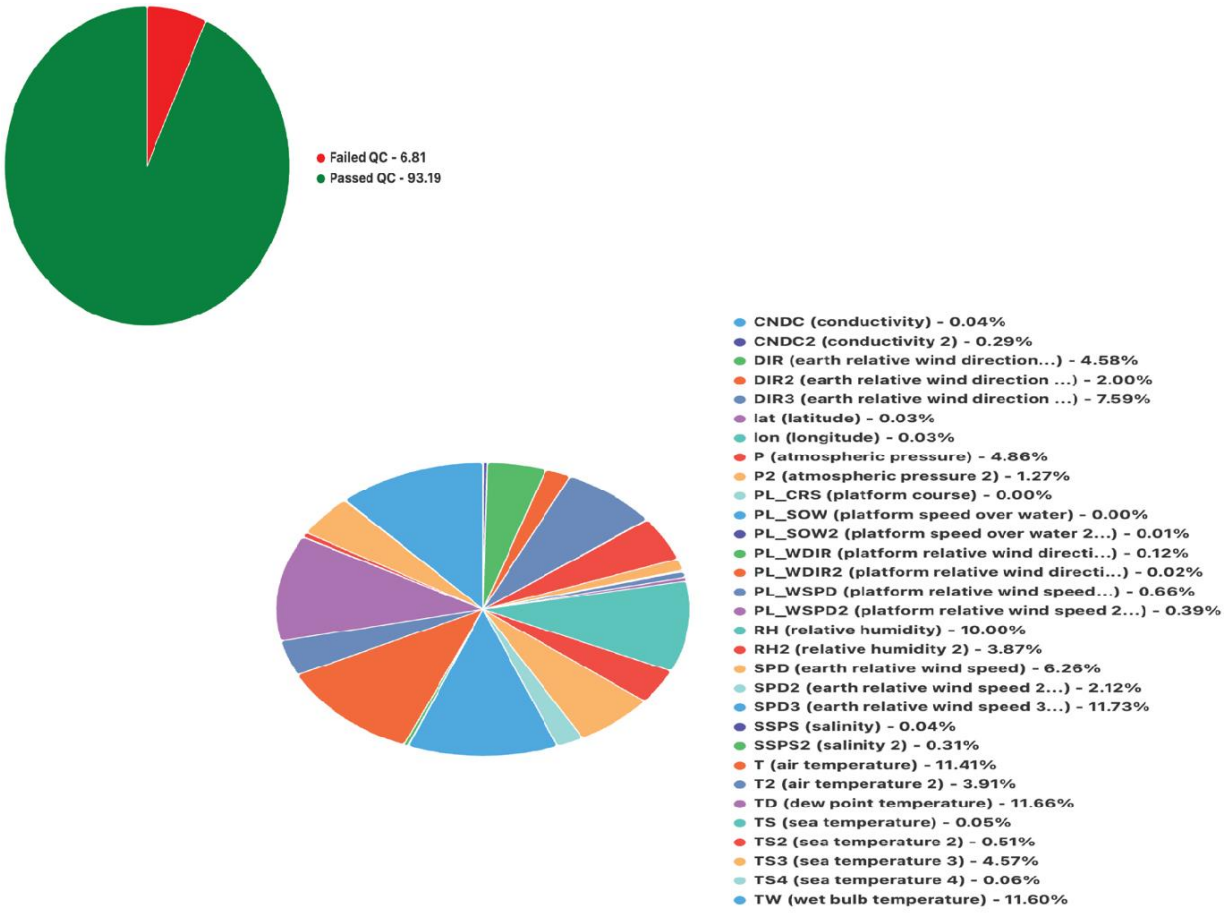


Figure 48: For the *Oregon II* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Oregon II* provided SAMOS data for 178 ship days, resulting in 9,179,442 distinct data values. After both automated and visual QC, 6.8% of the data were flagged using A-Y flags (Figure 48). This is nearly identical to 2024 (6.5%) and keeps the *Oregon II* outside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

The only notable issue occurred early in the field season. In late April, the Sea-Bird 38 external sea temperature sensor (TS3) was observed to be reporting values on average 5-7 degrees Celsius higher than either the hull temperature probe or the two thermosalinographs. When contacted about the discrepancy, an operator stated a suspicion about the sensor's current placement being the culprit. She noted the sensor should ideally be placed before the flowthrough system pump and not after, but that this was not able to be achieved during their winter repair period. In lieu of being able to place the sensor ahead of the flow, the operator planned to try putting the sensor in

another area of the ship to see if it would alleviate or resolve the issue of higher-than-expected sea temps. This sensor move was never confirmed, but by 8 May TS3 data looked much more in line with the other sensors' sea temperature data. For the affected period, TS3 was assigned mostly poor quality (J) flags (Figure 49).

There were no other issues of note in 2025. In general, *Oregon II's* various meteorological sensors (air temperature, humidity, pressure, and winds) are known, like most vessels, to suffer the effects of flow distortion and ship/stack heating. This was especially evident in the older air temp and humidity sensor in use in 2025 that produced T, RH, and the calculated TD and TW data streams. Wherever any parameter appeared contaminated by distorted airflow or localized heating, the affected data were generally assigned caution/suspect (K) flags (Figure 49, not all shown).

As a side note, *Oregon II* was one of several NOAA ships to receive and install a new-to-the-fleet Vaisala WXT536 all-in-one weather sensor package in 2025 (which has now fully replaced the old T/RH/TD/TW sensor). As with other ships, there were a few snafus integrating the WXT data feeds with the SCS data acquisition system, configuring the true winds, and getting everything to interface with the SCS SAMOS routines. But in *Oregon's* case, any resulting data quality issues were mainly confined to SAMOS developmental processing, with data streams only being pushed to operational processing by us once setup was complete. (The NOAA WXT rollout was a learning curve for SAMOS, too!) We also note that in 2025, *Oregon II's* WXT was mounted in a temporary location on the ship's fly bridge, in an area known to be plagued by flow issues (also the area where the P pressure sensor lives). But the plan was always to relocate the WXT to a much more ideal permanent position on the forward mast during some repair period (being as it would involve going through different bulkheads). As of 2026, this relocation looks to have been completed.

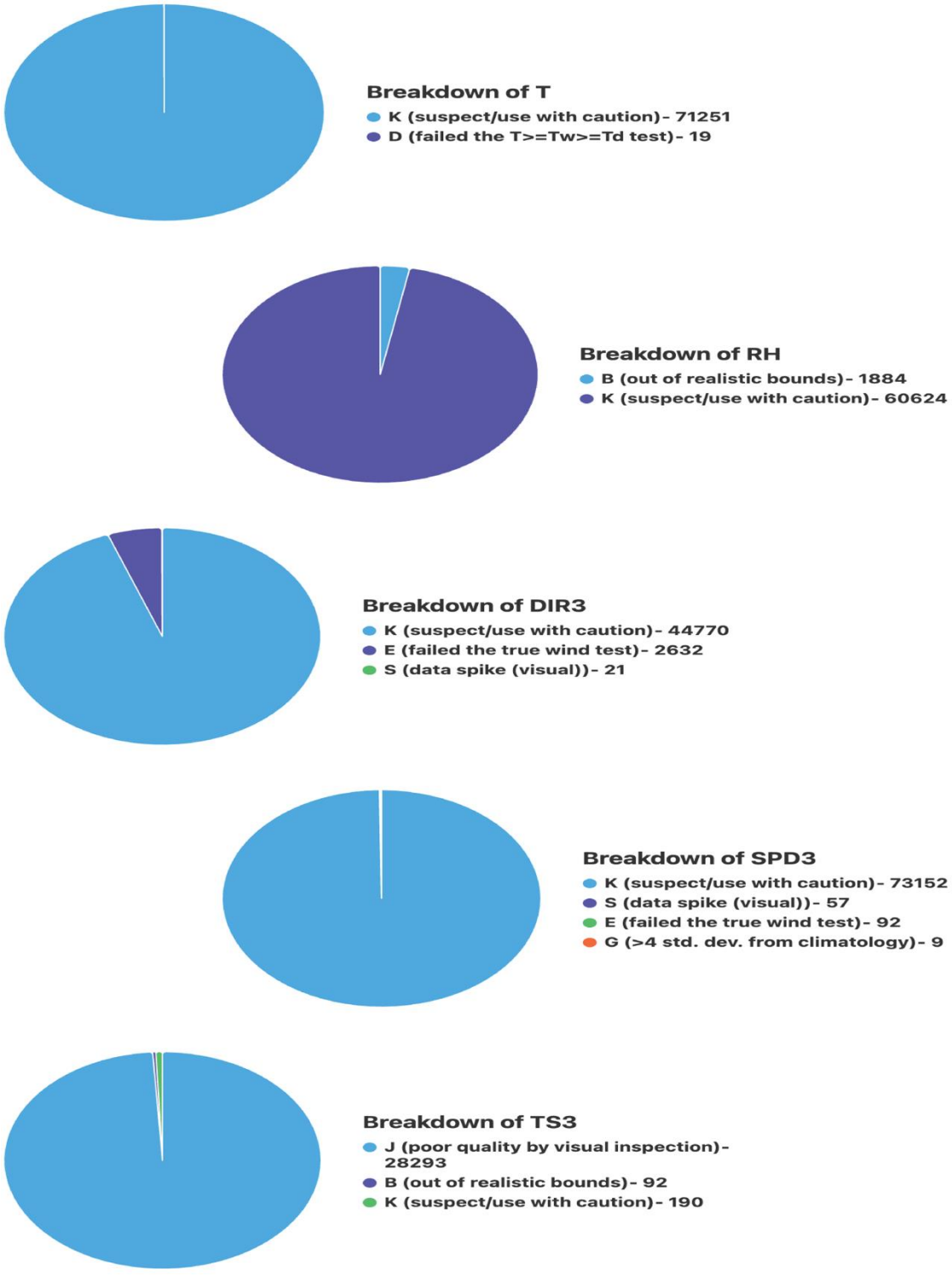


Figure 49: Distribution of SAMOS quality control flags for (first) air temperature –T – (second) relative humidity – RH – (third) earth relative wind direction 3 – DIR3 – (fourth) earth relative wind speed 3 – SPD3 – and (last) sea temperature 3 – TS3 – for the *Oregon II* in 2025.

Oscar Dyson

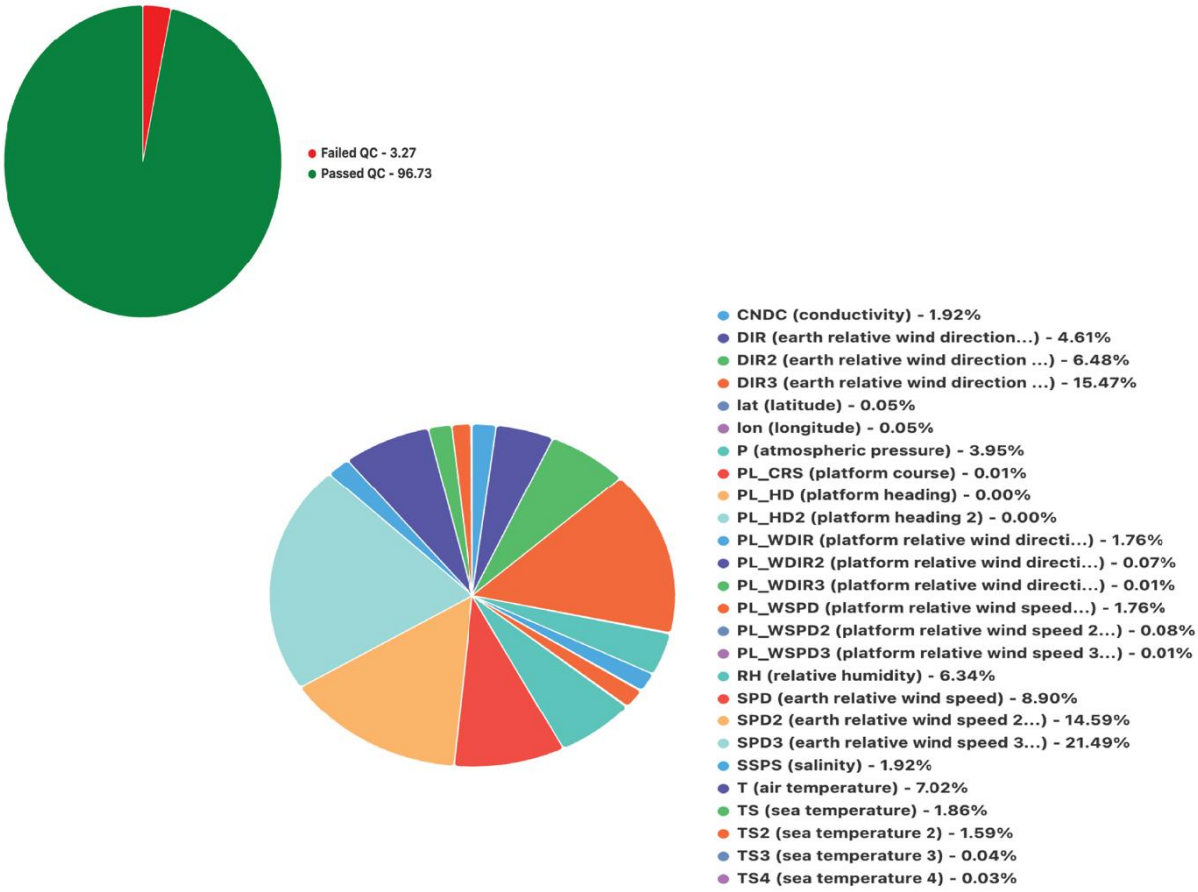


Figure 50: For the *Oscar Dyson* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Oscar Dyson* provided SAMOS data for 127ship days, resulting in 5,104,610 distinct data values. After both automated and visual QC, 3.3% of the data were flagged using A-Y flags (Figure 50). This represents a significant improvement in data quality compared to 2024 (7.9%) and puts the *Dyson* inside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

Referencing Figure 50 above, it's plain the majority of *Dyson's* data flags in 2025 were applied to the true wind direction and speed streams from the ship's forward mast, port main mast, and starboard main mast anemometers (DIR and SPD, DIR2 and SPD2, DIR3 and SPD3, respectively). Some small portion of these flags stems from an ongoing issue that was first spotted several years ago. And while suspicions surrounding the issue's cause shifted in July 2024 (see previous report), the actual culprit remains an unknown/unconfirmed entity through the present day. In summary, at sparse, odd intervals each of these wind sensors will inexplicably throw out several minutes of

bad/garbled raw data messages. As sporadic as the issue is, it is even more rare for the effects to trickle down to the SAMOS averaged data. But on these isolated occasions, the affected SAMOS variables are generally flagged with "spike" (S) or potentially J flags (Figure 51, not all shown).

The bigger player in *Dyson's* true wind SAMOS QC flags simply comes down to instrument siting. As air flows over, around, and above the ship and any deck structures (pilothouse, etc.), the direction and speed of the flow can become distorted at each anemometer's location depending on which ship relative direction the flow is coming from (e.g., from the bow, stern, or abeam) and, sometimes, the magnitude of that flow, as well. This is not uncommon; it's often difficult to impossible to site meteorological instruments optimally on a moving ship. The redundancy in wind sensors is a virtue here. When one anemometer might be experiencing flow distortion, another one might be receiving perfectly uncontaminated airflow. Whenever the effects of flow distortion are suspected in the SAMOS true winds, the data are generally assigned caution/suspect (K) flags (Figure 51, again not all shown).

In addition to the above, there was one small batch of bad true (DIR, SPD) and relative (PL_WDIR, PL_WSPD) wind direction and speed data from the forward mast anemometer at the beginning of the year. SAMOS partial-day data transmissions for 30 January and 1, 3, and 4 February contained data from the forward wind sensor that did not agree with the other two anemometers at all. As this data was being transmitted from port and in between the 2024 and 2025 field seasons, it's assumed the forward mast had been lowered, possibly in preparation for shipyard. These data were assigned poor quality (J) flags (Figure 51, not all shown).

The other issue of note regards the air temperature (T) and humidity (RH) data. Late on 30 April, T and RH began logging unrealistic, mainly out of bounds data. Ship operators contacted us almost immediately to report they'd looked into it and concluded the T/RH sensor had failed. On 2 May they disabled logging for the sensor, and when the data resumed a day later, after they had replaced the sensor, all appeared normal again. There was one further blip of unrealistic T/RH for a few hours on 13 May when operators were actively working on this recently swapped sensor, but again all returned to normal in short order. Any affected T/RH data from 30 April to 2 May and on 13 May were assigned malfunction (M) flags (Figure 51).

In general, all of *Dyson's* various meteorological sensors – not just the wind sensors, but air temperature, humidity, and pressure as well – exhibit some data distortion that is dependent on the vessel relative wind direction and/or stack exhaust contamination and/or, in the case of air temperature (T) and relative humidity (RH), likely ship heating (all common to most vessels). Where any of the meteorological data appears affected by flow distortion, exhaust, or ship heating, they are typically assigned K flags (Figure 51, not all shown).

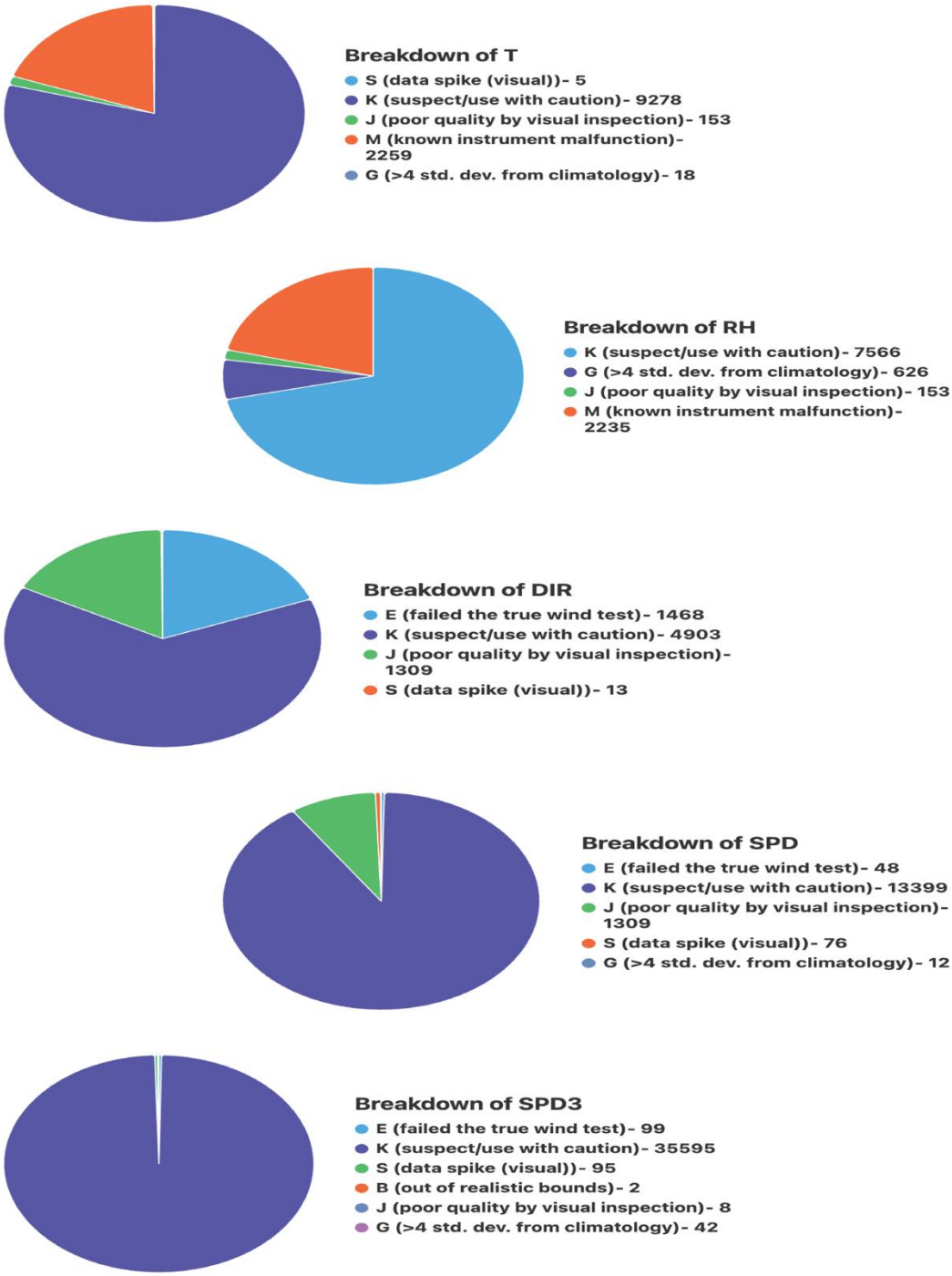


Figure 51: Distribution of SAMOS quality control flags for (first) air temperature – T – (second) relative humidity – RH – (third) earth relative wind direction – DIR – (fourth) earth relative wind speed – SPD – and (last) earth relative wind speed 3 – SPD3 – for the *Oscar Dyson* in 2025.

Oscar Elton Sette

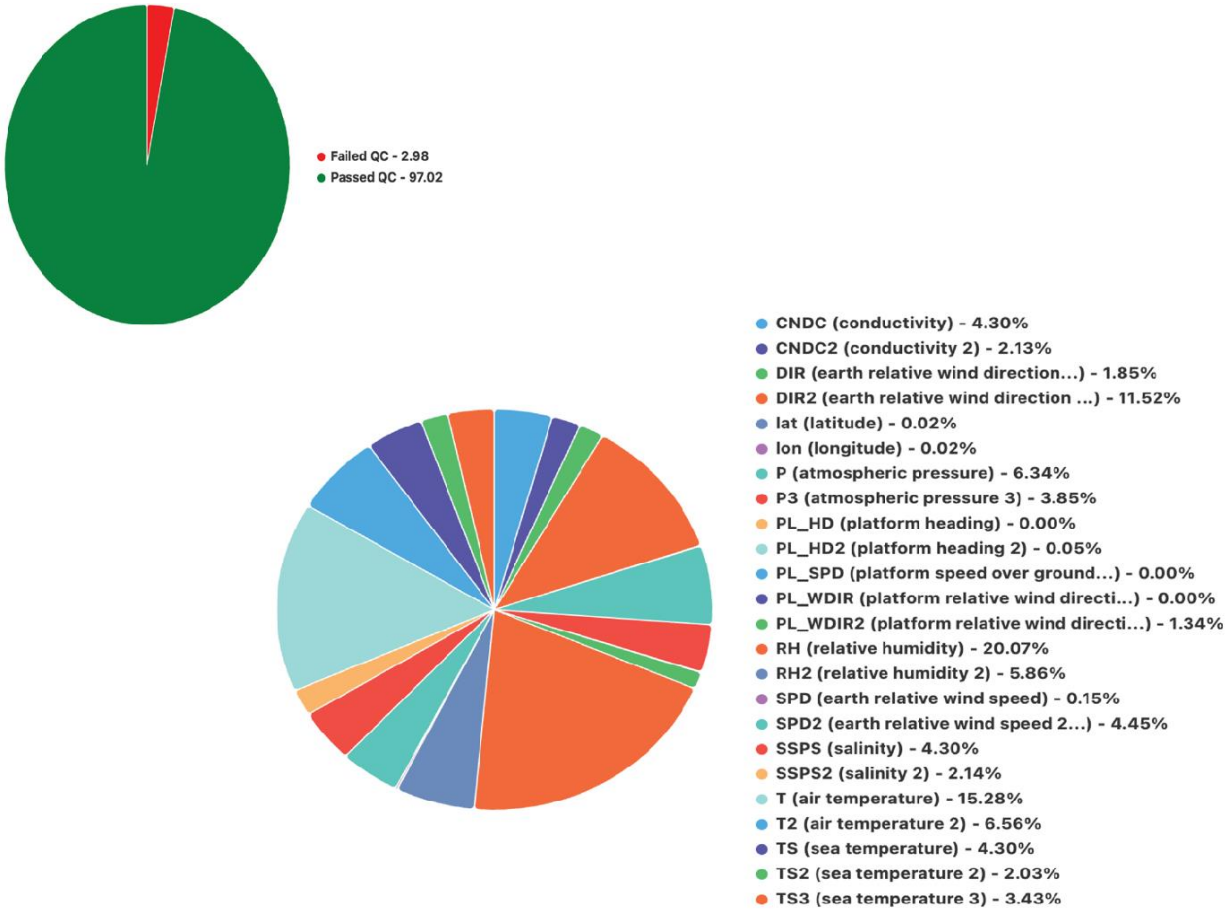


Figure 52: For the *Oscar Elton Sette* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Oscar Elton Sette* provided SAMOS data for 172 ship days, resulting in 6,449,348 distinct data values. After both automated and visual QC, 3.0% of the data were flagged using A-Y flags (Figure 52). This is about one and a quarter percentage points lower than in 2024 (4.3%) and keeps the *Sette* inside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

In a continuation from the 2024 field season, *Sette's* (then sole reporting) relative humidity sensor data (RH) in the early 2025 field season was stuck in an unrealistically narrow range (high 80s to low 90s %), leading to these data receiving primarily poor quality (J) and some caution/suspect (K) flags (Figure 53). There also continued to be a lot of missing/special values in RH as well as in the (then sole reporting) air temperature (T) and the true and relative wind directions and speeds (DIR, PL_WDIR, SPD, PL_WSPD), all of which shared the same translator box as a common terminal before feeding into the ship's SCS data acquisition system. In late April 2025 it was finally

determined the RH serial connections into the translator box had been wired incorrectly all along. Once these connections were rewired, the issue with RH disappeared. The missing/special values often seen in T, DIR, PL_WDIR, SPD, and PL_WSPD also resolved around the same time, although the jury is still out whether those traced back in some way to the miswired RH (seems likely, though).

In May, *Sette* added a Vaisala WXT536 all-in-one weather sensor package to their ship installations, providing SAMOS with a second set of winds (DIR2, PL_WDIR2, SPD2, PL_WSPD2), air temperature (T2), humidity (RH2), and pressure (P2), plus rain rate (R_RATE), data. There were two notable incidences with the WXT a few months after installation. First, the connector at the bottom of the WXT translator came loose on or around 27 July, likely as a result of some rough weather encountered leaving Guam. This naturally resulted in a complete data blackout from the WXT. Second, once operators were able to climb aloft a few days later and reconnect the translator, the resumed DIR2/PL_WDIR2 data were found to have a bias of about +20 to +30 degrees when compared with DIR/PL_WDIR from the old standalone anemometer. It was suspected the WXT mount may have come loose, either from the earlier rough weather or during the ensuing servicing/reinstall. This conjecture was based on the knowledge the same "loosening" had recently occurred with another ship's WXT (and which subsequently came to be understood as a common problem with these WXT ship installs – it is now recommended to drive a bolt through the WXT's pole mount to keep it in place, rather than relying solely on the mount's set screw). A loose mount was confirmed about two weeks later when the ship made port and operators were able to reach the WXT again. Once all points were retightened, DIR2 and PL_WDIR2 came back into alignment with the other anemometer. Meanwhile, any transmitted DIR2 and PL_WDIR2 were assigned malfunction (M) flags for the duration of the problem period (Figure 53).

There were no other noteworthy issues for the *Sette* in 2025. In general, *Sette's* various meteorological sensors, like most vessels, exhibit some data distortion that is dependent on the vessel relative wind direction and, in the case of air temperature and relative humidity, possible ship heating and likely stack exhaust contamination, particularly when the relative flow over the ship is from the stern. Where any of the meteorological data appears affected by flow distortion, exhaust, or ship heating, they are typically assigned K flags (Figure 53, not all shown). We note the issues of flow distortion, exhaust, and/or ship heating are nearly identical between the older meteorological sensors and the newer WXT, as all are mounted in the same general area on the ship's instrument mast.

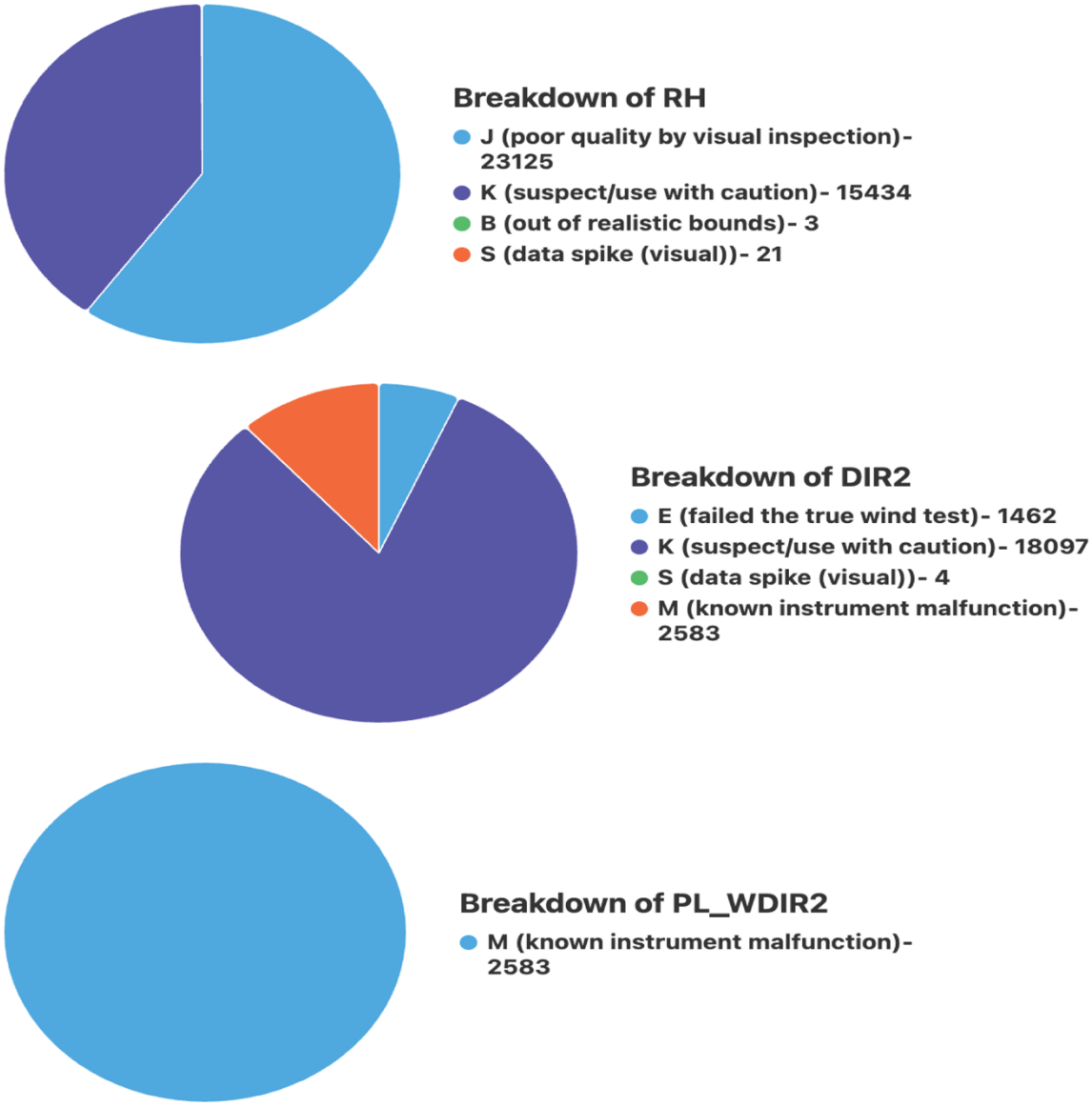


Figure 53: Distribution of SAMOS quality control flags for (top) relative humidity – RH – (middle) earth relative wind direction 2 – PL_WDIR2 – and (bottom) platform relative wind direction 2 – PL_WDIR2 – for the *Oscar Elton Sette* in 2025.

Pisces

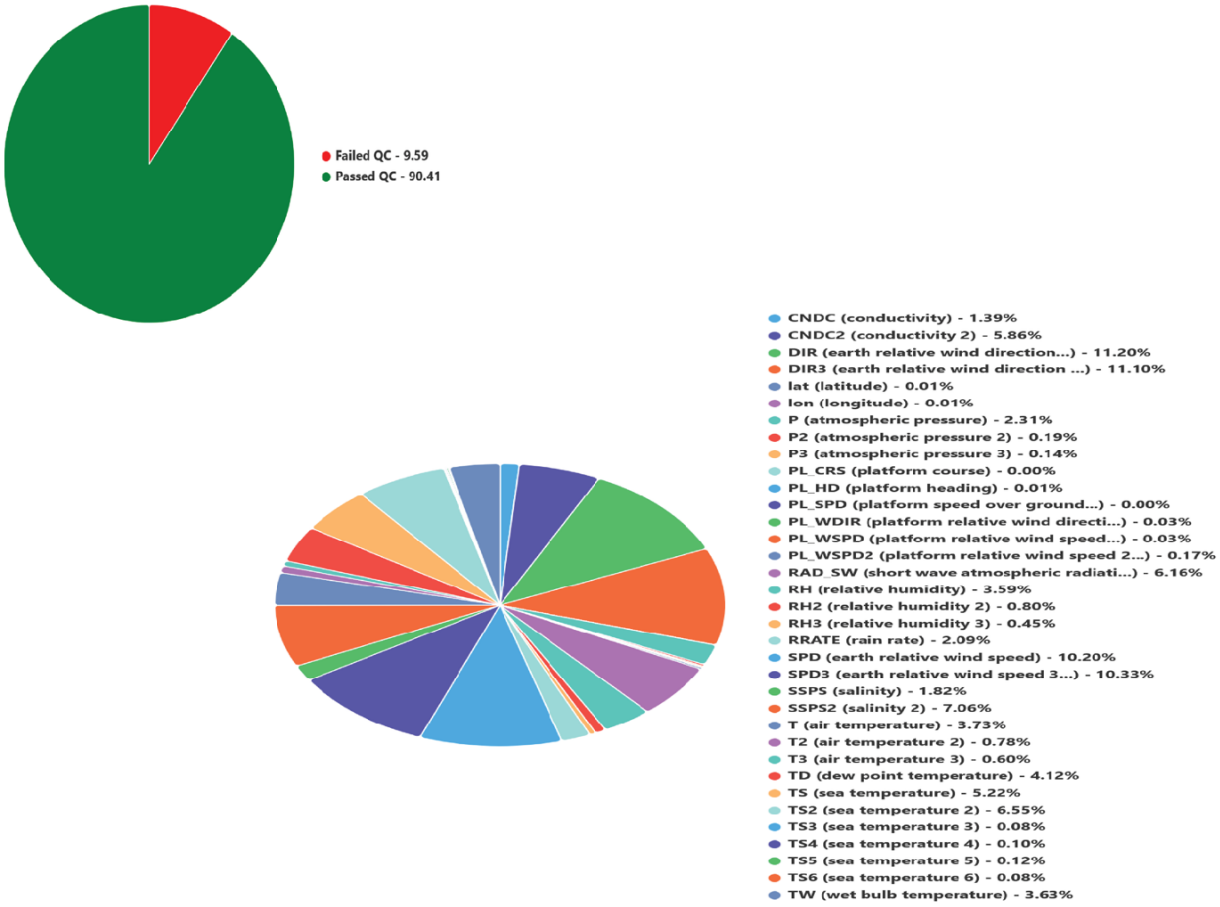


Figure 54: For the *Pisces* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Pisces* provided SAMOS data for 173 ship days, resulting in 8,191,186 distinct data values. After both automated and visual QC, 9.6% of the data were flagged using A-Y flags (Figure 54). This is roughly one percentage point higher than in 2024 (8.3%) and keeps *Pisces* out of the <5% total flagged bracket regarded by SAMOS to represent "very good" data.

From 16 to 20 July, one of the sea temperature sensors (TS2) started reporting values in the thousands to tens of thousands Celsius range, which were assigned out of bounds (B) flags by autoQC (Figure 55). The cause was unknown, as data appeared to look okay on the vessel's end according to ship techs. Data transmission subsequently ceased for about a week while the ship was at the dock. When data transmission resumed again on 1 August, TS2 returned to normal after a single, initial spike around 3,000 Celsius.

Another data quality issue occurred between 27 February and 10 March when pressure, air temperature, wet bulb temperature, dew point temperature, and relative humidity (P, T, TW, TD, RH) started reporting values far below normal, such as 500 mb pressure and –50 Celsius temperature, resulting in B-flags being added by autoQC (not shown). The issue involved ongoing dockside repairs where some sensors were not deployed or running, and meanwhile the SCS data acquisition system was still reporting "data" for reasons that are not clear. Transmissions were shut off 11 March and later turned back on 12 May, at which point the data issues were no longer present.

On 19 May, *Pisces* began transmitting shortwave radiation (RAD_SW) and longwave radiation (RAD_LW) from their new Kipp and Zonen radiation sensors. However, both RAD_SW and RAD_LW were reporting very small, unrealistic values, generally not even 10 W/m^2 for either parameter. RAD_LW data were already not being processed operationally (i.e., for public download) by us, due to a decision made in 2024 owing to the previous (Eppley) sensor's degraded data quality (see 2024 report). Given the issues with the new sensors, we continued suspension of operational RAD_LW processing and began suspension of operational RAD_SW, as well, starting on 20 May. The issues with RAD_SW and RAD_LW were looked at by the ship techs but were not resolved by the end of the year, hence no more data were processed. We note these Kipp and Zonen sensors are brand-new-to-the-fleet, and their installation/configuration and integration with SCS have not been fully worked out to date in 2026.

There were no other issues noted for the *Pisces* in 2025. In general, *Pisces's* various meteorological sensors – DIR, SPD, air temperature (T), relative humidity (RH), calculated dew point and wet bulb temperatures (TD and TW), and, to a lesser extent, atmospheric pressure (P) – do exhibit some data distortion that is dependent on the vessel relative wind direction and, in the case of T/RH, ship heating (all common to most vessels). Where any of these data appear affected, they are generally flagged with K flags (Figure 55, only DIR and SPD shown). *Pisces* also occasionally transmits sea temperature and thermosalinograph (TS, TS2, TS5, SSPS, SSPS2, CNDC, and CNDC2) data while the flow-through sea water system appears to be secured, such as routinely occurs when a vessel is near/at port or in rough seas. Where this trend is apparent, variables receive either K or else "poor quality" (J) flags (Figure 55, only TS2 shown), depending on whether they are positive-valued or zero.

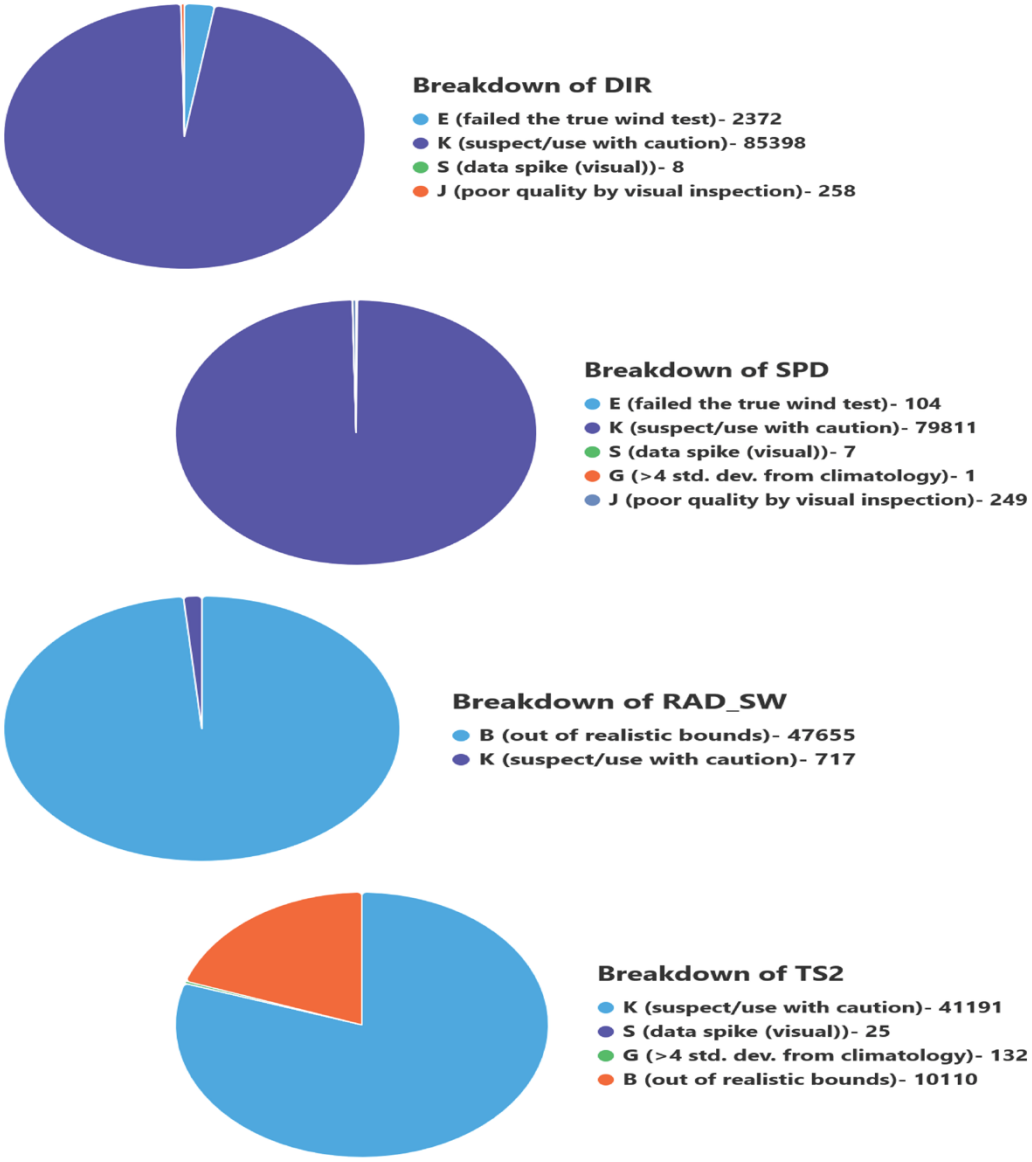


Figure 55: Distribution of SAMOS quality control flags for (first) earth relative wind direction – DIR – (second) earth relative wind speed – SPD – (third) short wave atmospheric radiation – RAD_SW – and (last) sea temperature 2 – TS2 – for the *Pisces* in 2025.

Rainier

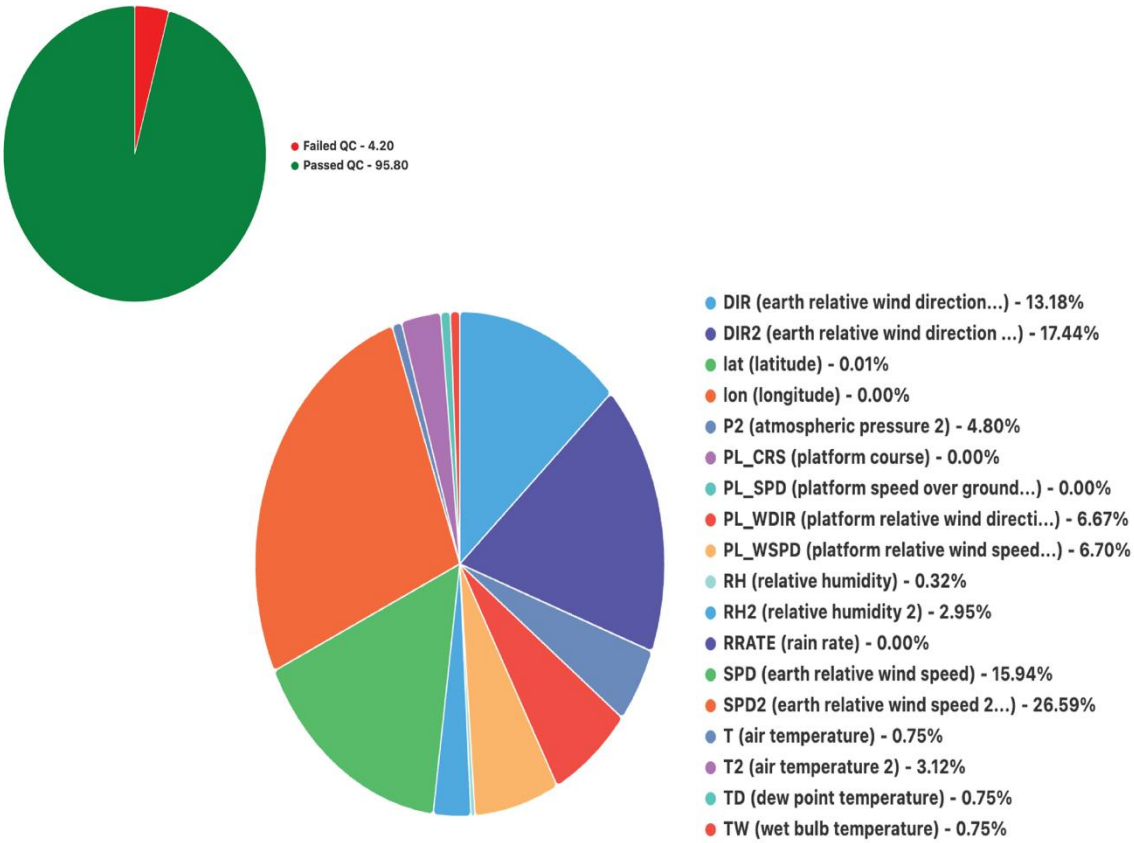


Figure 56: For the *Rainier* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Rainier* provided SAMOS data for 228 ship days, resulting in 5,387,258 distinct data values. After both automated and visual QC, 4.2% of the data were flagged using A-Y flags (Figure 56). This is a significant improvement in data quality as compared to 2024 (10.0%) and puts the *Rainier* into the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

In a repeat from previous years, at random times/days in 2025 the *Rainier's* relative winds (PL_WDIR and PL_WSPD) from the RM Young wind sensor reporting to SAMOS would undergo a period of constant (aka flatlined) values, usually lasting no more than a few hours. These flatline periods did not have any apparent dependency on a particular relative wind direction or vessel speed, nor was the output value the same from one flatline occurrence to the next. A definitive cause was never found over the years, though this analyst suspects the peripheral wind tracker component may have been the culprit, as swapping the anemometer itself never had any effect. Whenever PL_WDIR and PL_WSPD were flatlined, they were assigned "poor quality" (J) flags (Figure 57, only PL_WSPD shown). The true winds (DIR and SPD), being calculated from

PL_WDIR and PL_WSPD, clearly mirrored changes in the platform heading and platform speed during these flatline occurrences. Thus, DIR and SPD were also J-flagged whenever the relative winds were flatlined (Figure 57, only SPD shown). Once PL_WDIR and PL_WSPD begin varying again DIR and SPD also resume typical wind patterns. We note that, as of January 2026, *Rainier* no longer uses the RM Young, having replaced it and other sensors with a Vaisala WXT all-in-one meteorological sensor package. The WXT wind data does not exhibit the same routine flatlining as the RMY did, so the (unsolved) wind issue is, thankfully, no more.

Speaking of the WXT, there was just one other notable data issue in 2025: Shortly after the WXT configuration was stabilized in SCS and data were routinely flowing to SAMOS, the relative wind feeds from the WXT (PL_WDIR2 and PL_WSPD2, not shown in Figure 56) disappeared from the SCS device configuration and the SCS SAMOS instrument metadata XMLs and data files for no discernible reason. The issue sadly went unresolved in 2025, despite even the primary SCS shoreside support person who handled these types of bugs (prior to her retirement in early 2026) eventually looking into it. (Even more mind boggling, the WXT true wind data, DIR2 and SPD2, continued flowing and looked basically fine.) Fortunately, with the start of the 2026 field season, both the true and relative wind data are flowing again for the WXT. Further, as noted above, the WXT is now the sole instrument source for wind data from *Rainier*.

There are no other notable issues for *Rainier* in 2025. As a general note, the installation location of *Rainier's* older pressure (P)and air temperature and humidity (T, RH) sensors were known to have significant exposure issues, being low down on the instrument mast and quite close to the side of the vertical spar (mast tube). Historically, these three parameters were frequently flagged with caution/suspect (K) flags. However, P, T, and RH were only transmitted for two days at the beginning of the 2025 field season, and then completely supplanted by the newer WXT in early April. The WXT's location, being higher up on the mast but still quite close to the mast tube, also suffers from some measure of flow distortion and ship/stack exhaust heating (as with most vessels), resulting primarily in caution/suspect (K) flags on DIR2, SPD2, T2, RH2, and P2 (Figure 57, not all shown). The amount of thermal contamination seems decidedly less than it was with the older T/RH sensor, however. It is now the true winds – DIR2 and SPD2 – that tend to see the most flags, as is evident in Figure 56.

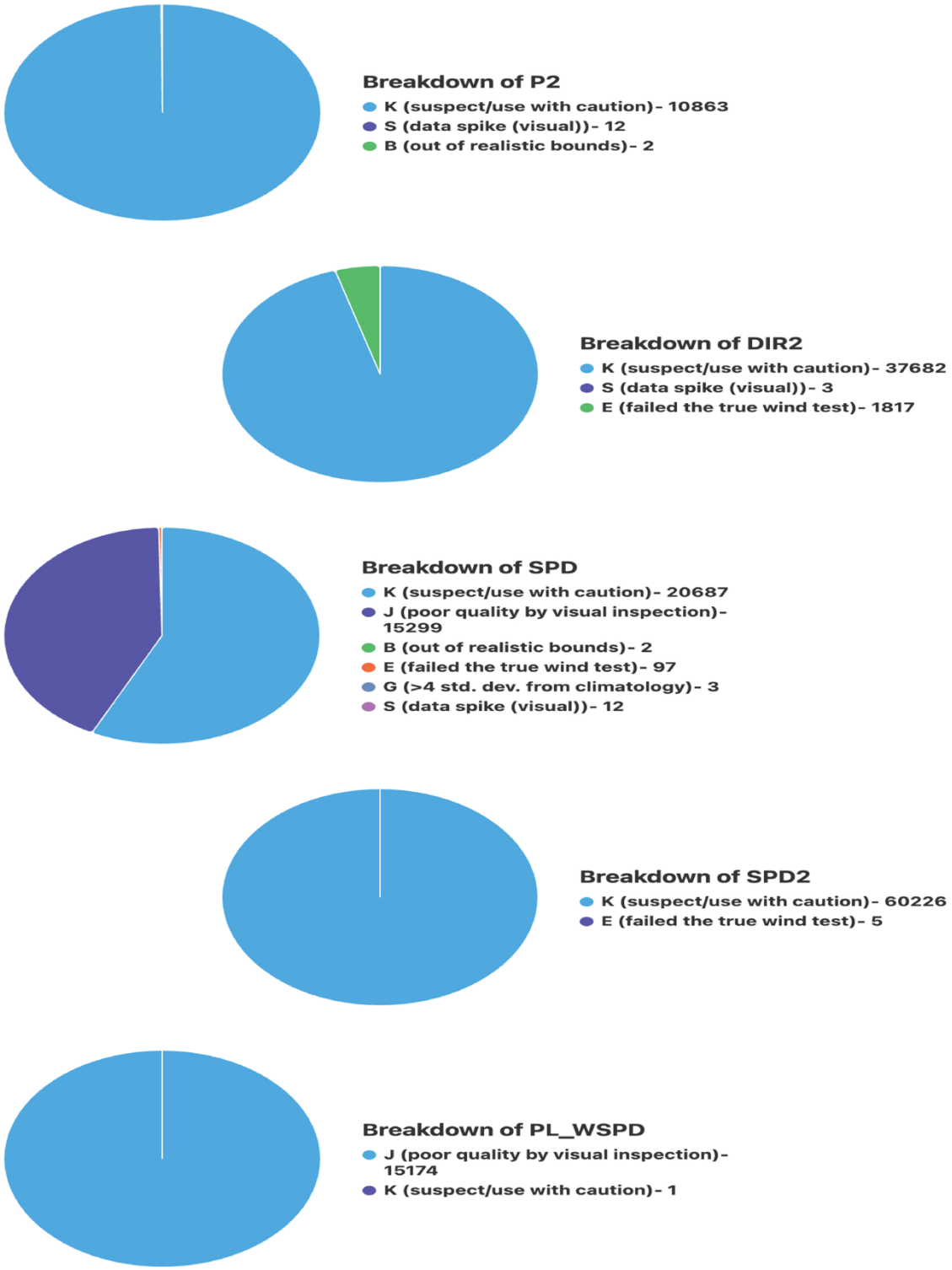


Figure 57: Distribution of SAMOS quality control flags for (first) atmospheric pressure – P – (second) earth relative wind direction 2 – DIR2 – (third) earth relative wind speed – SPD – (fourth) earth relative wind speed 2 – SPD2 – and (last) platform relative wind speed – PL_WSPD – for the *Rainier* in 2025.

Reuben Lasker

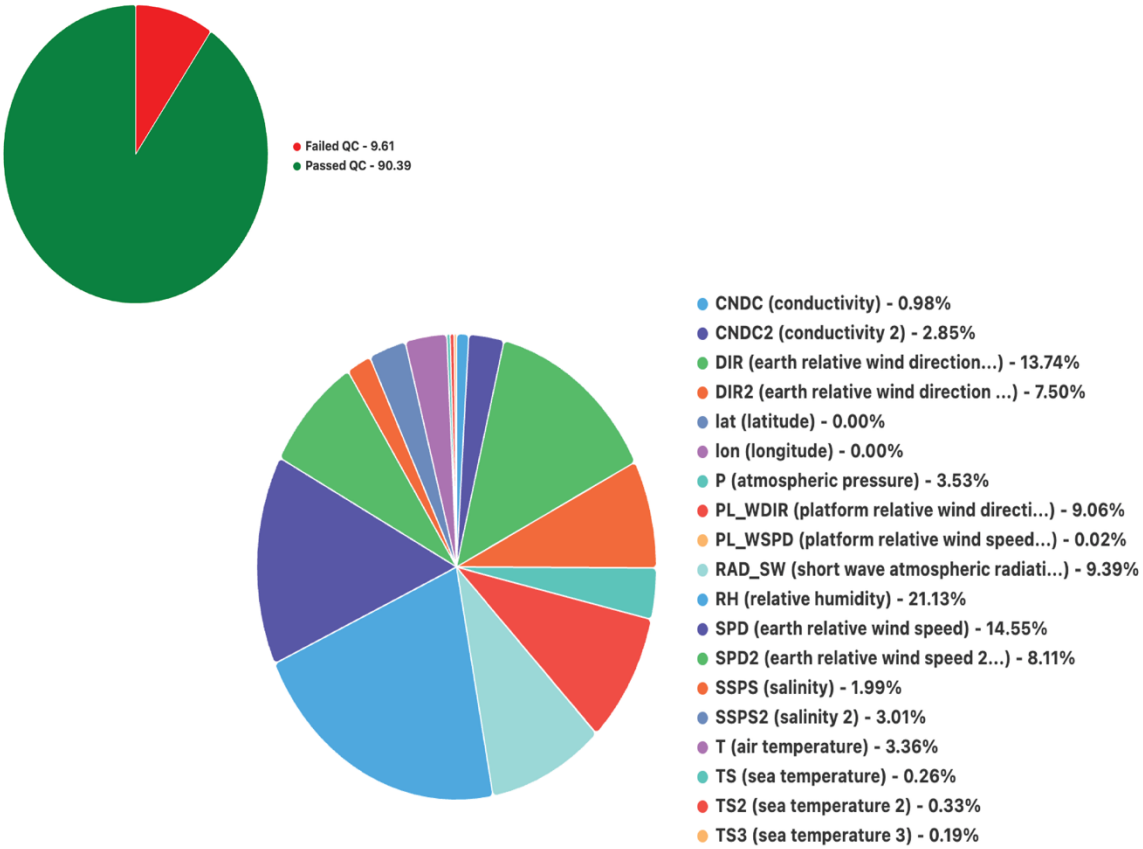


Figure 58: For the *Reuben Lasker* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Reuben Lasker* provided SAMOS data for 126 ship days, resulting in 4,595,238 distinct data values. After both automated and visual QC, 9.6% of the data were flagged using A-Y flags (Figure 58). This is about two percentage points higher than in 2024 (7.2%) and keeps Lasker outside the < 5% total flagged cutoff regarded by SAMOS to represent "very good data".

Looking at Figure 58, more than 20% of the total flags in 2025 were applied to the relative humidity (RH) parameter. In a continuance from the previous year, RH often seemed stuck near or above 100% in 2025, despite having been shipped off to RM Young for calibration the previous October. Many times, it was hard to tell if the vessel may have been stuck in a persistent fog bank (not uncommon for this ship's typical region of operation off the southern California coastline). But with RH values routinely reaching 105% - 110%, which are not plausible even in heavy fog, it was suspected the sensor was probably failing. There was unfortunately no spare temperature and humidity probe available, however, and an expected installation of a new Vaisala WXT536 all-in-one

meteorological sensor package was unable to be completed in 2025 due to installation and configuration issues (a common enough experience during the new sensor rollout among the fleet). The end result was a large volume of mostly out of bounds (B) and some caution/suspect (K) flags being applied to RH throughout the year (Figure 59). We note that as of 1 April 2026, WXT T2 and RH2 have completely replaced T and RH.

On 3 January, when Lasker began transmitting data for their last cruise before a dry dock period, it was noted the relative wind direction data (PL_WDIR) for the RM Young mechanical anemometer looked to be off by ~180 degrees. As a result, the true winds (DIR and SPD) showed erroneous steps in the data that were tracking with the ship's heading and course. The ship was contacted, and operators concurred the anemometer had likely been reinstalled backwards but noted there would not be an opportunity to do anything about it before the upcoming dry dock period. It was hoped data transmission for the RMY could be suspended in the SCS acquisition system for the time being. Unfortunately, the opportunity to do so did not end up materializing before the ship reached land, and thus PL_WDIR, DIR, and SPD incurred a volume of malfunction (M) flags in the period 3 January through 2 February (Figure 59, not all shown).

There were no other notable issues in 2025. In general, *Reuben Lasker's* earth relative wind parameters (SPD, SPD2, DIR, and DIR2) exhibit a fair amount of data distortion that is dependent on the vessel's relative wind direction (not uncommon). Where data appear affected, they are generally assigned K flags (Figure 59, not all shown). Additionally, *Lasker's* short wave radiation sensor (RAD_SW) is known to be located right next to the deck area from where they trawl. This area is routinely lit up very brightly during nighttime trawls. Positive (> 10-20 W/m^2) steps are frequently observed in RAD_SW at night, seemingly in response to the bright trawl lights. As such, nighttime RAD_SW are often flagged as either "caution/suspect" (K) or "poor quality" (J) at night (Figure 59). These flags are in addition to any "out of bounds" (B) flagging of slightly negative nighttime values that occur with RAD_SW sensors, owing to sensor tuning (see 3b. for details). We note there is often limited real estate for sensors on a ship, and sometimes sensor locations are a bit of a compromise. In this case, with nighttime values of RAD_SW essentially of no scientific interest anyway, the sacrifice made in favor of sensor accessibility seems well chosen. Finally, Lasker's SBE-21 and SBE-45 Sea-Bird thermosalinographs are known to occasionally show small data spikes in the sea temperatures (TS2 and TS3) and/or low grade sawtooth oscillations in the salinity and conductivity parameters (SSPS, SSPS2, CNDC, CNDC2) while underway. Signs point to this being a plumbing issue, and the effects are usually sufficiently small as to not be of much concern. Some limited amount of caution/suspect (K) and spike (S) flagging does occur with all of these parameters, though (not shown).

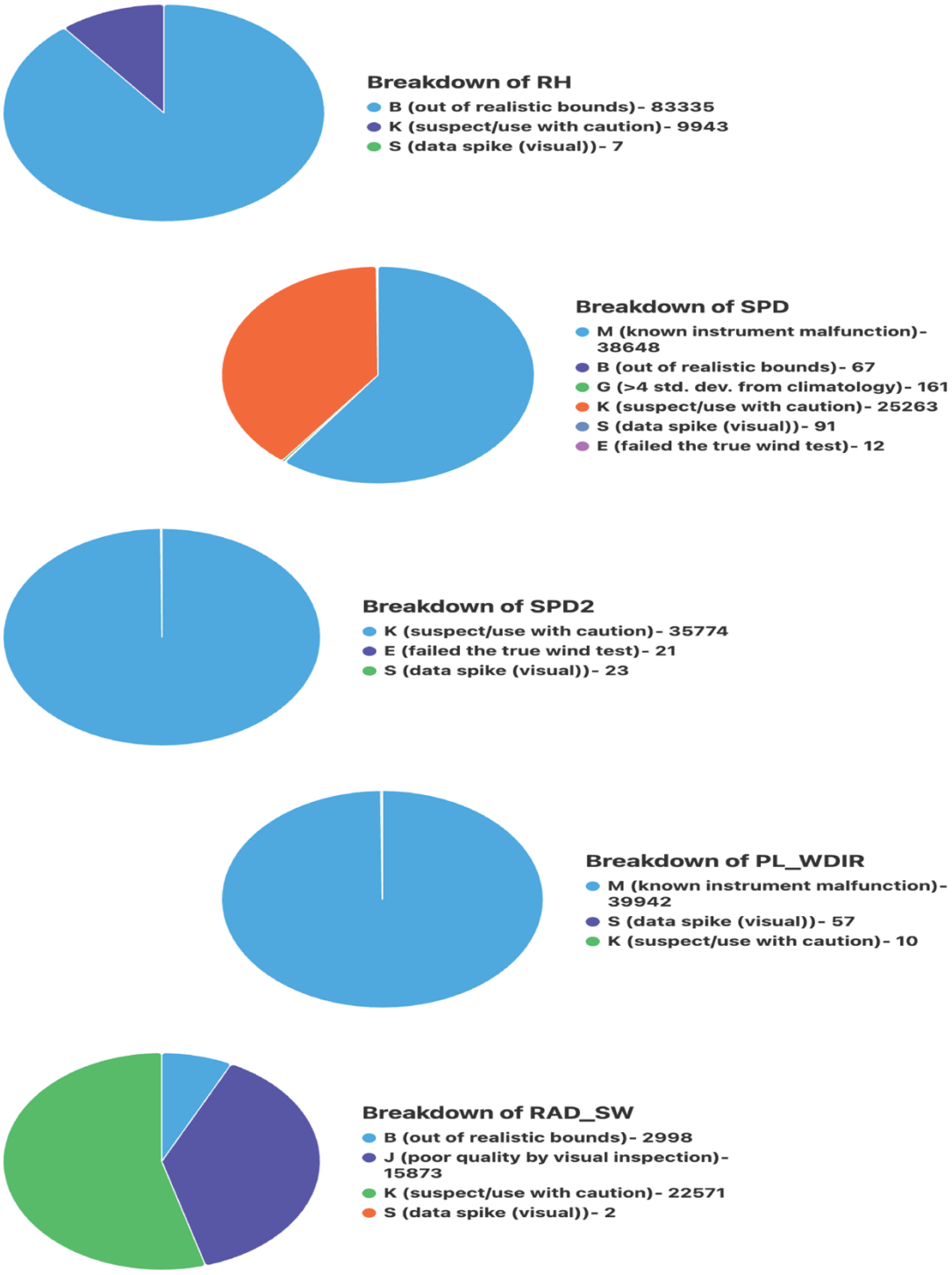


Figure 59: Distribution of SAMOS quality control flags for (first) relative humidity – RH – (second) earth relative wind speed – SPD – (third) earth relative wind speed 2 – SPD2 – (fourth) platform relative wind direction – PL_WDIR – and (last) short wave atmospheric radiation – RAD_SW – for the *Reuben Lasker* in 2025.

Ron Brown

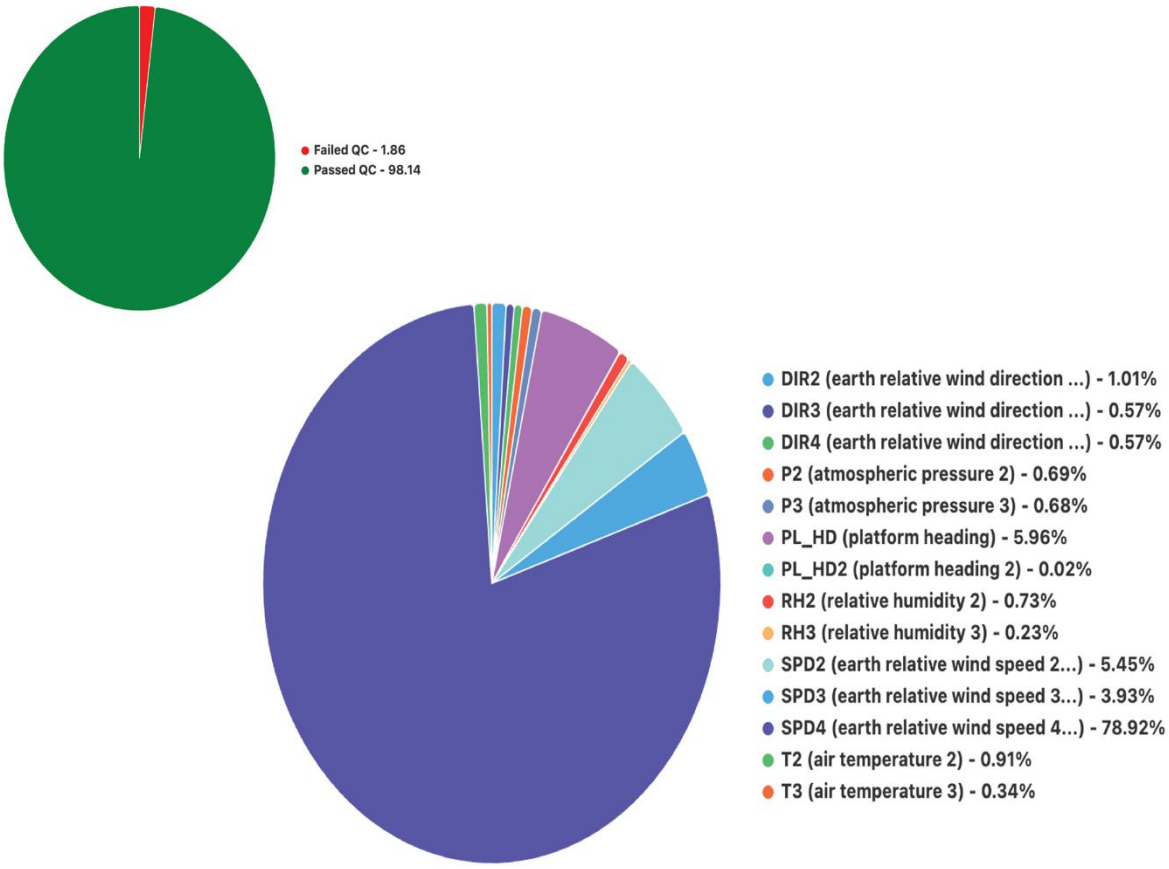


Figure 60: For the *Ron Brown* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Ron Brown* provided SAMOS data for 16 ship days, resulting in 673,921 distinct data values. After both automated and visual QC, 1.9% of the data were flagged using A-Y flags.

Ron Brown returned to service in the second half of 2025, after a lengthy (~2yr) midlife refit period. SAMOS transmissions resumed from the ship on 26 September 2025. Unfortunately, the ship suffered a catastrophic engine fire shortly after leaving port and was immediately taken back out of service. The last SAMOS transmission from the ship was on 11 October 2025. It is not clear at this time (now mid-2026) when the *Brown* may return to service. But we look forward to the day we see this ship sailing again!

With so little data transmitted and such a low total flagged percentage, it isn't really worth drilling down into the individual parameter flag percentages. Although, looking to Figure 60, we can at least note in this brief period the overwhelming majority of the flags

were applied to the true wind speed associated with the ultrasonic anemometer installed on the starboard side of the flying bridge (SPD4). These were virtually all caution/suspect (K) flags (not shown) that were likely applied whenever flow distortion due to sensor siting was suspected in the data (commonly observed in anemometer data from most vessels).

Thomas Jefferson

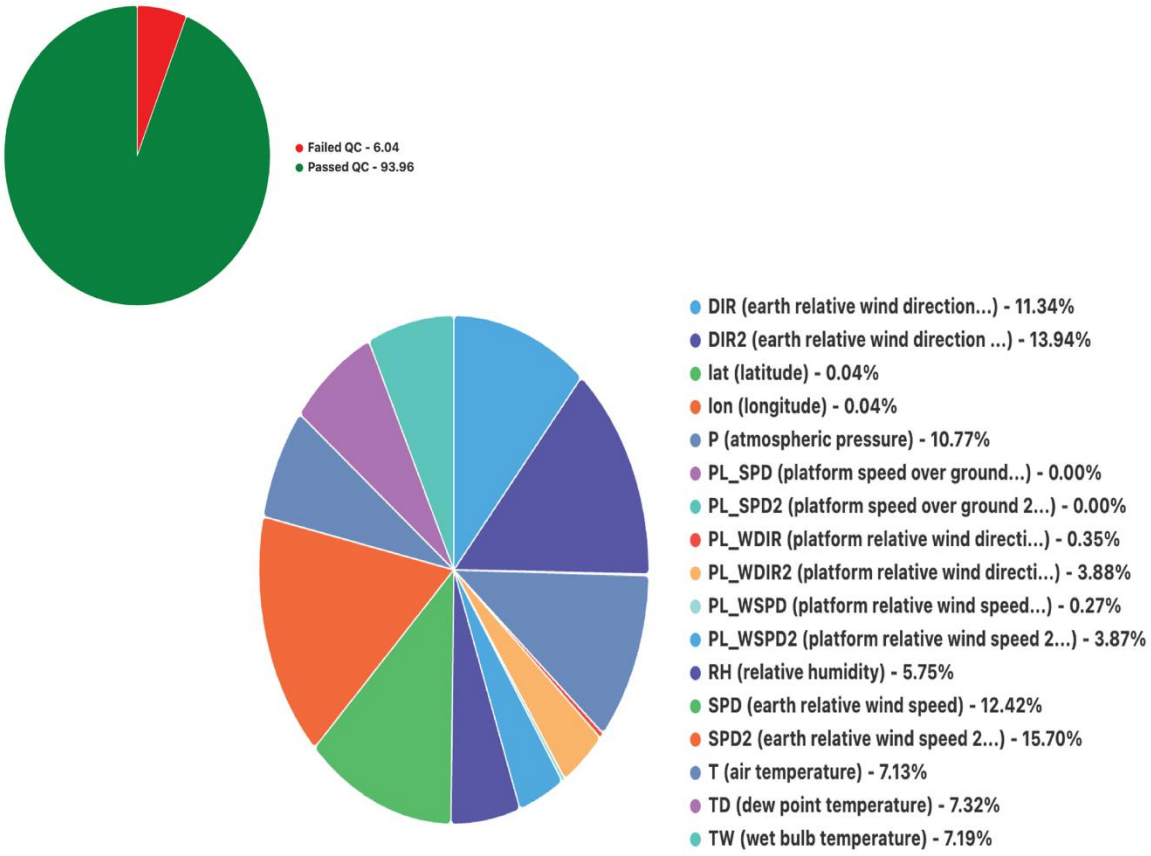


Figure 61: For the *Thomas Jefferson* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Thomas Jefferson* provided SAMOS data for 188 ship days, resulting in 5,069,178 distinct data values. After both automated and visual QC, 6.0% of the data were flagged using A-Y flags (Figure 61). This is nearly identical to 2024 (5.7%) and keeps *Thomas Jefferson* just outside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

The only issue of note in 2025 occurred fairly late in the field season. Beginning on 18 August, at the start of a new cruise, it was noted the relative wind direction and speed from the starboard RM Young anemometer (PL_WDIR2 and PL_WSPD2) were often in very poor agreement with the port anemometer. The true wind direction and speed associated with the starboard anemometer (DIR2 and SPD2) also exhibited a lot of "steps" in the data and just generally did not align with the port true winds or any available satellite/station wind comparisons (see Figure 62). Email communications with ship operators ensued, and some troubleshooting took place over the next week or so. But by 28 August, with the issue ongoing (more questions having been found than

answers) and ship operators needing to tend to other ship and science tasks, the decision was made to temporarily disable SAMOS processing for the starboard sensor. It was eventually suspected there was a configuration error in the RMY translator that was misinterpreting incoming voltage signals and outputting skewed digital values, which were even negative at times (an impossibility for wind direction and speed). But by this time, it was near the end of the field season and there was no remaining opportunity to try reconfiguring the translator, thus there were no more starboard wind data transmitted in 2025. From 18-28 August, all of the starboard wind parameters received primarily poor quality (J) and some caution/suspect (K) flags (mainly PL_WDIR2) wherever the data appeared affected (Figure 63).

There were no other issues of note for *Thomas Jefferson* in 2025. As a general note, *Thomas Jefferson's* various meteorological sensors, especially the wind sensors, do exhibit a fair amount of data distortion that is dependent on the vessel relative wind direction and potentially, in the case of atmospheric pressure (P), the vessel speed. Ship/stack heating is also sometimes present in the temperature (T, TD, TW) and relative humidity (RH) parameters, again depending on the vessel's relative wind direction. (All common to most vessels.) Where the data appear affected, they are generally "caution/suspect" (K) flagged (Figure 63, not all shown). We also note the *Jefferson* installed a Vaisala WXT536 all-in-one meteorological sensor suite in 2025. However, due to configuration/integration issues and questions of data quality (all common enough as these sensors rolled out to the fleet over the year), *Jefferson's* WXT data streams were unable to be added to SAMOS processing in 2025.

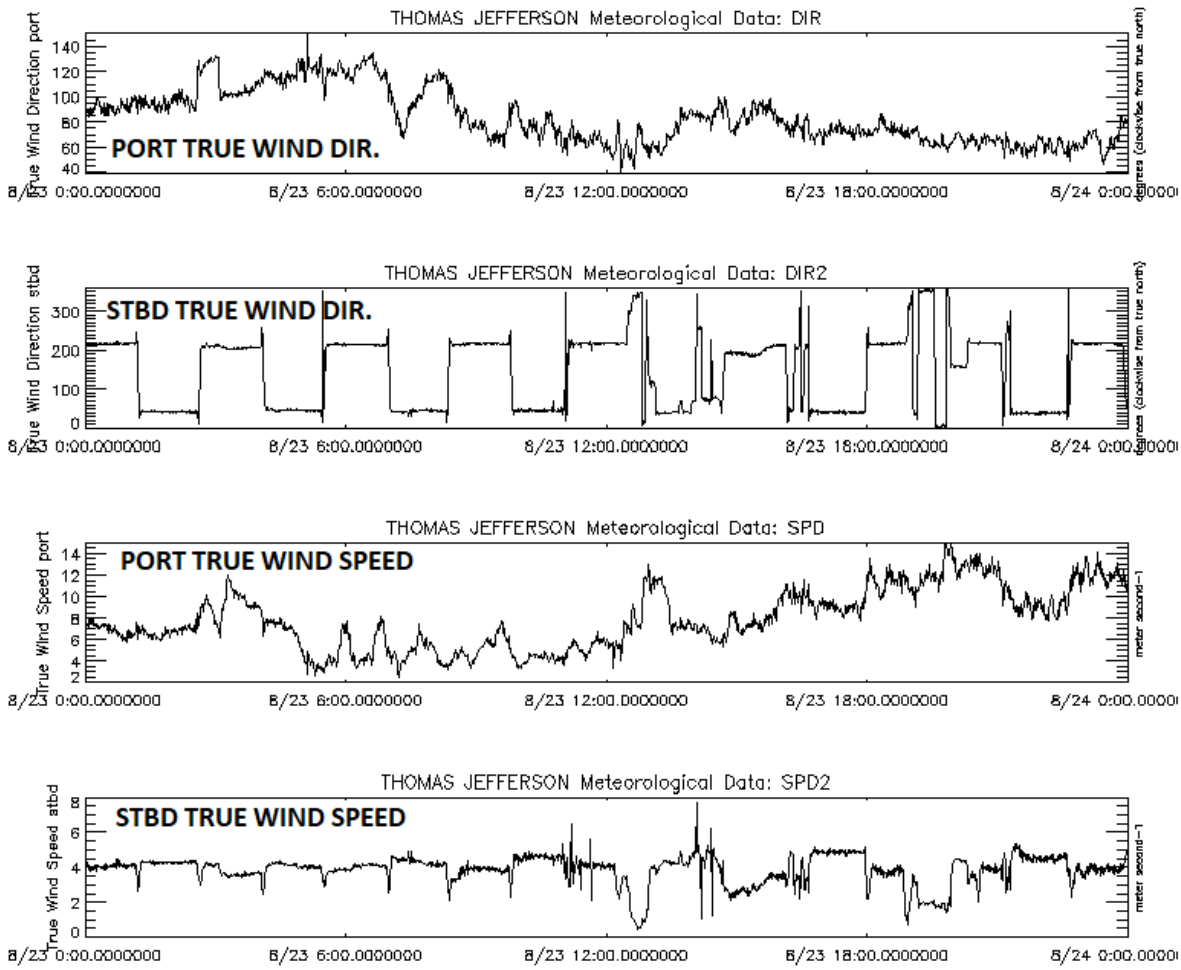


Figure 62: *Thomas Jefferson* SAMOS (first) earth relative wind direction – DIR – (second) earth relative wind direction 2 – DIR2 – (third) earth relative wind speed – SPD – and (last) earth relative wind speed – SPD2 – data for 23 August 2025. Note obvious steps in the starboard true wind parameters DIR2 and SPD2 and general disagreement with the port parameters DIR and SPD.

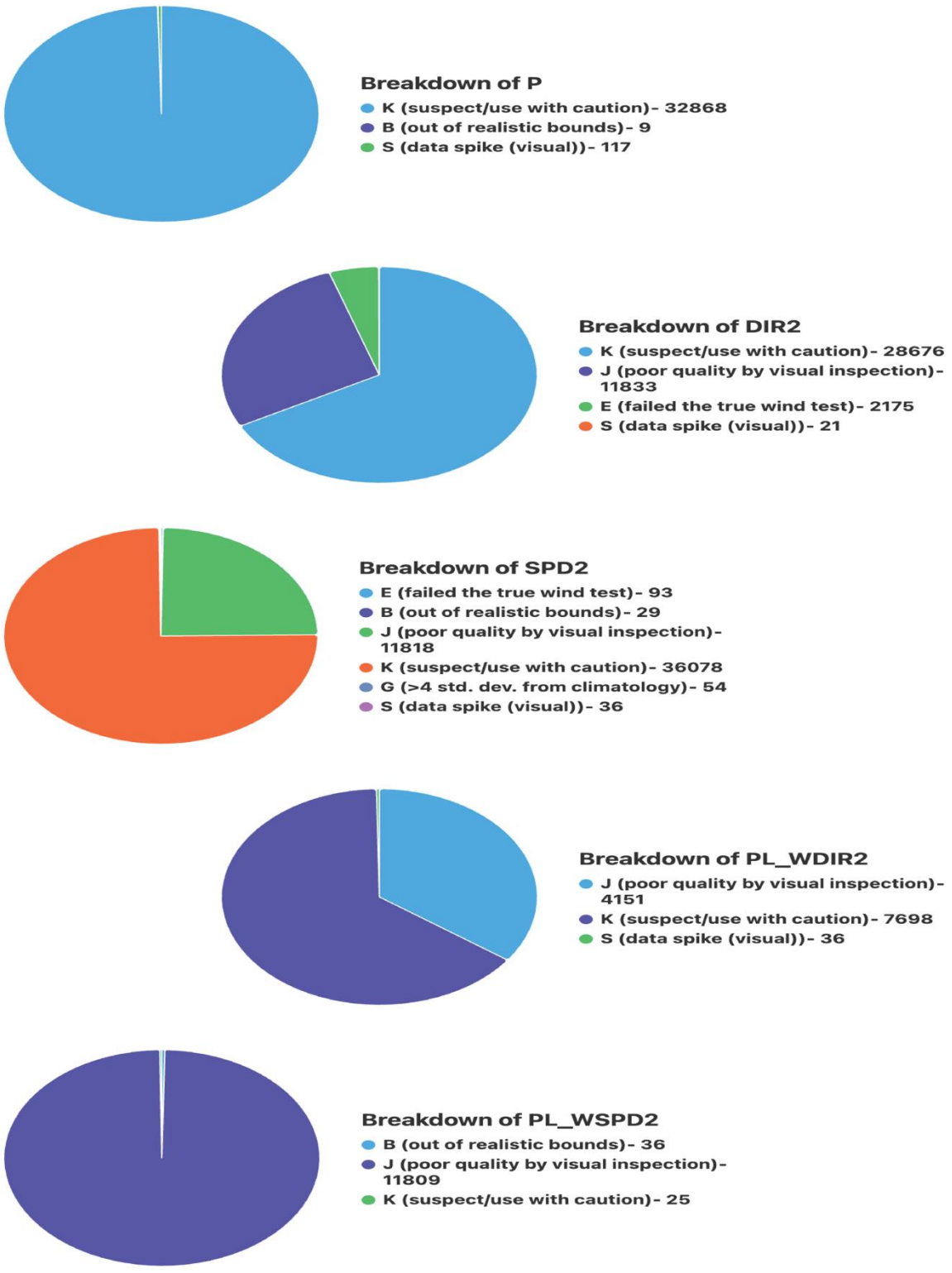


Figure 63: Distribution of SAMOS quality control flags for (first) atmospheric pressure – P – (second) earth relative wind direction 2– DIR2 – (third) earth relative wind speed 2 – SPD2 – (fourth) platform relative wind direction 2 – PL_WDIR2 – and (last) platform relative wind speed 2 – PL_WSPD2 – for the Thomas Jefferson in 2025.

Nathaniel B. Palmer

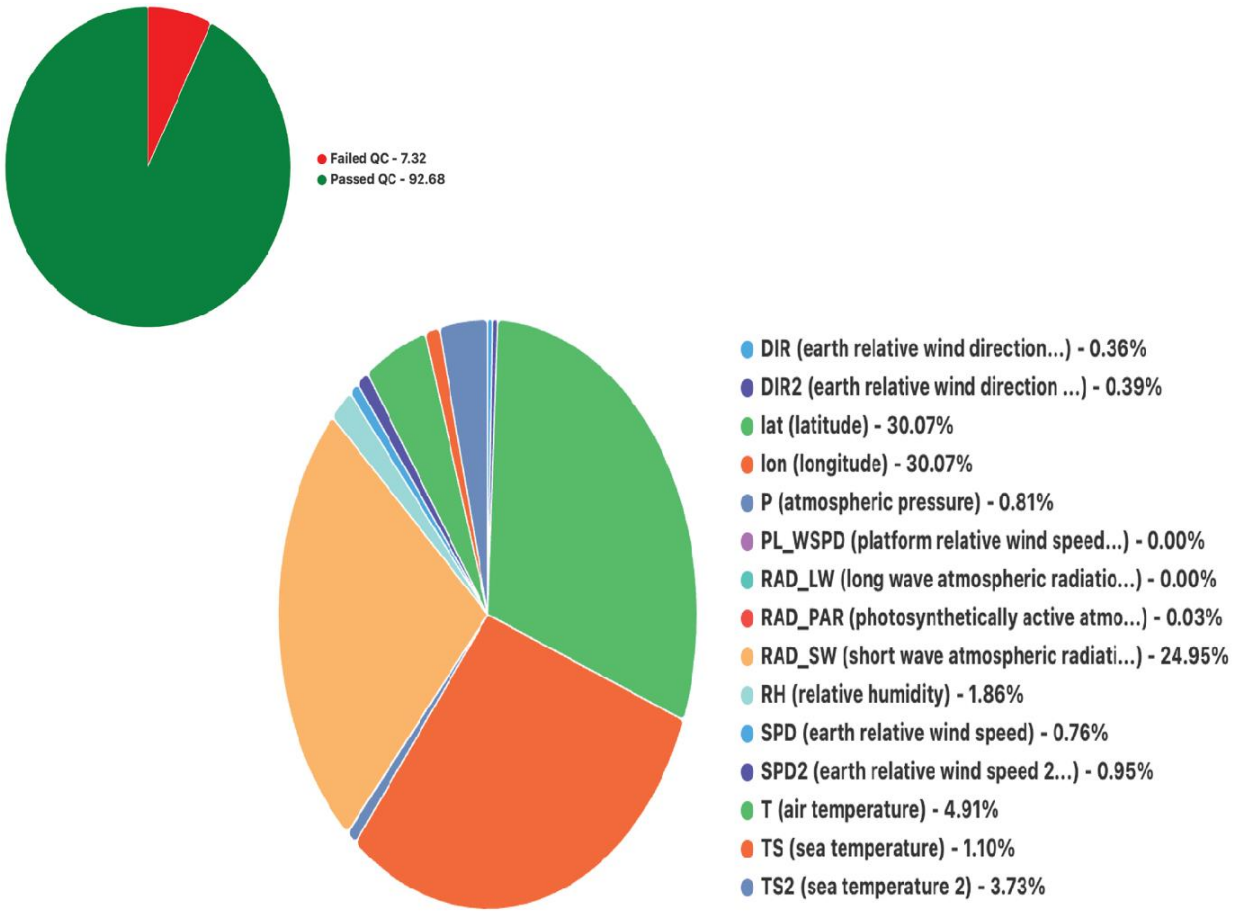


Figure 64: For the *Nathaniel B. Palmer* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

Sadly, 2025 is the last year the *Nathaniel Palmer* contributed to SAMOS. The vessel was retired from the program on 17 October 2025, and we thank the technicians and crew for providing 19 years of high-quality data in the Southern Ocean. The *Nathaniel Palmer* provided SAMOS data for 277 ship days in 2025, resulting in 8,376,287 distinct data values. After automated QC, 7.3% of the data were flagged using A-Y flags (Figure 64). This is nearly identical to 2024 (7.0%). It should be noted that the *Palmer* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only. Also, the *Nathaniel Palmer* frequently transmitted data while dockside in Chile, resulting in the large number of "platform position over land" (L) flags.

A few minor issues occurred with the *Nathaniel Palmer* data in 2025. From 3-6 February 2026, the atmospheric pressure (P) data should not be used because, following a sensor swap, the technicians got sidetracked by other issues prior to configuring the new barometer. The barometer configuration was completed by 0400 UTC on 6 February. While in port in Chile, some cleanup work on the SAMOS processing codes resulted in some odd data averaging on 24 July 2025. Data prior to 2043 on this day should not be used. Additionally, several periods with missing data from one or more devices are documented in Annex A. Some were caused by temporary power issues, tripped breakers, or email problems that typically were resolved after a few days.

There were no other issues noted in 2025 for the *Palmer*. Looking to the flag percentages in Figure 64, ~60% of the total flags were applied to latitude (LAT) and longitude (LON), and ~25% to short wave atmospheric radiation (RAD_SW). These were almost exclusively L flags in the case of LAT and LON (Figure 65) that appear generally to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port. In the case of RAD_SW, all the flags were B flags (Figure 65) and appear to have been applied mainly to negative nighttime values. Once again, slightly negative values commonly occur with shortwave sensors at night.

As a general note, it is known that *Palmer's* sensors are frequently affected by airflow being deflected around the super structure, as well as stack exhaust contamination, although, being a vessel that does not receive visual QC, none of this is evident in the flag percentages seen in Figure 64. Finally, the *Palmer* frequently transmitted flow through water data (TS, TS2, SSPS, CNDC) when the pumps were shutdown (typically in port or an EEZ). When known, these are identified in Annex A.

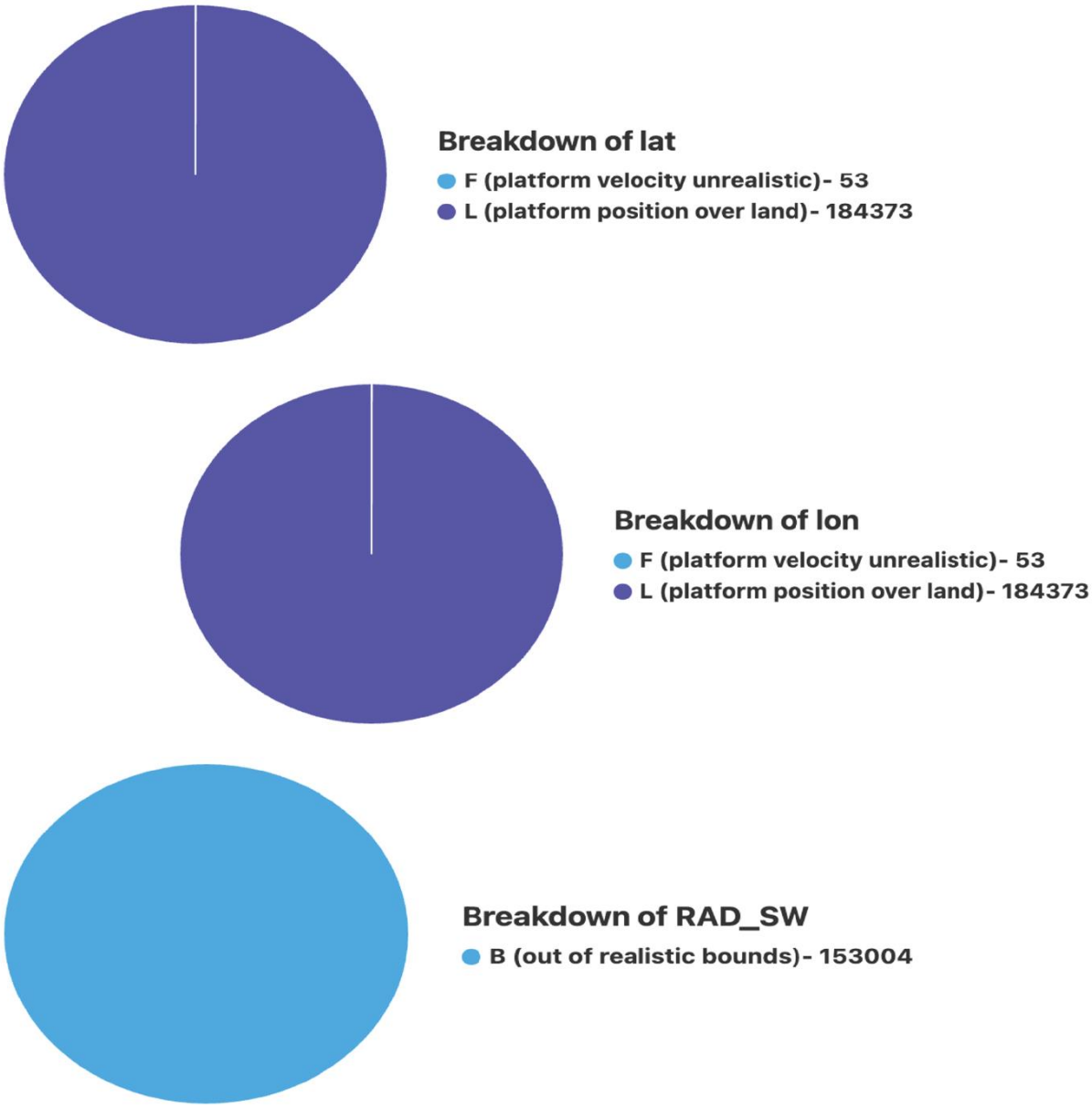


Figure 65: Distribution of SAMOS quality control flags for (top) latitude – LAT – (middle) longitude – LON – and (bottom) short wave atmospheric radiation – RAD_SW – for the *Nathaniel B. Palmer* in 2025.

Robert Gordon Sproul

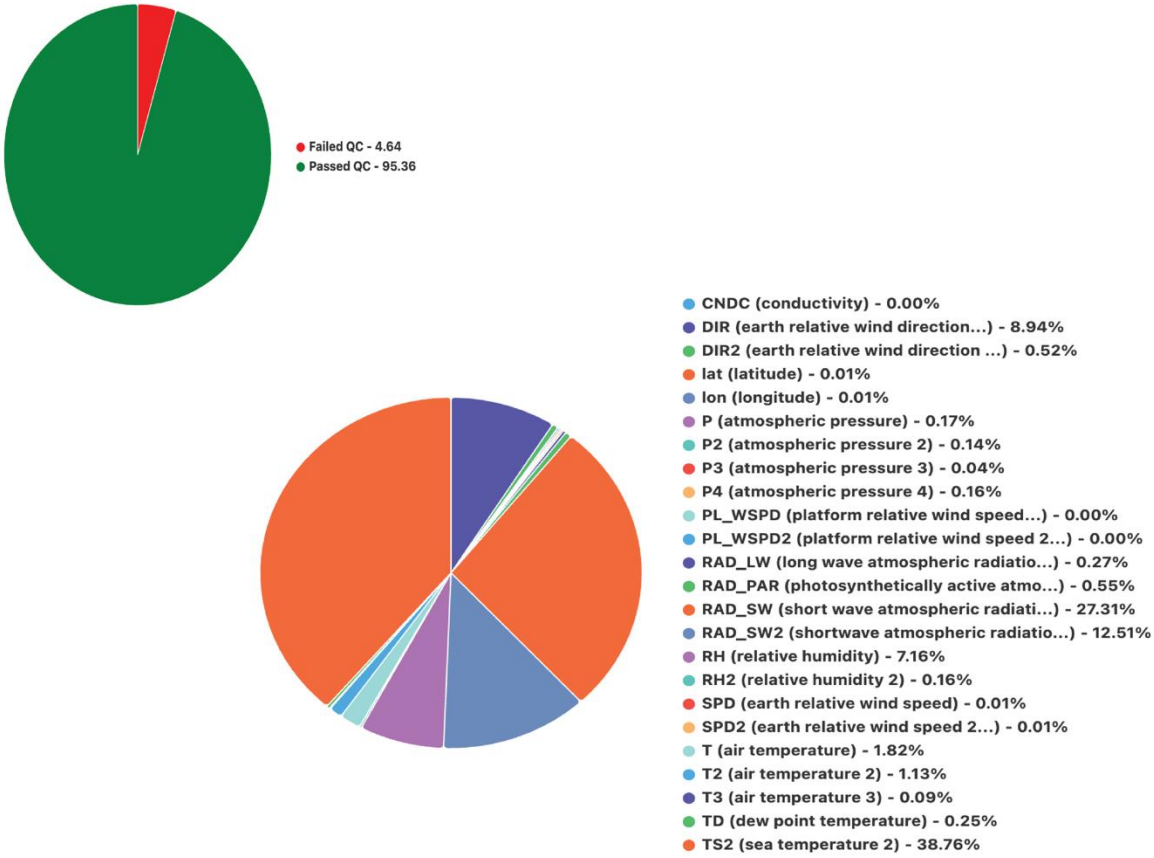


Figure 66: For the *Robert Gordon Sproul* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Robert Gordon Sproul* provided SAMOS data for 335 ship days, resulting in 11,935,082 distinct data values. After automated QC, 4.6% of the data were flagged using A-Y flags (Figure 66). This is approximately one percent higher than 2024 (3.4%) and keeps *Sproul* under the 5% total flagged cutoff regarded by SAMOS to represent "very good" data. It should be noted the *Sproul* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only (no research-level files exist at the SAMOS DAC for the *Robert Gordon Sproul*).

From 20 January to 15 April, air temperature (T) was reading higher than T2 by about 3 Celsius. Initially, it appeared that T was the issue, but when comparing *Robert Gordon Sproul* data to *Sally Ride* data while both were near the Channel Islands showed that T2 was the more likely culprit due to poor agreement between the vessels. After the ship techs replaced the sensor, the difference between T and T2 fell to 1 Celsius, which is a reasonable difference. However, T would see more data issues, such as intermittent spikes resulting in out of bounds (B) and climatology (G) flags (not shown) from 2 May

to 4 May and again from 30 May to 14 June. The most likely reason for this was sensor failure, and it was replaced on 16 June and the spikes ceased. This new sensor would later be removed from *Robert Gordon Sproul* and installed on *Sally Ride* on 8 December.

One notable data issue affects the relative humidity (RH) for the *Sproul* throughout 2025. The SIO team in 2024 modified their software to record relative humidity values over 100% (previously these values were set to NaN and treated by SAMOS as missing values), so there are periods where the relative humidity (RH) received B and G flags for RH > 100% (Figure 67).

There were no other issues of note for the *Sproul* in 2025. Looking to the flag percentages in Figure 66, nearly 39% of the total flags were applied to the thermosalinograph sea temperature (TS2). These were mostly G flags (Figure 67) and were mainly due to instances of the sea water system being off over the course of the year, generally when the vessel was in port (common) but also occasionally during a cruise in which the resident science party did not want the thermosalinograph running (common for this vessel). Short wave radiation (RAD_SW) also received ~27% of the total flags (Figure 66). Upon inspection the flags, which are unanimously B flags (Figure 67), appear to have been applied mainly to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.) Finally, there were periods when the TS2, conductivity (CNDC), and salinity (SSPS) data exhibited a smooth time series not representative of real ocean observations. This tends to occur when the pumps to the sea water system are shutdown, particularly when the vessel is still sending SAMOS data while in port. This sometimes results in B or G flags (Figure 67, only TS2 shown) being applied to these variables when the sea water in the pipes is not representative of the surrounding environment, but the autoQC does not flag all occurrences. When noted, the dates of these shutdowns are listed in Annex A.

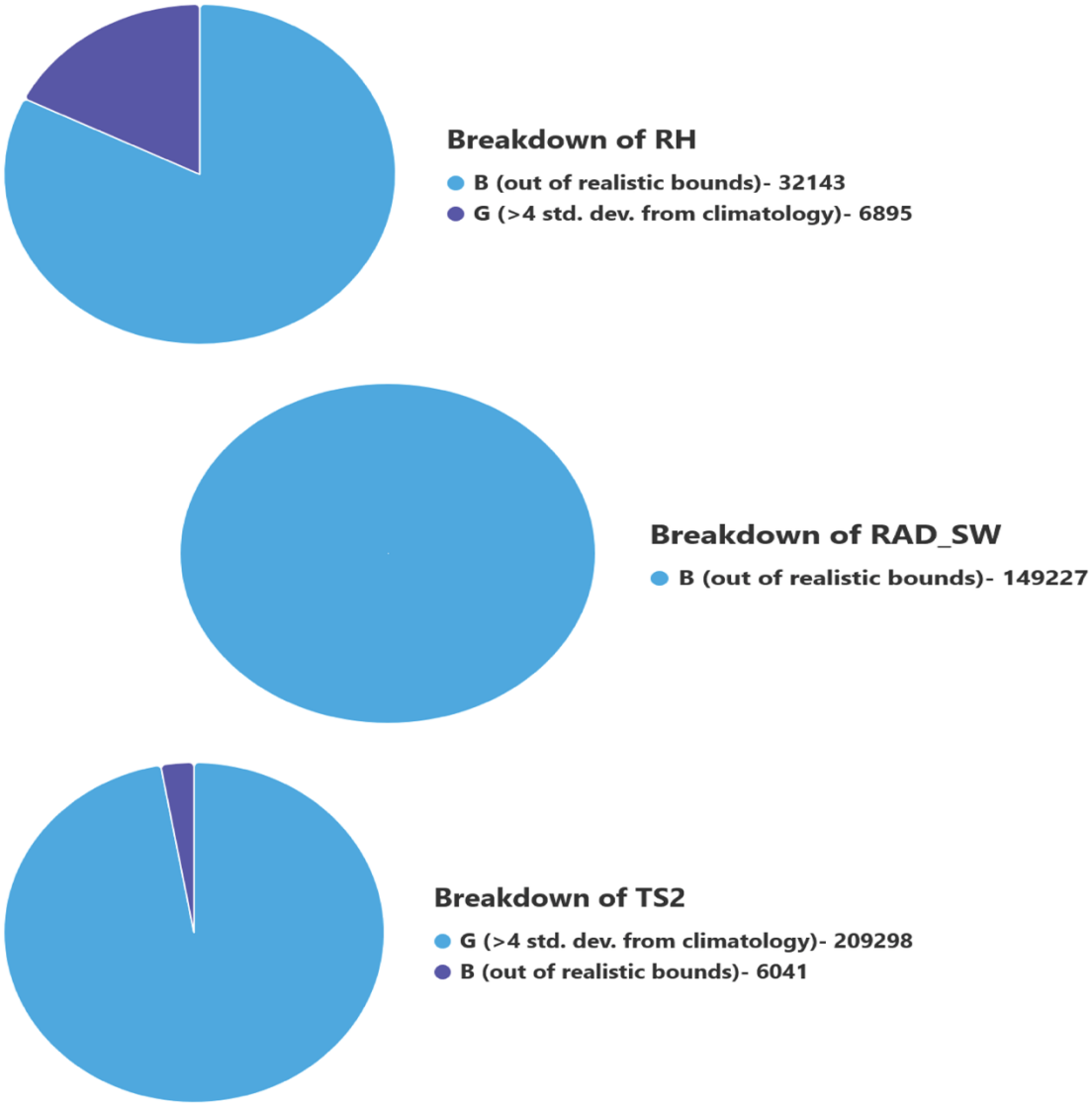


Figure 67: Distribution of SAMOS quality control flags for (top) relative humidity – RH – (middle) short wave atmospheric radiation – RAD_SW –and (bottom) sea temperature 2 – TS2 – for the *Robert Gordon Sproul* in 2025.

Roger Revelle

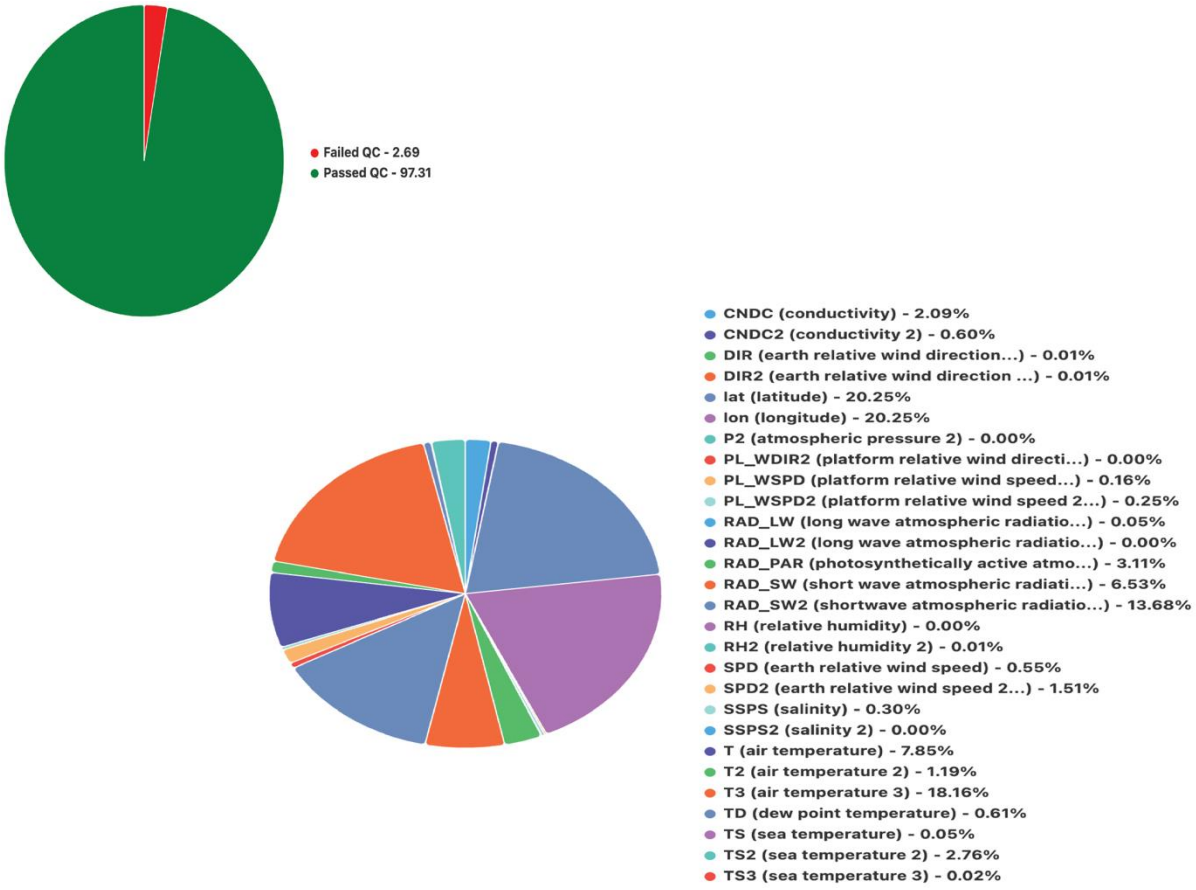


Figure 68: For the *Roger Revelle* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Roger Revelle* provided SAMOS data for 257 ship days, resulting in 12,257,542 distinct data values. After automated QC, 2.7% of the data were flagged using A-Y flags (Figure 68). This is about a one and a half percentage increase in flags as compared to 2024 (1.1%) but keeps the *Revelle* inside the <5% total flag range that SAMOS considers "very good" data. It should be noted that the *Revelle* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only (no research-level files exist at the SAMOS DAC for the *Roger Revelle*).

Starting on 18 April, the precipitation data (PRECIP) began flatlining at a value of -0.5 mm, which is an unrealistic value, which resulted in out of bounds (B) flags being applied by autoQC (not shown). This value would increase slightly to 0.5 mm between 30 August and 1 September, still continuously flatlined until 29 September, when PRECIP was temporarily removed from processing. The ship techs reported the sensor as failing,

and a replacement on 4 December resolved the issue. Data from PRECIP during this period should not be used; PRECIP2 should instead be utilized as it did not have this issue.

Another issue arose in the shortwave radiation data (RAD_SW2) where extremely large spikes exceeding the normal range up to 60,000 W/m^2 were recorded for about a month between 1 May and 4 June. After investigation by ship techs, these values were actually found to stem from small negative values. This is normal behavior, as the sensors are calibrated to be more accurate at high radiation values rather than low radiation values (see 3b.). The problem was with how these small negative values were being read by the ship's software. The issue of unrealistically large values was resolved starting on the 4 June file. This issue contributed many B flags for RAD_SW2, as seen in Figure 69.

Similarly to shortwave radiation, the dew point temperature (TD) would begin to spike up and flatline at 6,550 Celsius intermittently from 13 June to 17 June. The techs agreed that the issue looked similar, but this was not fully confirmed. Regardless, the issue was resolved by the 17 June file. Data from this period should be used with caution, as there are periods of normal dewpoint temperature interspersed with erroneous values (B-flagged, not shown).

A period of inaccurate readings from one of the air temperature sensors (T3) occurred from 24 August to 26 August, where the temperature reported was 37 Celsius rather than the 13-14 Celsius range reported by T1 and T2. While T3 data resumed to have reasonable values after this, the ship techs decided to replace the sensor when the opportunity arose. This would come later in December when T3 began reporting spikes between -40 and 60 Celsius. The sensor was replaced on 11 December. However, the new sensor lacked the correct coefficients, and T3 reported values about 10 Celsius cooler than T1 or T2. The correct coefficients were not updated until shortly after the new year. Many B and G-flags were applied by autoQC as seen in Figure 69, mostly from August onwards. Caution should be taken when using data from T3 between August and November, and data from December should not be used.

There were no other issues of note for the *Revelle* in 2025. Looking to the flag percentages in Figure 68, approximately 40% of the total flags applied were assigned to latitude (LAT) and longitude (LON). These were almost exclusively "platform position over land" (L) flags in the case of LAT and LON (not shown) that appear generally to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port (and the *Revelle* typically sends data while dockside). Short wave atmospheric radiation (RAD_SW) and photosynthetically active atmospheric radiation (RAD_PAR) contributed almost 10% of the total flags when B flags (Figure 69) were applied when slightly negative values occurred at night (a consequence of instrument tuning, see 3b.) Finally, there were periods when the sea temperature (TS, TS2, TS3), conductivity (CNDC, CNDC2), and salinity (SSPS, SSPS2) data showed a smooth time series not representative of real ocean observations. This tends to occur when the pumps to the sea water system are shutdown, particularly when the vessel is in port or operating in an EEZ (or other restricted waters). This sometimes results in B or "greater than four standard deviations from climatology" (G) flags being applied to these variables when the sea water in the pipes is not

representative of the surrounding environment, but the autoQC does not flag all occurrences. When noted, the dates of these shutdowns are listed in Annex A.

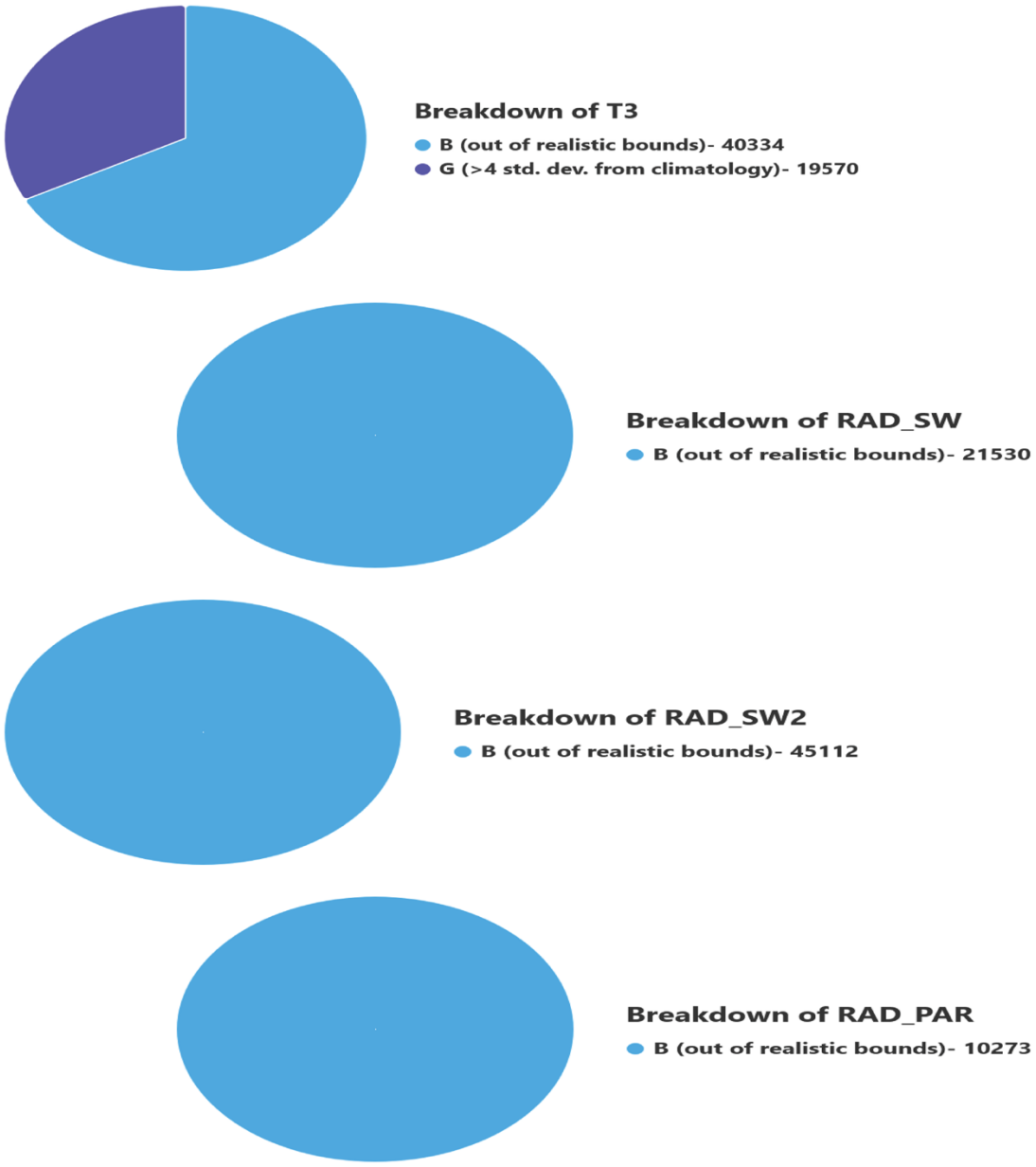


Figure 69: Distribution of SAMOS quality control flags for (first) air temperature 3 – T3 – (second) short wave atmospheric radiation – RAD_SW – (third) short wave atmospheric radiation 2 – RAD_SW2 – and (last) photosynthetically active atmospheric radiation – RAD_PAR – for the *Roger Revelle* in 2025.

Sally Ride

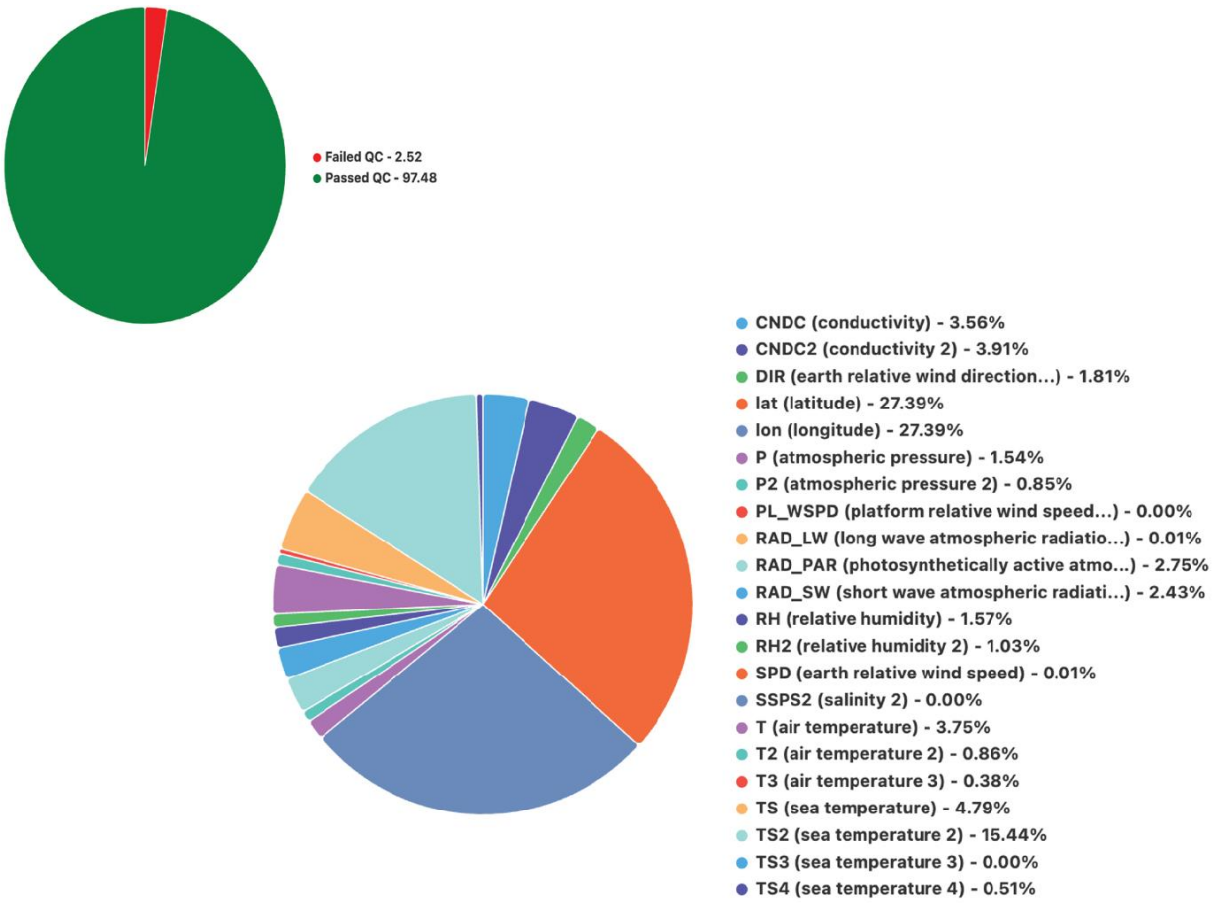


Figure 70: For the *Sally Ride* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Sally Ride* provided SAMOS data for 349 ship days, resulting in 14,137,943 distinct data values. After automated QC, 2.5% of the data were flagged using A-Y flags (Figure 70). This is a slight increase in flags from 2024 (1.7%) but keeps *Sally Ride* inside the “under 5% total flagged” bracket regarded by SAMOS to represent "very good" data. It should be noted that the *Sally Ride* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only (no research-level files exist at the SAMOS DAC for the *Sally Ride*).

The photosynthetically active atmospheric radiation sensor (RAD_PAR) failed on 17 April at approximately 0400 UTC when it began reading at 200 microeinsteins m^{-2} s^{-1} and flatlined at that value. Upon inspection, the ship techs discovered that pin corrosion had occurred. The sensor was replaced on 21 April when the vessel was in port again. Data values returned to normal afterwards.

Up until 12 December, *Sally Ride’s* barometer (P, P2) was 8-10 hPa lower than the *Sproul’s* barometers while both were in port at San Diego. It is unknown when the issue started, but it likely was from slow degradation of the sensor over time. The barometer was swapped and values stepped up to 10 hPa higher and compared favorably with the

Sproul again. This should be kept in mind when using barometer data from *Sally Ride* from 2025.

There were no other issues of note for *Sally Ride* in 2025. Looking to the flag percentages in Figure 70, approximately 55% of the total flags applied were assigned to latitude (LAT) and longitude (LON). These were almost exclusively "platform position over land" (L) flags (Figure 71) that appear generally to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port (and the *Sally Ride* typically sends data while dockside). Another 20% of the total flags were applied to the first two sea temperature parameters (TS and TS2). In this case there was a mix of "greater than four standard deviations from climatology" (G) and B flags (Figure 71), mainly due to instances of the sea water system being off but the sensors still providing a data value over the course of the year, either when the vessel was in port (common) or during transit through an exclusive economic zone (also common). Shutdowns of the sea water system will also affect the conductivity (CNDC, CNDC2), and salinity (SSPS, SSPS2) data, prompting a smooth time series not representative of real ocean observations, but these variables tend not to receive flags from the automated QC in these situations. When noted, the dates of these shutdowns are listed in Annex A.

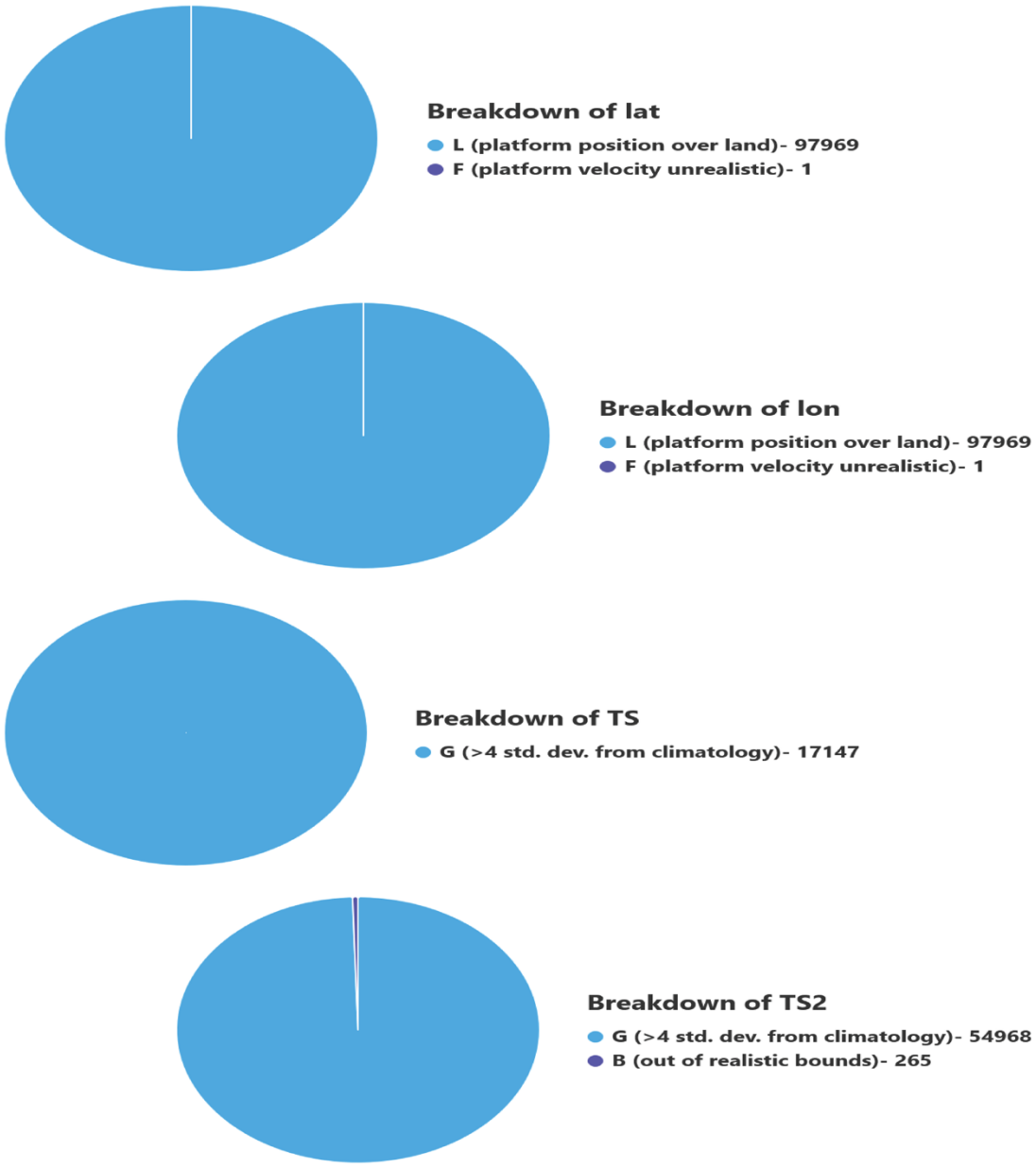


Figure 71: Distribution of SAMOS quality control flags for (first) latitude – LAT – (second) longitude – LON – (third) sea temperature – TS – and (last) sea temperature 2 – TS2 – for the *Sally Ride* in 2025.

Falkor (too)

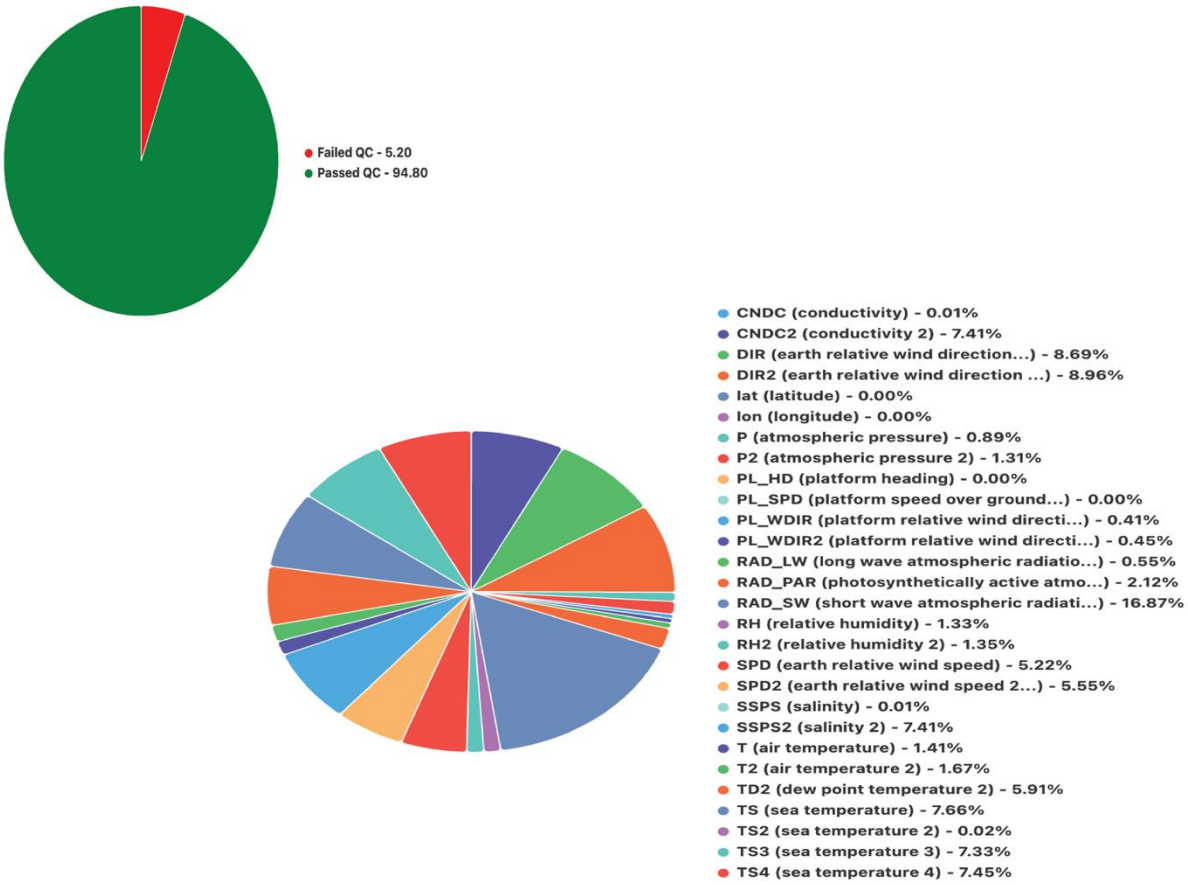


Figure 72: For the *Falkor (too)* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Falkor (too)* provided SAMOS data for 259 ship days, resulting in 10,181,528 distinct data values. After both automated and visual QC, 5.2% of the data were flagged using A-Y flags (Figure 72). This is slightly higher than in 2024 (4.6%) and places the *Falkor (too)* slightly outside the < 5% total flagged bracket regarded by SAMOS to represent "very good" data.

Early in the year operators experienced some issues with their secondary seawater system that necessitated them turning off the flow for that system. As a result, the secondary thermosalinograph sat with stagnant water that produced unrepresentative data. As a result of this, the secondary salinity (SSPS2), conductivity (CNDC2), and internal sea temperature (TS4) received poor quality (J) flags (Figure 74, only TS4 shown), for the period 13 January through 9 February.

The only other "issue" worth noting in 2025 was that, during a port stop in Buenos Aires from 24 September to 8 October, nighttime short wave radiation (RAD_SW) values consistently read ~40 W/m^2. This is, of course, unreasonable in the physical sense. Short wave radiation is absent when the sun is down and values should be effectively zero at night (note that some SW sensors do read slightly negative at night, owing to instrument tuning – see 3b.). In this case, however, the ship was parked at the dock with the foremast and all of its instrumentation (including RAD_SW) sitting directly under bright fluorescent lighting, hence the erroneous positive short wave measurements. These positive nighttime values were assigned poor quality (J) flags for the duration (Figure 74). (There was also a sizable volume of out-of-bounds "B" flags applied to RAD_SW in 2025. However, these were mainly applied to the aforementioned slightly negative nighttime values that were reported when the ship was NOT around bright dock lights.)

In general, the air temperatures (T, T2), moisture variables (TD2, RH, and RH2), and true wind directions and speeds (DIR, DIR2, SPD, and SPD2) are subject to the effects of flow distortion and/or ship heating when flow is from the stern. This makes sense, as all these sensors are located on the foremast/bow platform (forward of the bow) with all the ship's superstructure behind them. Whenever flow and/or heating effects are suspected, the data are typically assigned caution/suspect K flags (Figure 74, not all shown). All these sensors on the bow are also vulnerable to the occasional spray or wave hit, sometimes resulting in K flags. Plus, *Falkor (too)* occasionally has issues with birds roosting on the foremast, which sometimes impacts the data from the various sensors (more K flags). The radiometers, in particular, have historically seemed to need frequent cleaning to "de-poop". Additional to these common enough vessel data issues, the relative wind directions PL_WDIR and PL_WDIR2 also sometimes receive K flags when the relative wind strays near/crosses over the bow, and, related to this, DIR, DIR2, SPD, and SPD2 sometimes receive "failed the true wind recomputation check" (E) flags from autoQC when the relative wind is near or crossing the bow (Figure 74, not all shown). Further, DIR and DIR2 sometimes receive caution/suspect (K) flags when those two parameters are showing a north wind. The reason for all of these latter cases is the same: Noise in wind direction data appears whenever the direction is close to or crossing 0/360. It has never been established precisely why this occurs, but the answer almost certainly lies buried somewhere among the shipboard true and relative wind averaging routines (and potentially the true wind calculations themselves). In any case, the true wind data are still considered of good enough quality for distribution.

Lastly, a point of interest: In early March, *Falkor (too)* was working around Saunders Island in the South Sandwich Islands, which is comprised of an active volcano with a fumarolically active lava lake at its summit and several pyroclastic cones on the southeastern side. On 11 March, with a strong northwest wind blowing (Figure 73b), the ship crossed the island's southeastern flank four times (Figure 73a). Each time, a distinct plume of heat is observable in T and T2 (Figure 73c), accompanied by increased wind speed (possibly indicative of a thermal updraft) observable in SPD and SPD2 (not shown). At the closest passage, around 12 Z, there is even a sizable (~2 mb) drop in pressure (P and P2, not shown), while the wind speed is topping out at around 25 m/s. It is surmised all these effects were due to volcanic heat emissions being carried downwind, and the most extreme points in each data set received an "interesting feature" (I) flag

(Figure 74, only T shown). Additionally, some climatology (G) flags were applied to T and T2 by autoQC.

As a special note for interested users, the average depth of *Falkor (too)'s* longitudinal and transverse speed through water variables (PL_SOW and PL_SOW2, respectively, not shown here) from their ADCP is 14 meters below the water's surface.

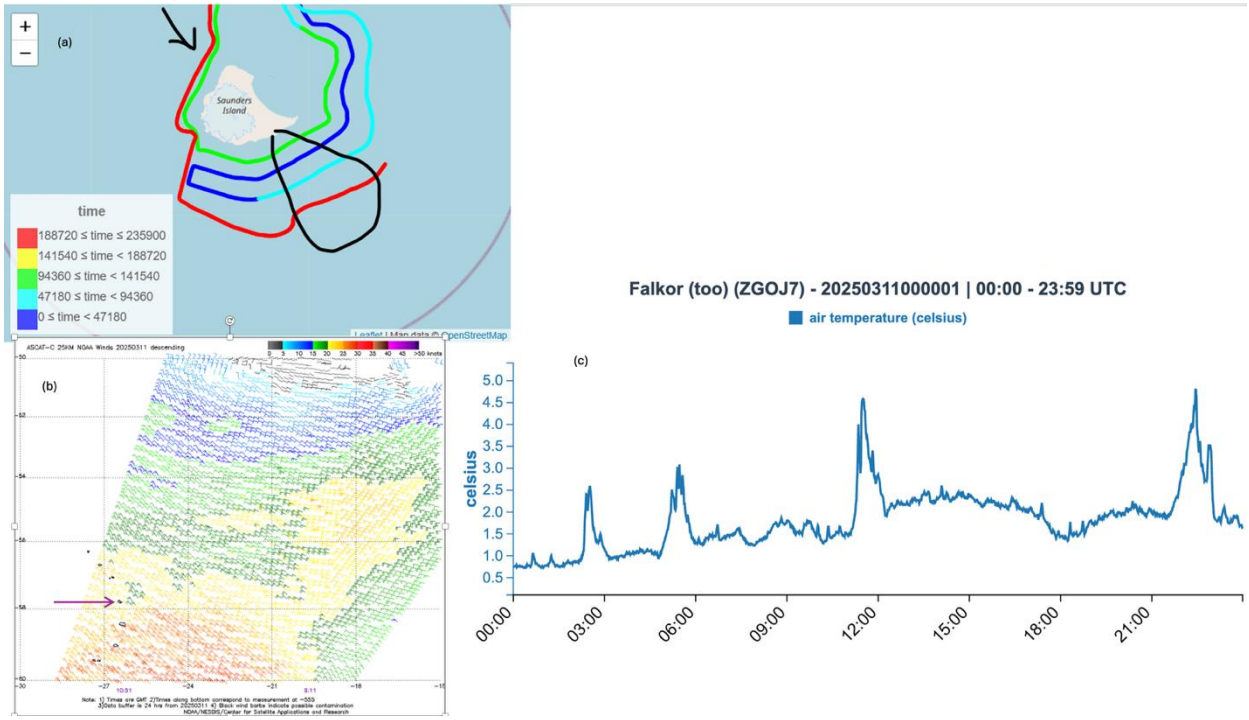


Figure 73: 11 March 2025 (a) *Falkor (too)* ship track, (b) ASCAT wind analysis, and (c) *Falkor (too)* SAMOS air temperature – T – data. Note sharp increases in T when the ship crosses the southeastern quadrant below the island (area circled in black on the ship track) while strong (10-15 m/s) northwesterly air flow dominates the region, as indicated by black arrow on ship track and in ASCAT wind analysis (Saunders Island pointed out in purple).

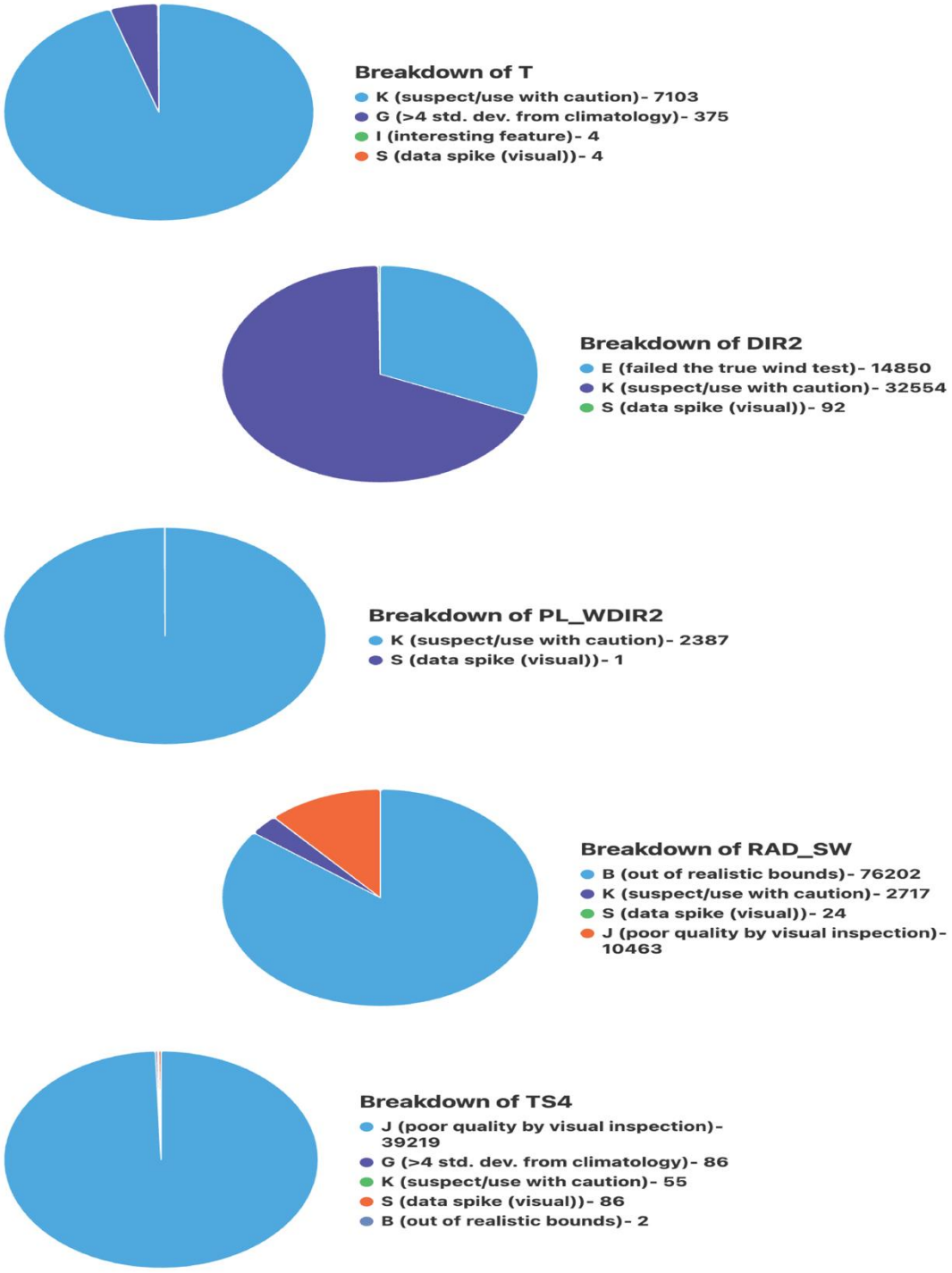


Figure 74: Distribution of SAMOS quality control flags for (first) air temperature – T – (second) earth relative wind direction 2 – DIR2 – (third) platform relative wind direction 2 – PL_WDIR2 –(fourth) short wave atmospheric radiation – RAD_SW – and (last) sea temperature 4 – TS4 – for the *Falkor (too)* in 2025.

Sikuliaq

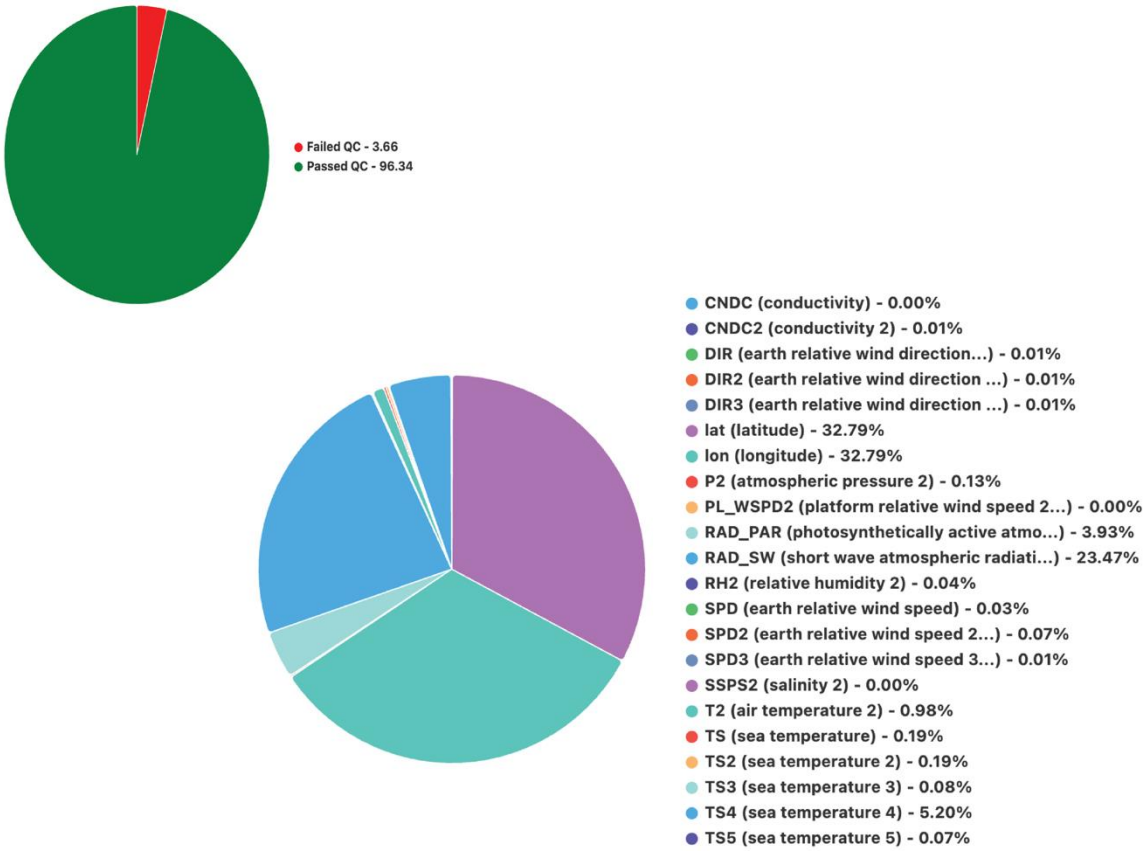


Figure 75: For the *Sikuliaq* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Sikuliaq* provided SAMOS data for 355 ship days, resulting in 16,204,221 distinct data values. After automated QC, 3.6% of the data were flagged using A-Y flags (Figure 75). This is about half a percentage point higher than in 2024 (3.1%) but keeps *Sikuliaq* under the 5% total flagged cutoff regarded by SAMOS to represent "very good" data. It should be noted that the *Sikuliaq* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only (no research-level files exist at the SAMOS DAC for the *Sikuliaq*).

From 21-24 July 2025, the *Sikuliaq* experienced a heat wave while docked at Seward, AK. Air temperature (T2) drifted up to anomalously high values with high solar radiation values and many values exceeded the upper bound (B-flag) for temperature at this latitude. The operator confirmed the extreme heat during this period, so users should treat the air temperature as good, but extreme, values.

Sea temperature from the centerboard SBE38 (TS5) should not be used from ~1900 UTC on 9 October thru ~1800 UTC on 13 October 2025. During this period, this SBE38 was left running when the *Sikuliaq* was tied up in Seward and, with no good water flow to the sensor, the temperature likely warmed to unrealistic values.

Occasionally, the *Sikuliaq* transmitted flow through water data (TS, TS2, TS3, TS5, SSPS, SSPS2, CNDC, CNDC2) when the pumps were shutdown (typically in port or an EEZ). When known, these are identified in Annex A.

When in port, the infrared sea surface temperature sensor (TS4) on *Sikuliaq* is not turned off (all the other underway seawater sensors do not report in port). At these times, the sensor may be pointing at a feature other than sea water (e.g., dock, building), resulting in unrepresentative TS4 values. Values tend to be unrealistically high when pointed at a land surface. Notable occurrences. These data should not be used. It is also worth noting this sensor will report values well below those of the other sea water temperature sensors when the *Sikuliaq* is operating in sea ice. In the ice, TS4 values well below a realistic -2˚C sea water temperature can occur. This has been confirmed in the past to be a good indicator of the vessel being in the sea ice pack. Extremely high or low TS4 values accounted for ~5% of the total flags on the *Sikuliaq* data in 2025 (Figure 76).

There were no other data issues of note for *Sikuliaq* in 2025. Looking to the flag percentages in Figure 75, about 65% of the total flags were applied to latitude (LAT) and longitude (LON). These were exclusively “platform position over land” (L) flags (Figure 76) that appear generally to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port. A further 23% of the total flags were applied to shortwave atmospheric radiation (RAD_SW) and 4% to photosynthetically active atmospheric radiation (RAD_PAR), in both cases exclusively “out of bounds” (B) flags (Figure 76) which are applied to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.)

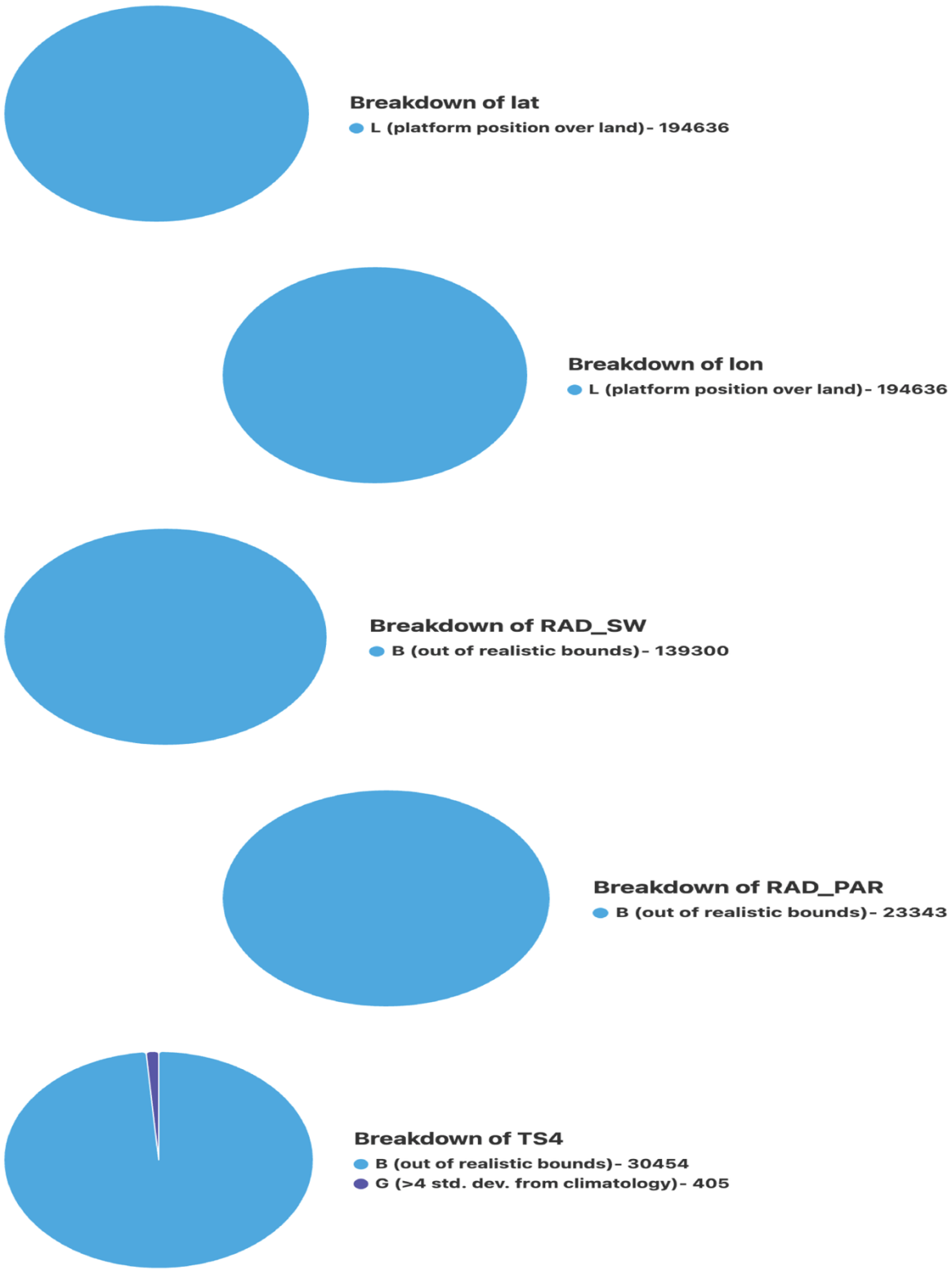


Figure 76: Distribution of SAMOS quality control flags for (first) latitude – LAT – (second) longitude – LON – (third) short wave atmospheric radiation – RAD_SW – (fourth) photosynthetically active atmospheric radiation – RAD_PAR – and (last) sea temperature 4 – TS4 – for the *Sikuliaq* in 2025.

Kilo Moana

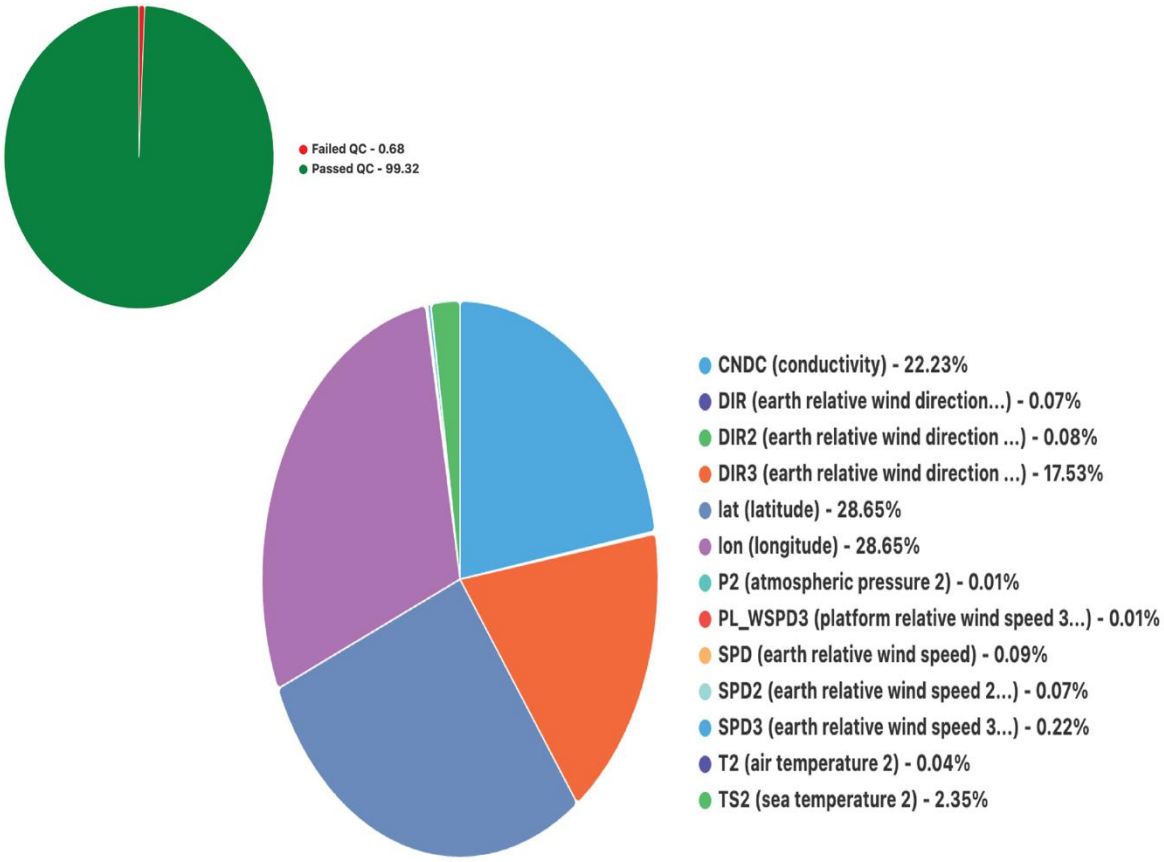


Figure 77: For the *Kilo Moana* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Kilo Moana* provided SAMOS data for 59 ship days, resulting in 2,013,900 distinct data values. After automated QC, just 0.7% of the data were flagged using A-Y flags (Figure 77). This is nearly identical to 2024 (1.0%) and maintains *Kilo Moana's* standing below the 1% total flagged cutoff regarded by SAMOS to represent "excellent" data. It should be noted that the *Kilo Moana* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only (no research-level files exist at the SAMOS DAC for the *Kilo Moana*).

There were no major issues of note for *Kilo Moana* in 2025. Looking to the flag percentages (Figure 77), about 57% of the total flags were applied to latitude (LAT) and longitude (LON). These were exclusively "platform position over land" (L) flags (Figure 82) that appear generally to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is

often incapable of resolving the very fine detail of a coastline or an inland port. The conductivity (CNDC) provided ~22% of the total flags (Figure 77), likely from a few periods when the flow water system was not providing adequate water flow. Also, the true wind direction from the Vaisala WXT (DIR3) had a few more failures of the true wind recomputation code (E-flags, not shown) than the other two anemometers, but no clear reason for this issue has been determined. It may be subtle flow distortion at the location of the WXT on the instrument mast above the bridge. Considering the very low total flagged percentage it is not worth drilling down into individual parameter flag percentages.

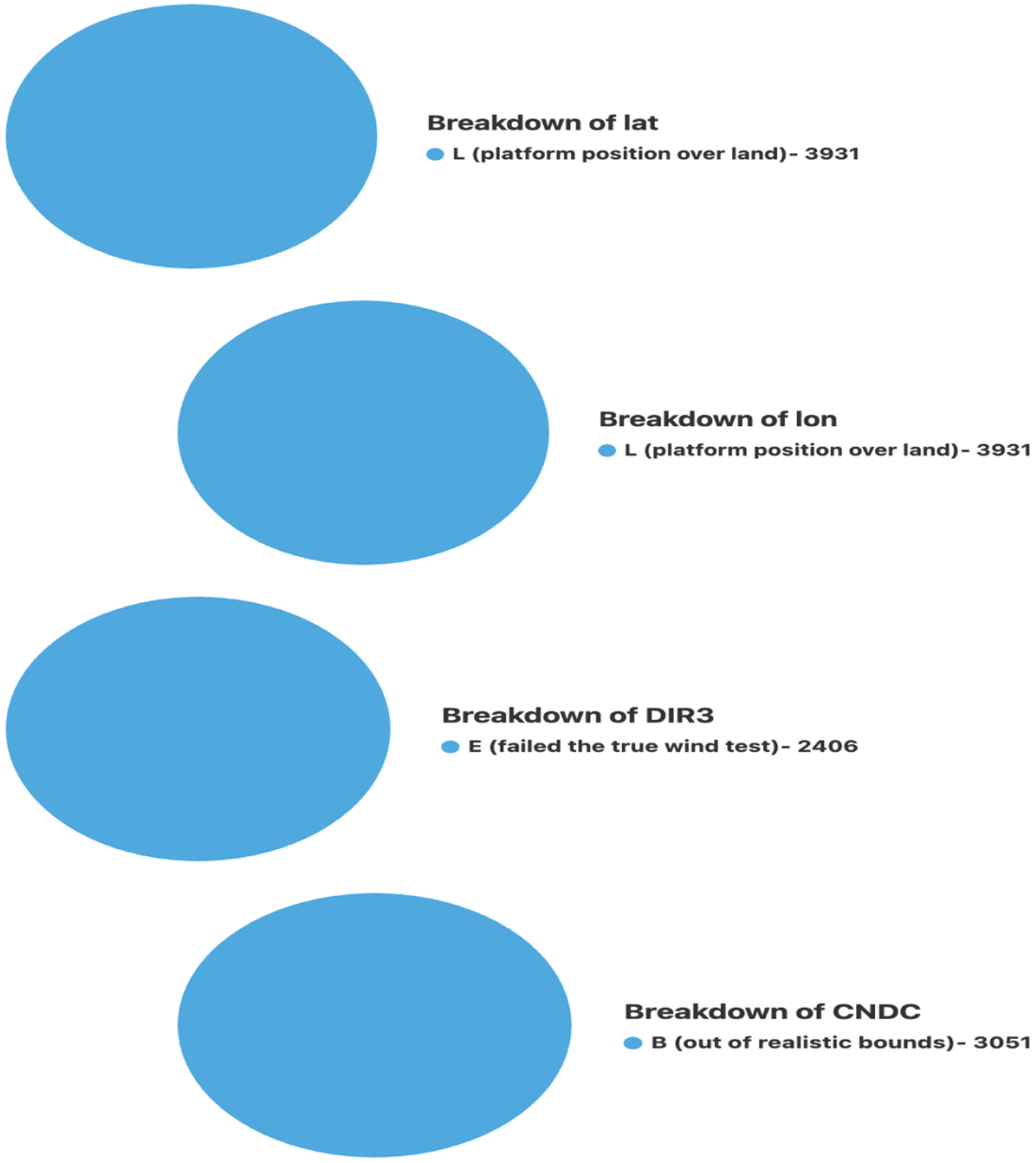


Figure 78: Distribution of SAMOS quality control flags for (first) latitude – LAT – (second) longitude – LON – (third) earth relative wind direction 3 – DIR3 –and (last) conductivity – CNDC – for the *Kilo Moana* in 2025.

Thomas G. Thompson

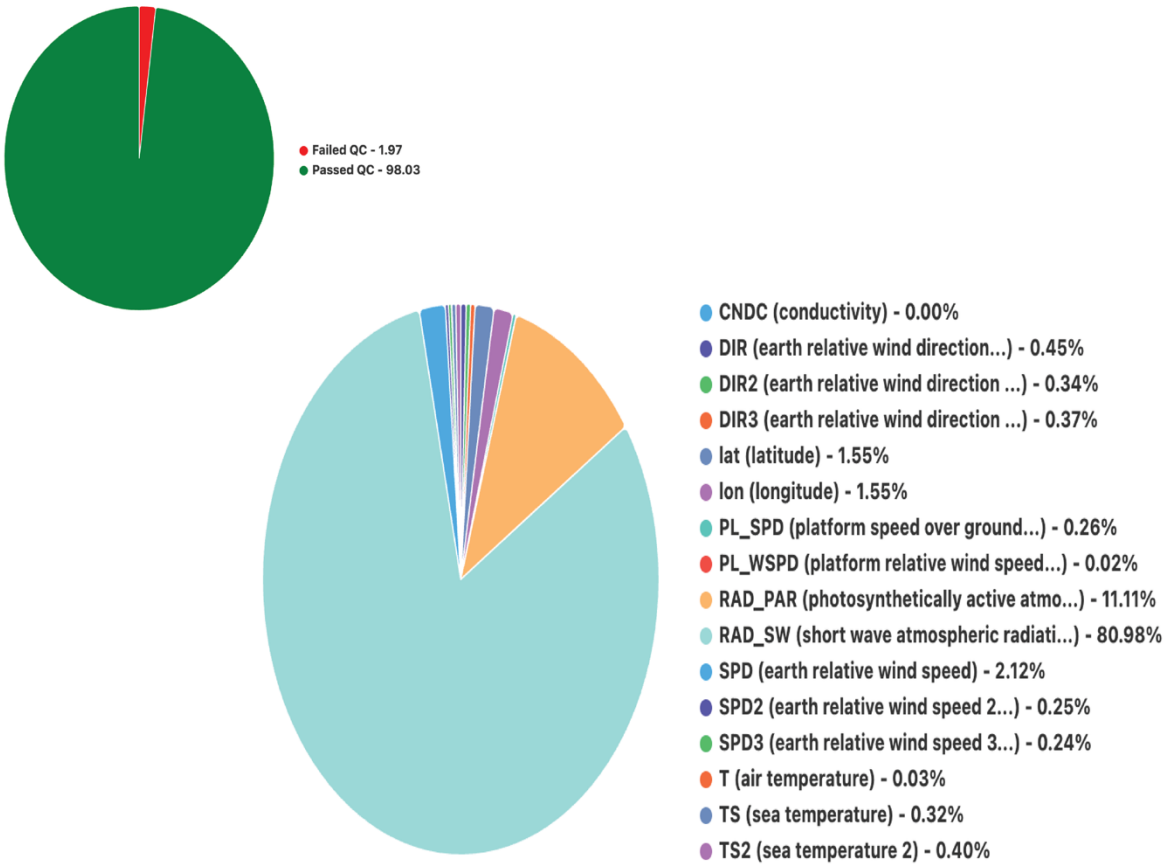


Figure 79: For the *Thomas G. Thompson* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Thomas G. Thompson* provided SAMOS data for 153 ship days, resulting in 5,847,428 distinct data values. After automated QC, 2.0% of the data were flagged using A-Y flags (Figure 79). This is about one-half a percentage point lower than in 2024 (2.7%) and keeps the *Thompson* nicely within the “under 5% total flagged” bracket regarded by SAMOS to represent "very good" data. It should be noted the *T. G. Thompson* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only (no research-level files exist at the SAMOS DAC for the *T. G. Thompson*).

Several instances are noted in Annex A when the bow sonic anemometer on the *Thompson* was the site of roosting tropical sea birds. This is a common problem when the vessel is operating in the tropics and results in numerous very large spikes (up to 50+ m/s) in the platform relative and earth relative wind speeds (PL_WSPD and SPD, respectively). When "bird events” occur in the *Thompson’s* SPD data, they are usually

assigned either B, G, or E flags by automated quality control procedures (Figure 81, only SPD shown). A nice photo of a bird roosting on the anemometer was provided by the *Thompson's* technician in 2024 (Figure 80).

Late in 2025, the sonic anemometer was replaced following a shipyard period and was reinstalled backwards, resulting in a 180-degree error in the relative wind direction (PL_WDIR). This subsequently impacted the calculated true winds (SPD, DIR). Data from this sensor for the period 4-25 December 2025 should not be used. The sensor was replaced in the correct orientation on 26 December.

One other issue to note occurred on 24 July 2025 from 1015-1600 UTC and on 25 July 2025 from 0600-0640 UTC. The operator notified SAMOS of problems with their POSMV which impacted the calculation of true winds. During these periods the navigational (Lat, Lon, PL_SPD, PL_CRS) and true winds (DIR, DIR2, DIR3, SPD, SPD2, SPD3) should not be used.

No other notable problems were identified in the data for the *Thompson* in 2025. Looking at the flag percentages in Figure 79, about 3% of the total flags were applied to latitude (LAT) and longitude (LON). These were primarily "platform position over land" (L) flags that appear generally to have been applied when the vessel was either in port or very close to land (not shown). This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port. In addition, 81% of the total flags were applied to shortwave atmospheric radiation (RAD_SW) and ~11% to photosynthetically active atmospheric radiation (RAD_PAR). These were primarily B flags (Figure 81) applied to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.)

Figure 80: Sea bird roosting on top of the bow sonic anemometer on the *Thompson* on 21 October 2024. Image courtesy of Elizabeth Ricci at the University of Washington.

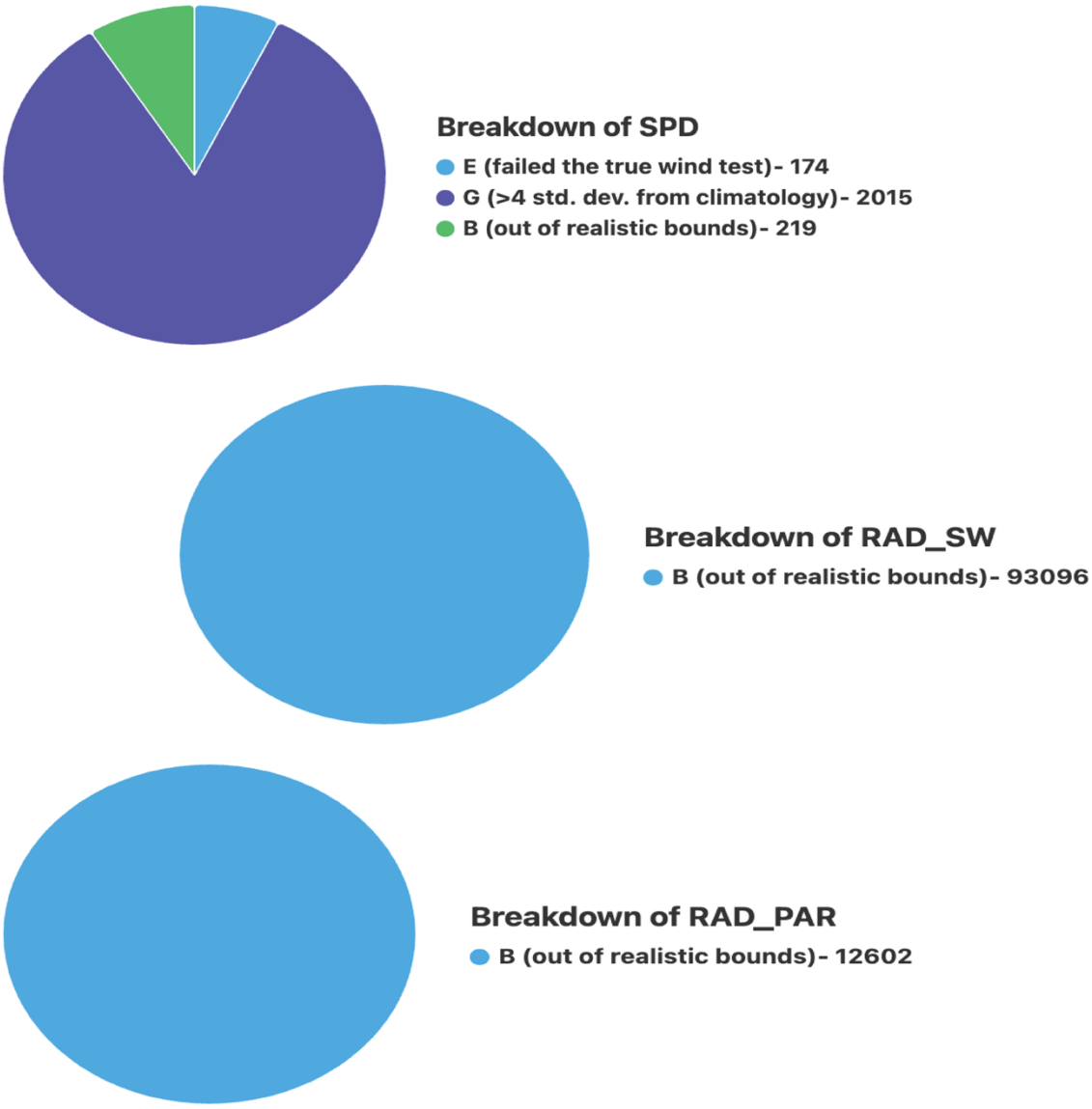


Figure 81: Distribution of SAMOS quality control flags for (top) earth relative wind speed – SPD – (middle) short wave atmospheric radiation – RAD_SW– and (bottom) photosynthetically active atmospheric radiation – RAD_PAR – for the *Thomas G. Thompson* in 2025.

Healy

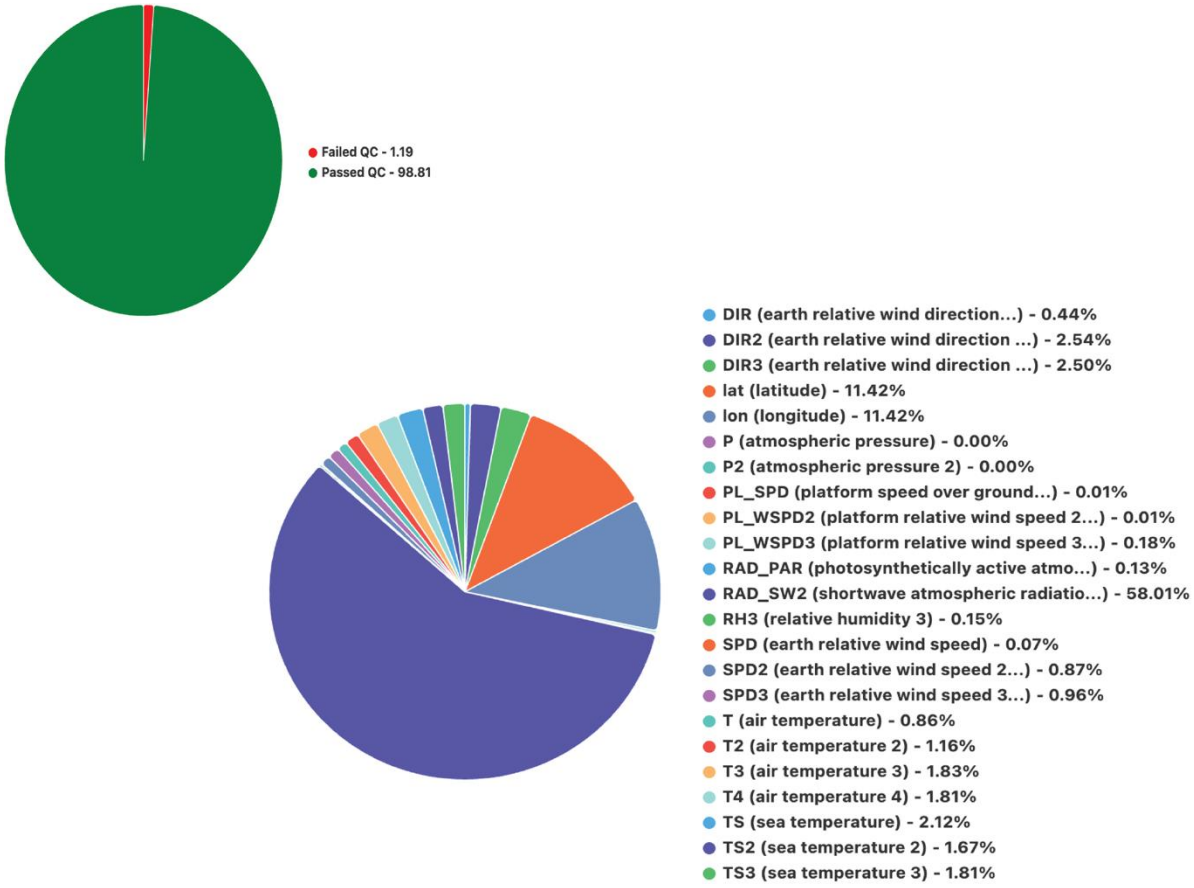


Figure 82: For the *Healy* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *Healy* provided SAMOS data for 139 ship days, resulting in 6,639,902 distinct data values. After automated QC, 1.2% of the data were flagged using A-Y flags (Figure 82). This is slightly lower than 2024 (1.8%) and keeps *Healy* under the 5% total flagged cutoff regarded by SAMOS to represent "very good" data. It should be noted *Healy* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only.

The *Healy* experienced a few data quality issues in 2025 outside some known issues related to the blocky superstructure on the vessel. The main issue was a failure of the sensor mount for the bow anemometer around 20 July 2025. The bow wind sensor was unable to be replaced and processing for DIR, SPD, PL_WDIR, PL_WSPD was disabled on 22 July 2025 for the remainder of the Healy's field season. This mount failure also temporarily impacted the bow hygrometer (T, RH), but these were restored on 21 July. The other unexpected issue was the daytime increase in the air temperature (T3) HTP201

sensor (sn: 24071600065955) from 1 September – 1 October 2025. The cause of the diurnal heating of this sensor is unknown but was most prominent before the *Healy* entered the sea ice pack on 14 September. The problem then resolved (no reason known) by the end of September. We suggest the daytime data from this sensor be used with caution in this period.

Generally, steps from suspected flow distortion continued to be observed in *Healy's* atmospheric pressure (P and P2) and main mast true wind speed (SPD2, SPD3) data when the relative wind is from abeam (either 90 or 270 degrees) in 2025. In both cases, the blockhouse bridge/superstructure on *Healy* is likely causing airflow issues around these sensors and there is no real solution without moving these sensors higher up on the main mast.

Another continuing data issue affects the relative humidity (RH, RH2, RH3) for the *Healy* throughout 2025. The installed version of the SIO-MET data acquisition software outputs NaN values for any relative humidity value over 100%, and these values are treated by SAMOS as missing values. It is common, because of sensor tuning, for RH sensors to report values slightly higher than 100% in saturation conditions, but in the *Healy* data, these saturation conditions may be missing because the values over 100% are not reported by SIO-MET. Users should be aware of this when they see missing values for relative humidity in the SAMOS dataset.

Looking again to the flag percentages in Figure 82, about 58% of the total flags were applied to RAD_SW2 (the Kipp and Zonen), in this case exclusively "out of bounds" (B) flags (Figure 83) such as are applied to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.). A further ~23% of the total flags were applied to latitude (LAT) and longitude (LON). These were virtually all "platform position over land" (L) flags (Figure 83) that were likely mainly to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port. Finally, several occurrences when the flow water system was shutdown resulting in smooth, unrealistic sea temperature, conductivity and salinity data, are documented in Annex A.

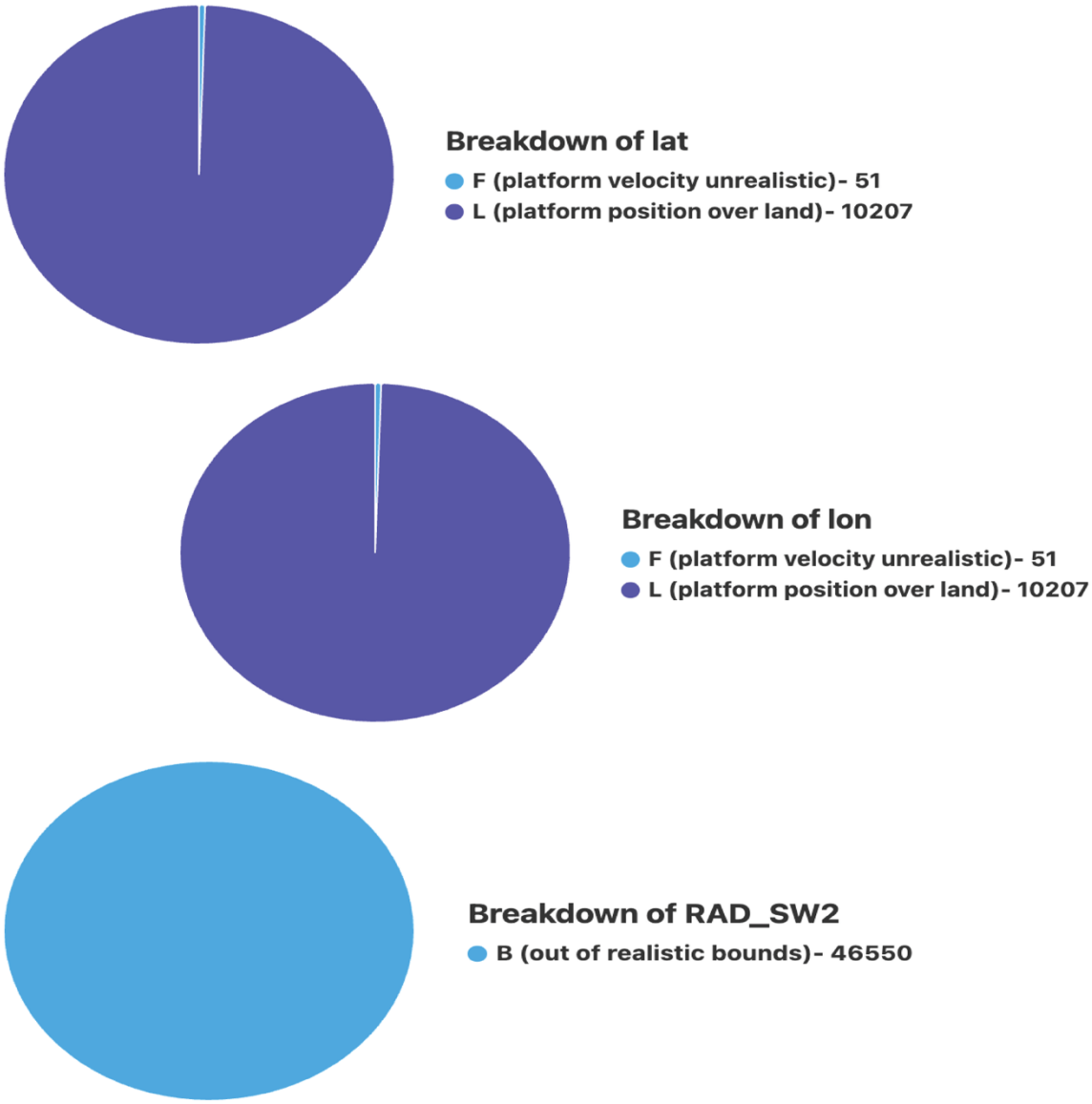


Figure 83: Distribution of SAMOS quality control flags for (top) latitude – LAT – (middle) longitude – LON – and (bottom) shortwave atmospheric radiation 2 – RAD_SW2 – for the *Healy* in 2025.

R/V Atlantis

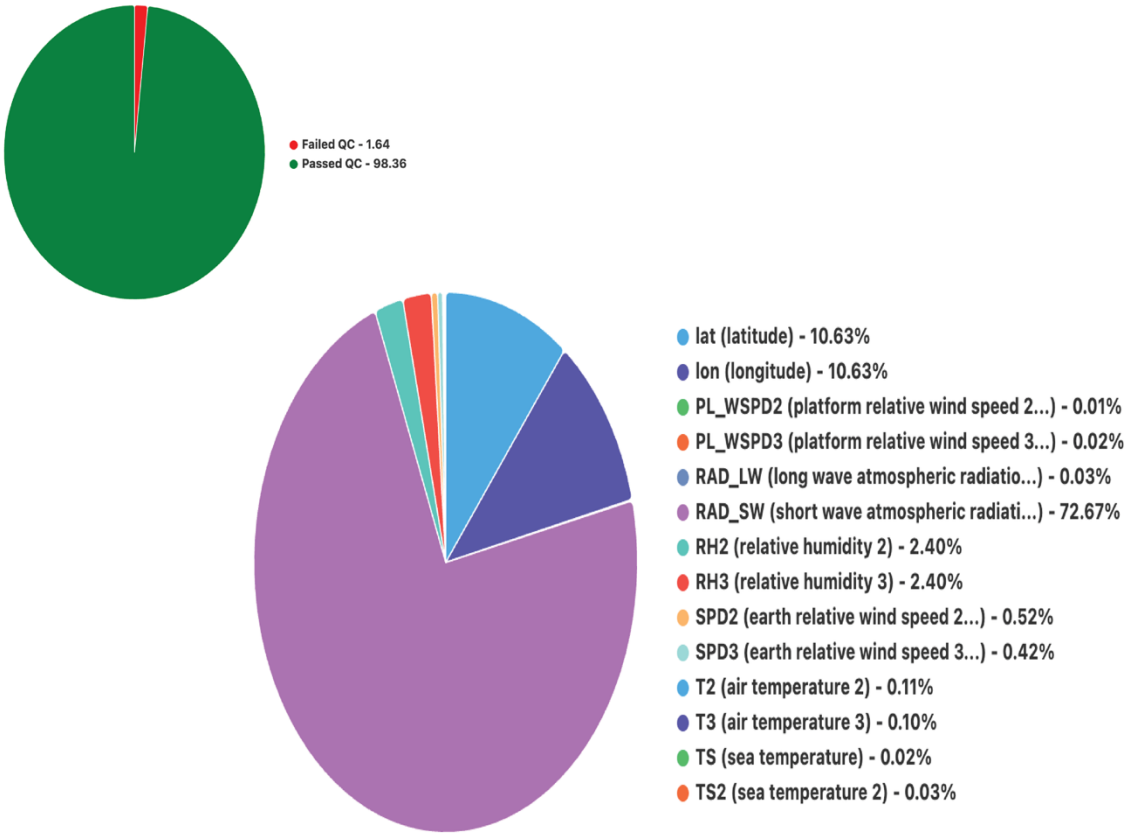


Figure 84: For the *R/V Atlantis* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *R/V Atlantis* provided SAMOS data for 283 ship days, resulting in 11,986,701 distinct data values. After automated QC, 1.6% of the data were flagged using A-Y flags (Figure 84). This is virtually unchanged from 2024 (1.9%) and maintains *Atlantis's* standing well under the 5% total flagged cutoff regarded by SAMOS to represent "very good" data. It should be noted that the *R/V Atlantis* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only.

The *Atlantis* captured a unique weather event when the vessel encountered strong winds from a Tehauntepec gap (north) wind event. This gap flow event is clear on the 17 March 2025 15:59 UTC satellite wind analysis (Figure 85, a), where the maximum winds were over 40 knots (~20 m/s). The true wind speeds (SPD2, SPD3) were most extreme (peaking at 20.5 m/s at 17:24 UTC on the 17th) between 0900 on 17 March to 1800 on 18 March 2026, peaking at 20.5 m/s at 17:24 UTC on the 17th (Figure 85, b and c). Not unexpectedly, many of the wind speed values failed the local climatology check (G-flags) for this region.

The *Atlantis* is another vessel that gets periodic visits from tropical seabirds, which, when they roost on the meteorological sensors (Figure 86), results in some very anomalous readings. Notable occurrences are documented in Annex A. It is worth noting that many of the bird infestations occur at night, which was confirmed by the technicians and bridge crew with some nice photos. In many cases, the bird-affected data are not flagged by the SAMOS automated QC, though some "out of bounds" (B) or "greater than four standard deviations from climatology" (G) flags are applied to extreme values.

One other minor issue on the *Atlantis* is that the Vaisala WXTs periodically stop transmitting data. This affects the wind, pressure, air temperature, relative humidity, precipitation accumulation, and rain rate values from the affected instrument. These failures are random and are quickly resolved when the technicians power cycle the WXT. The cause is unknown, and it seems to affect mainly the port WXT, although occasionally the same situation is evident in the starboard WXT.

There were no other data issues of note for *Atlantis* in 2025. Looking to the flag percentages in Figure 84, over 73% of the total flags were applied to RAD_SW. These were exclusively B flags (Figure 87) and appear to have been applied mainly to the slightly negative values that can occur with these sensors at night (a consequence of instrument tuning, see 3b.). A further 21% of the total flags were applied to latitude (LAT) and longitude (LON). These were exclusively "platform position over land" (L) flags (Figure 87) that were likely mainly to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port.

As a final note, on many occasions the thermosalinograph on the *Atlantis* reported smooth/unrealistic data when the flow water system pumps were shut down (either in port or in a country's EEZ). These events are noted in Annex A and the TS2 (some with B-flags), CNDC, and SSPS data should not be used.

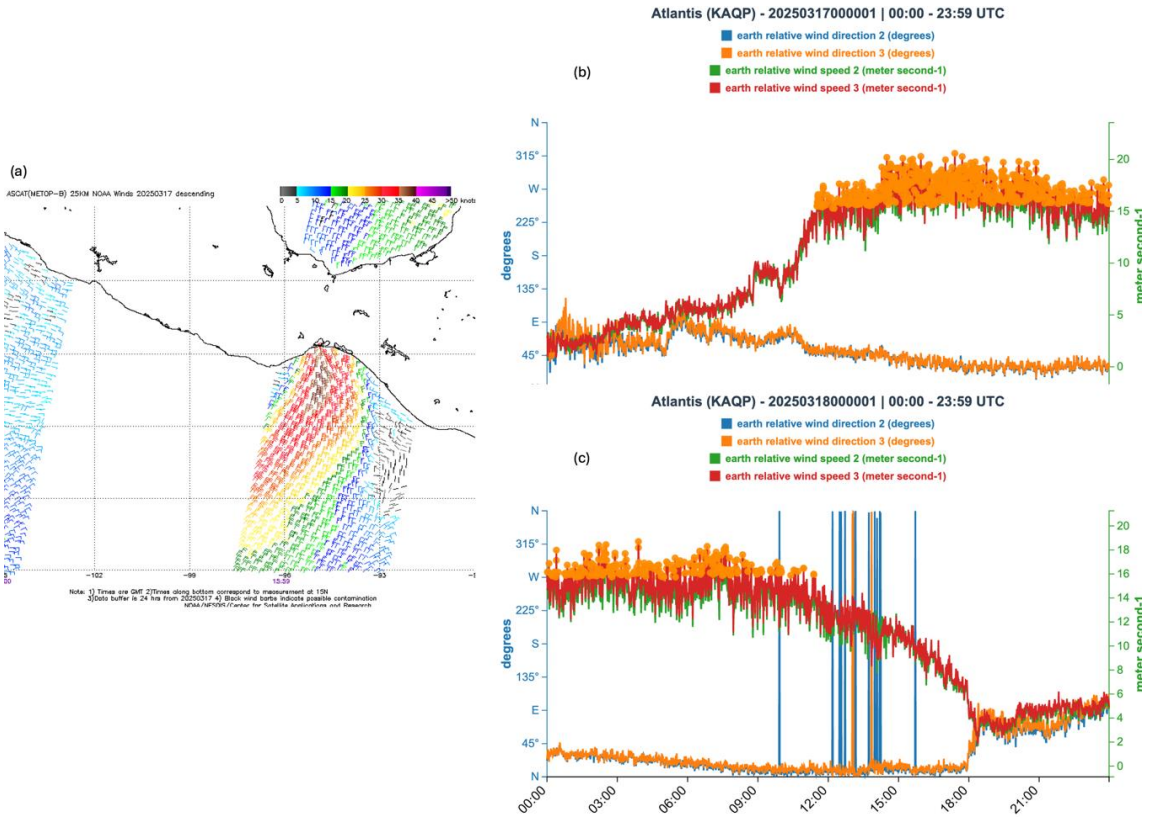


Figure 85: (a) ASCAT wind analysis for 17 March 2025, and SAMOS true wind direction – DIR2, DIR3 – and speed – SPD2, SPD3 – observations for (b) 17 March 2025, and (c) 18 March 2025. Note Tehauntepec gap (north) wind event observable in ASCAT analysis and extreme measured wind speeds both days.

Figure 86: Nice image of tropical birds roosting on the Atlantis meteorological mast in January 2024. Image courtesy of WHOI ship technicians.

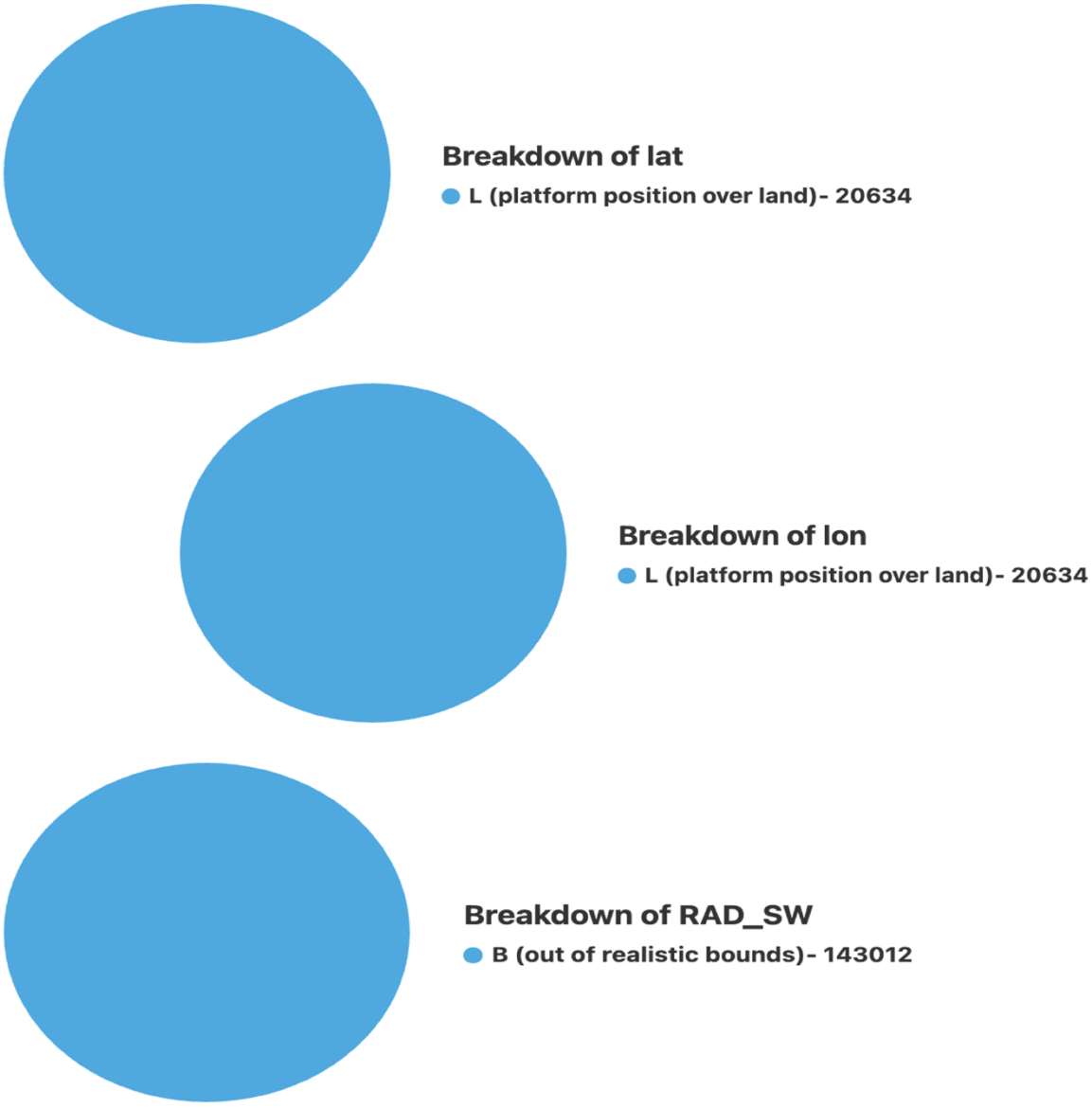


Figure 87: Distribution of SAMOS quality control flags for (top) latitude – LAT – (middle) longitude – LON – and (bottom) short wave atmospheric radiation – RAD_SW – for the *R/V Atlantis* in 2025.

R/V Neil Armstrong

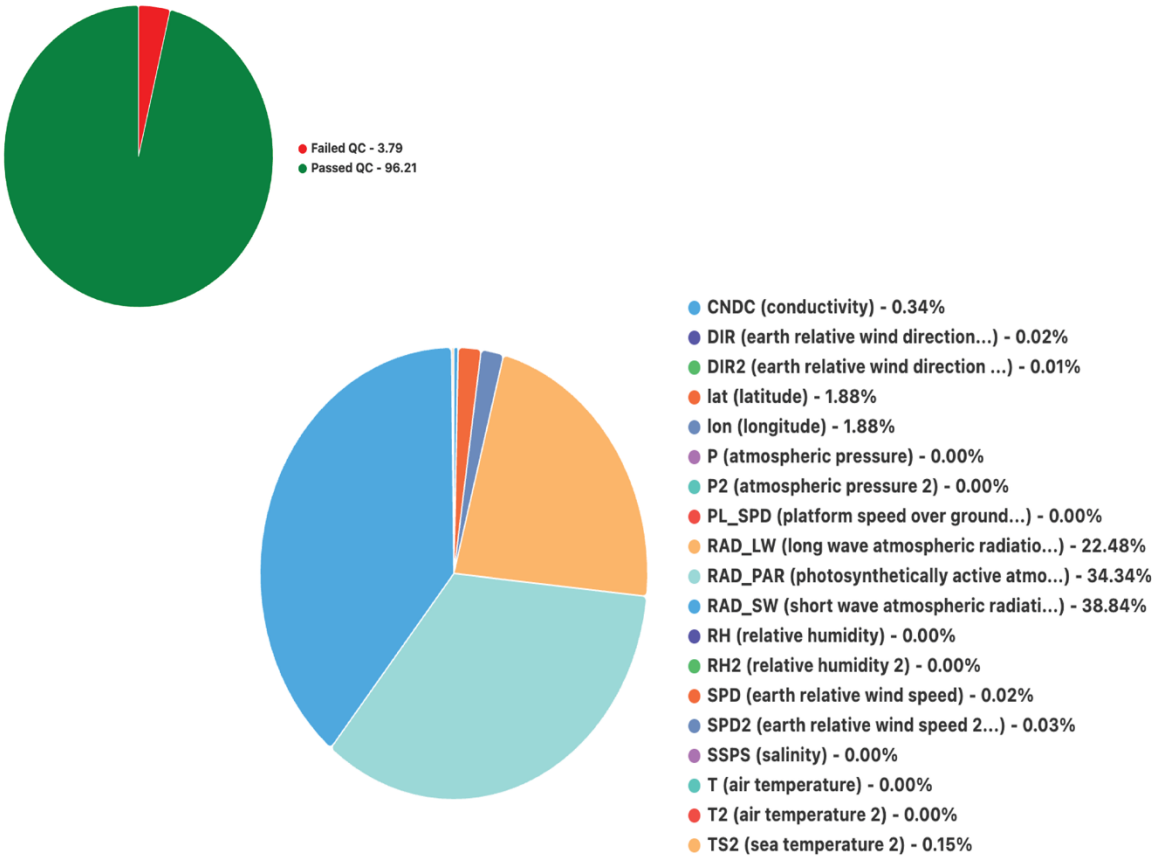


Figure 88: For the *R/V Neil Armstrong* from 1/1/25 through 12/31/25, (left) the percentage of all observations that passed vs. failed SAMOS quality control tests and (right) the percentage of the overall failed observations broken down by parameter.

The *R/V Neil Armstrong* provided SAMOS data for 333 ship days, resulting in 14,079,154 distinct data values. After automated QC, 3.8% of the data were flagged using A-Y flags (Figure 88). This is a slightly higher flag percentage in 2024 (3.1%) but keeps *Armstrong* under the 5% total flagged cutoff regarded by SAMOS to represent "very good" data. It should be noted that the *R/V Neil Armstrong* receives only automated QC, and visual QC is when the bulk of flags are typically applied. All the flags are the result of automated QC only (no research-level files exist at the SAMOS DAC for the *R/V Neil Armstrong*).

The primary unexpected issue on the *Armstrong* in 2025 was the intermittent and erratic behaviour of their Eppley longwave radiometer (RAD_LW). Annex A documents numerous periods when the radiometer would start reporting values that are unrealistically high (over 1000 W m-2) or low and often negative (resulting in numerous out of range, B, flags; Figure 89). The technicians on the vessel tried several times to troubleshoot the sensor, swapping cables, and other components, but no solution could be

found. On 14 September 2025, in agreement with WHOI, the SAMOS team discontinued processing longwave data from the *Atlantis* pending their selection of a replacement radiometer (which is still pending in 2026).

Another notable issue was problems with the *Armstrong's* CNAV system starting around 22 October 2025. The technicians switched the navigation parameters (LAT, LON, PL_CRS, and PL_SPD) from the CNAV to the SeaPath for SAMOS data products and true wind computation on 10 November 2025. Users should be aware of this change and note that there are some missing data records in October because of the missing (NaN) values in the latitude and longitude data received by SAMOS.

Like the *Atlantis*, the Vaisala WXTs on the *Neil Armstrong* spontaneously stop logging, and the only solution is to power cycle all the met mast sensors. This spontaneous ceasing of data logging in *Armstrong's* WXT units results in gaps in the associated pressure (P, P2), air temperature (T, T2), relative humidity (RH, RH2), relative and true winds (PL_WDIR, PL_WDIR2, PL_WSPD, PL_WSPD2, DIR, DIR, SPD, SPD2), precipitation (PRECIP, PRECIP2), and rain rates (RRATE, RRATE2) from the affected WXT that can last hours to a day or more. The technicians are aware of the problem and, along with the SAMOS data analyst, endeavor to identify and promptly resolve these power events.

The *Neil Armstrong* tends to continue reporting data values from their thermosalinograph even when the flow water system pumps are off. This typically happens when the vessel is either in port or in an EEZ without clearance to collect ocean data. The result is a smooth data trace for the sea temperature (TS2), conductivity (CNDC), and salinity (SSPS) from their SBE45 and sometimes "out of bounds" (B) or "greater than four standard deviations from climatology" (G) flags on TS2 (Figure 89, only TS2 shown) as the water sitting in the pipes is no longer representative of the actual ocean conditions where the vessel is operating. These data should not be used and whenever possible the occurrences are noted in Annex A.

There are no other data issues of note for *Neil Armstrong* for 2025. Looking at the flag percentages in Figure 88, almost all the total flags applied were assigned to short wave atmospheric radiation (RAD_SW, 39%) and photosynthetically active radiation (RAD_PAR, 34%). In both cases these were exclusively B flags (Figure 89) that appear to have been applied mainly to the slightly negative values that can occur with these types of sensors at night (a consequence of instrument tuning, see 3b.) A further ~4% of the total flags were applied to latitude (LAT) and longitude (LON). These were exclusively "platform position over land" (L) flags (Figure 89) that were likely mainly to have been applied when the vessel was either in port or very close to land. This is not uncommon, as the land mask in use for the land check routine is often incapable of resolving the very fine detail of a coastline or an inland port.

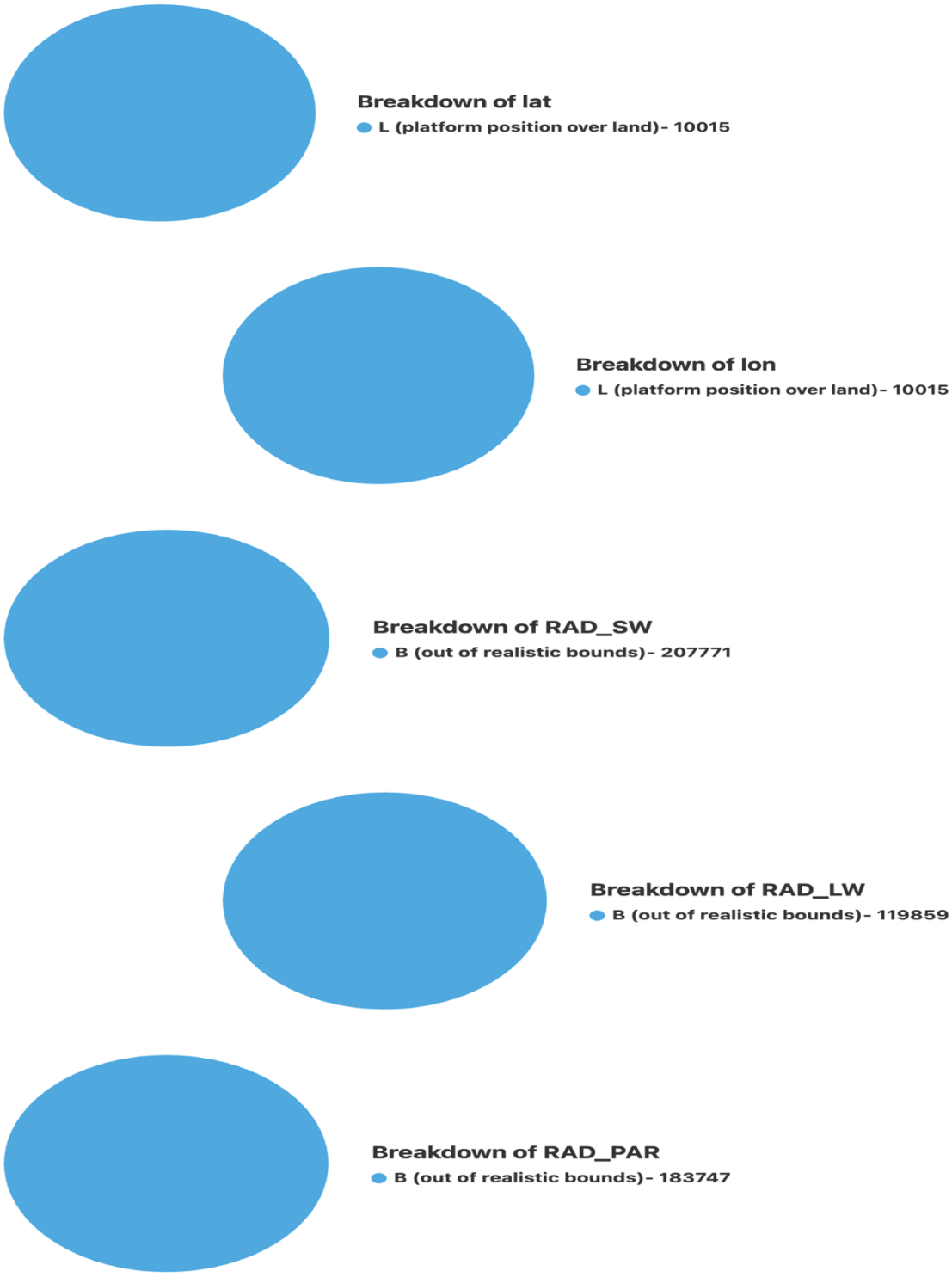


Figure 89: Distribution of SAMOS quality control flags for (first) latitude – LAT – (second) longitude – LON – (third) short wave atmospheric radiation – RAD_SW – (forth) long wave atmospheric radiation – RAD_LW – and (last) photosynthetically active radiation – RAD_PAR – for the *R/V Neil Armstrong* in 2025.

4. Metadata summary

Adequate metadata is the backbone of good visual QC. It also improves the utility of any data set. As such, vessel operators are strongly advised to keep vessel and parameter metadata complete and up to date. Annex B, Part Two, walks SAMOS operators through editing metadata online, step by step, while Part One offers instructions for monitoring metadata and data performance. For vessel metadata, the following are the minimum required items in consideration for completeness: Vessel information requires vessel name, call sign, IMO number, vessel type, operating country, home port, date of recruitment to the SAMOS initiative, data reporting interval, and instrument system name (i.e., data acquisition/assembly software) and, if applicable, version. Vessel layout requires length, breadth, freeboard, and draught measurements. Vessel contact information requires the name and address of the home institution, a named contact person and either a corresponding email address or phone number, and at least one onboard technician email address. A technician name, while helpful, is not vital. Vessel metadata should also include vessel imagery (highly desirable, see Figure 90 for examples) and a web address for a vessel's home page, if available.

Parameter metadata requirements for completeness vary among the different parameters, but in all cases "completeness" is founded on filling in all available fields in the SAMOS metadata form for that parameter, as demonstrated in Figure 91. (Any questions regarding the various fields should be directed to samos@coaps.fsu.edu. Helpful information may also be found at https://samos.coaps.fsu.edu/html/docs/samos_metadata_tutorial_p2.pdf, which is the metadata instruction document located on the SAMOS web site.) In this example (Figure 91 b.), as is frequently the case, the only missing field is the date of the last instrument calibration. Calibration dates may be overlooked as important metadata, but there are several situations where knowing the last calibration date is helpful. For example, if a bias or trending is suspected in the data, knowing that a sensor was last calibrated several years prior may strongly support that suspicion. Alternatively, if multiple sensors give different readings, the sensor with a more recent last calibration date may be favored over one whose last calibration occurred years ago. (Note that for those sensors not routinely calibrated, such as GPS instruments, an installation date is alternately desired.)

We note here that as of summer 2020 we are now collecting additional flow water metadata elements, namely, intake location and pipe run length. Knowing these details can help establish a basis for any unnatural increase or decrease seen in sea water variable values away from what they would have been directly at the sea water intake. Typically, the further water has travelled inside the ship, the greater the warming/cooling effects of the ship/pipes on the water.

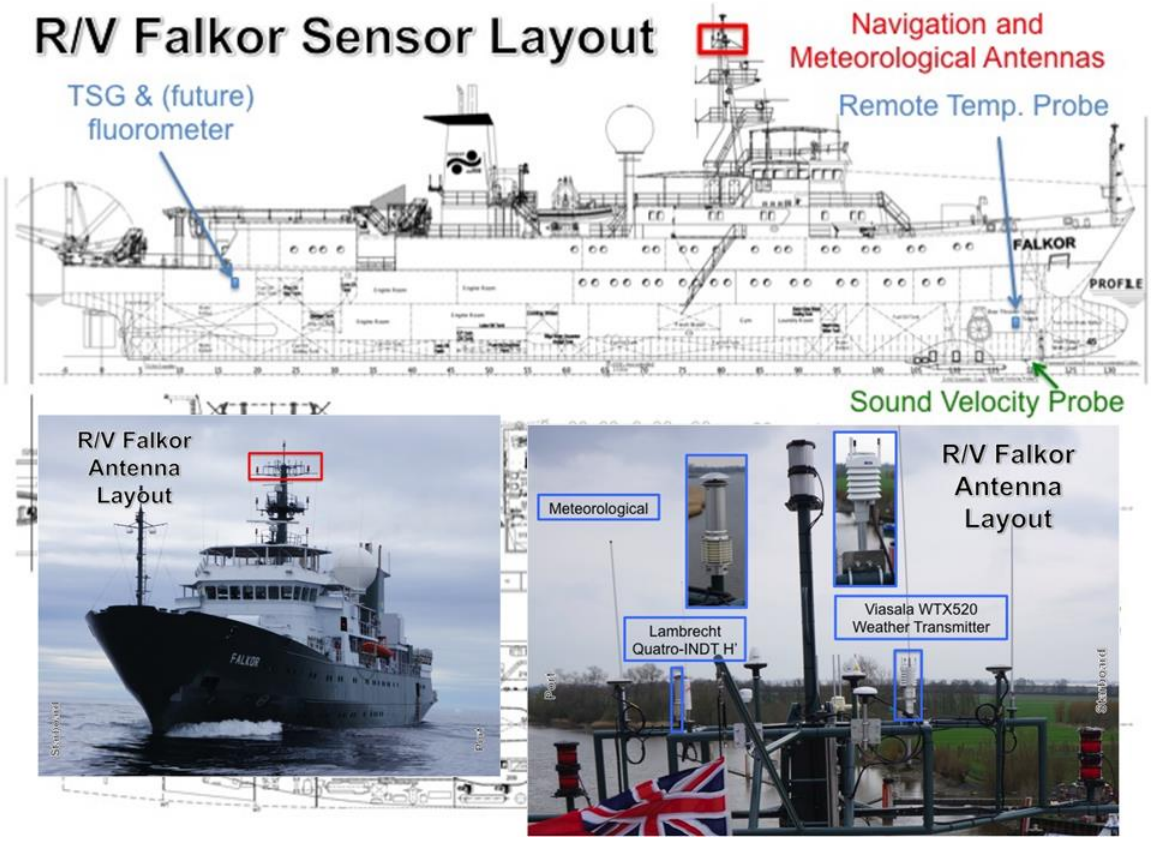


Figure 90: Examples of detailed vessel instrument imagery from the *R/V Falkor*.

a.

sea temperature

Designator		Date Valid	
SST		06/01/2005 to Today	
Descriptive Name	Original Units	Instrument Make & Model	Last Calibration
sea temperature	celsius	Falmouth Science Inc. OTM-S-212 (OTM1378)	August 2004
TS Sensor Category	Observation Type	Distance from Bow	Distance from Center Line
12	measured	0	0
Height	Average Method	Averaging Time Center	Average Length
-5.4	average	time at end of period	1
Sampling Rate	Data Precision		
4	0.01		

b.

sea temperature

Designator		Date Valid	
SST		05/09/2005 to Today	
Descriptive Name	Original Units	Instrument Make & Model	Last Calibration
sea temperature	celsius	Sea-bird SBE48 Hull Sensor	
TS Sensor Category	Observation Type	Distance from Bow	Distance from Center Line
hull contact sensor	measured	0	0
Height	Average Method	Averaging Time Center	Average Length
-5	average	time at end of period	1
Sampling Rate	Data Precision		
4	0.01		

Figure 91: Example showing parameter metadata completeness (a.) vs. incompleteness (b.). Note missing information in the "Last Calibration" field in (b.)

Following the above guidelines for completeness, Table 4 summarizes the current state of all SAMOS vessel and parameter metadata:

	Vessel Info	Contact Info	Vessel Layout	Digital Imagery	LATITUDE	LONGITUDE	PLATFORM HEADING	PLATFORM COURSE	PLATFORM SPEED	SEA TEMPERATURE	CONDUCTIVITY	SALINITY
KAOU	C	C	C	Yes	C	C	C	C	C	C,C,C	C,C	C,C
KAQP	C	C	C	Yes	C	C	C	C	C	I,I	I	I
KTDQ	C	C	C	Yes	C	C	C	C	C	C,C	C	C
NEPP	C	C	C	Yes	C	C	C,C	C	C	C,C,I	C,C	C,C
VLMJ	I	C	I	No	I	I	I	I	I	I,I		I
VMIC	I	C	C	Yes	I	I	I	I	I	I		I
WARL	C	C	I	Yes	I	I	I	I	I,I	I,I	I	I
WBP3210	C	C	C	Yes	I	I	I	I	I	I,I	I	I
WDA7827	C	C	C	Yes	I	I	I,I	I	I	I,I	I	I
WDC9417	C	C	C	Yes	I	I	I	I	C	C,C,C,C	C,C	C,C
WDN7246	C	C	C	Yes	I	I	I,C,C	I	I	C,C,C,C,I	C,C	C,C
WSAF	C	C	I	Yes	C	C	C	I	C	I,I,I,I,I	I,I	I,I
WSQ2674	C	C	I	Yes	C	C	C	C	C	I,I	I	I
WTDF	C	C	C	Yes	I	I	I,I	I,I,I	I,I,I,I,I,I	I,I,I,I,I	I	I
WTDH	C	C	C	Yes	I	I	I,I,I	I,I,I	I,I,I,I,I,I	I,I	I	I
WTDL	C	I	C	Yes	I	I	I,I	I,I	I,I,I,I	I,I,I,I,I,I	I,I	I,I
WTDO	C	I	C	Yes	I	I	I	I,I	I,I,I,I,I	I,I,I,I	I,I	I,I
WTEA	C	I	C	Yes	I	I	I,I	I,I	I,I	I	I	I
WTEB	C	I	C	No	I	I	I	I,I	I,I,I	I,I	I	I
WTEC	C	C	C	Yes	I	I	I,I,I	I,I,I,I	I,I,I,I	I,I,I,I	I,I	I,I
WTED	C	C	C	Yes	I	I	I,I	I,I	I,I,I,I	I,I,I,I,I,I	I,I	I,I
WTEE	C	C	C	No	I	I	I,I	I,I	I,I	I,I,I	I,I	I,I
WTEF	C	I	C	No	I	I	I,I	I,I	I,I			
WTEG	C	C	C	Yes	I	I	I,I,I	I,I	I,I,I,I	I,I	I	I
WTEK	I	I	C	No	I	I	I,I	I,I	I,I	I,I	I	I
WTEO	C	I	C	Yes	I	I	I,I	I,I,I	I,I,I,I,I	I,I,I,I	I	I
WTEP	C	C	C	Yes	I	I	I,I	I,I,I	I,I,I,I,I	I,I,I,I,I	I	I
WTER	C	I	I	Yes	I	I	I,I,I	I,I,I	I,I,I	I,I,I	I,I	I,I
ZGOJ7	C	C	C	Yes	I	I	C	C	C,C,C	C,C,C,C	C,C	C,C
ZMFR	I	C	C	No	I	I	I	I	I	I		

Table 4: Vessel and parameter metadata overview. Only metadata valid as of the writing of this report is shown. "C" indicates complete metadata; "I" indicates incomplete metadata. Under "Digital Imagery," "Yes" indicates the existence of vessel/instrument imagery in the SAMOS database, "No" indicates non-existence. Empty boxes indicate non-existence of a parameter; multiple entries in any box indicate multiple sensors for that parameter and vessel.

	RELATIVE WIND SPEED	RELATIVE WIND DIRECTION	TRUE WIND SPEED	TRUE WIND DIRECTION	AIR TEMP	DEW POINT TEMP	WET BULB TEMP	PRESSURE	RELATIVE HUMIDITY	PRECIP	RAIN RATE	LONG WAVE RADIATION	SHORT WAVE RADIATION	PHOTOSYNTHETICALLY ACTIVE RADIATION (PAR)
KAOU	C,C	C,I	C,I	C,C	C,C,C	C,C		C,C,C	C,C	C,C		C,C	C,I	C
KAQP	I,I	I,I	C,C	C,C	I,I			I,I,I,I	I,I	I,I	I,I	C	C	
KTDQ	C,C,C	C,C,C	C,C,C	C,C,C	C			C	C			C	C	C
NEPP	C,C,C	I,C,C	C,C,C	C,C,C	C,C,C,C			C,I	C,C,C			I	I	C
VLMJ	I,I,I	I,I,I	C,C,C	C,C,C	I,I			I	I,I	I,I		I,I	I,I	I,I
VMIC	I,I,I	I,I,I	I,I,I	I,I,I	I,I			I	I,I	I		I,I	I,I	I,I
WARL	C,C	C,C	C,C	C,C	C,C			C,C	C,C	C,C	C,C	C	C	C
WBP3210	I,I	I,I	I,I	I,I	I			I	I			I	I	I
WDA7827	I,I,I	I,I,I	I,I,I	I,I,I	I			I	I	I	I			
WDC9417	C,C,C	C,C,C	C,C,C	C,C,C	C,C			C,C	C,C	C		C	C	I
WDN7246	C,I,I	C,I,I	C,C,C	C,C,C	C			C	C			C	C	C
WSAF	C,C	C,C	C,C	C,C	C,C,C	C		C,C,C	C,C	I,C		I	I	C
WSQ2674	C,C	C,C	C,C	C,C	C,C,C	C		C,C,C,C	C,C	C		I	I	C
WTDF	I,I,I,I	I,I,I,I	I,I,I,I	I,I,I,I	I		I	I	I			I	I	
WTDH	I,I,I	I,I,I	I,I,I	I,I,I	I,I			I,I	I,I		I			
WTDL	I,I	I,I	I,I	I,I	I,I,I	I	I	I,I,I	I,I,I		I			
WTDO	I,I,I	I,I,I	I,I,I	I,I,I	I,I			I,I	I,I		I			
WTEA	I	I	I	I	I	I	I	I	I					
WTEB	I,I	I,I	I,I	I,I	I,I			I,I,I	I,I		I			
WTEC	I,I,I	I,I,I	I,I,I	I,I,I	I,I,I	I	I	I,I	I,I,I		I	I	I	
WTED	I,I,I	I,I,I	I,I	I,I	I			I,I	I					
WTEE	I,I	I,I	I,I	I,I	I,I			I,I	I,I		I			
WTEF	I	I	I	I	I			I	I		I			
WTEG	I	I	I	I	I			I					I	
WTEK	I,I	I,I	I	I	I			I	I					
WTEO	I,I,I,I	I,I,I,I	I,I,I,I	I,I,I,I	I	I	I	I	I					
WTEP	I,I,I,I	I,I,I,I	I,I,I,I	I,I,I,I	I,I			I,I,I	I,I					
WTER	I,I,I	I,I,I	I,I,I	I,I,I	I	I	I	I	I					
ZGOJ7	C,C	C,C	C,C	C,C	C,C	C		C,C	C,C	C	C	C	C	I
ZMFR			C	C	C			C	C	C		I,I	I,I	

(Table 4: cont'd)

5. Plans for 2026

2026 marks the start of the third decade of the SAMOS initiative. The SAMOS chairman would like to personally thank all the technicians, operators, captains, and crew of the SAMOS research vessels for their dedication to the project. In the past year, we continued to see the dedication of the vessel operators to provide high-quality underway observations and are pleased to continue to expand our two-way communications between the vessel operators/technicians and DAC personnel. The DAC team would also like to thank personnel within our funding agencies (see page 3), NOAA OMAO, NOAA NCEI, NOAA PSD, the Australian IMOS project, and the Schmidt Ocean Institute for their continued support of the SAMOS initiative.

The SAMOS DAC also recognizes an ongoing partnership with the Rolling deck To Repository (R2R; https://www.rvdata.us/) project. Funded by the National Science Foundation, R2R has developed procedures for transferring all underway data (navigation, meteorology, oceanographic, seismic, bathymetry, etc.) collected on U. S. academic research vessels and the U.S. Antarctic Program to a central onshore repository. So far in 2026, the university-operated vessels contributing to the SAMOS DAC were those operated by WHOI, SIO, UA, UH, UW, and BIOS. The focus of the R2R is collecting and archiving the full-sampling-level (e.g., sampling rates up to 1 Hz) underway data at the end of each planned cruise, which are the source data for the 1-min averages submitted to SAMOS in daily emails. In 2026, we continue working with OSU and UA to test SAMOS data and metadata flow using the CORIOLIX data presence software. This new SAMOS data pathway will be operational for the *Sikuliaq* by mid-2026 and we expect use of CORIOLIX to expand to other academic vessels in the coming years.

In 2026, we will continue to use the SAMOS data ingestion and processing system to take full advantage of the 5th version of NOAA's Scientific Computer System (SCS) software, but we are also preparing for the NOAA fleet to begin SAMOS data and metadata transfers using CORIOLIX. Both SCS5 and CORIOLIX support automated daily delivery of device metadata (down to the parameter level), which allows SAMOS to update our device metadata profile when changes are discovered and ensure the metadata are properly linked to the observations in the SAMOS netCDF files. We also plan to meet virtually with many operators providing SAMOS observations in 2026 to review and update their respective instrumental metadata and to discuss any questions the operators may have regarding meteorological sensor selection, placement, etc. Frequent dialog with the operators results in fewer data problems and the up-to-date metadata benefits both the SAMOS team for our quality evaluation and the downstream data users.

6. References

Beggs, H., N. Morgan and J. Sisson (2017) IMOS Ship SST for Satellite SST Validation, In: Proceedings of the GHRSST XVIII Science Team Meeting, Qingdao, China, 5th - 9th June 2017, ISSN 2014-2529, p. 127-134. https://www.ghrsst.org/meetings/18th-international-ghrsst-science-team-meeting-ghrsst-xviii

Freeman, E., S. D. Woodruff, S. J. Worley, S. J. Lubker, E. C. Kent, W. E. Angel, D. I. Berry, P. Brohan, R. Eastman, L. Gates, W. Gloeden, Z. Ji, J. Lawrimore, N. A. Rayner, G. Rosenhagen, and S. R. Smith, 2016: ICOADS Release 3.0: a major update to the historical marine climate record. Int. J. Climatol. doi:10.1002/joc.4775

Hill, K., T. Moltmann, R. Proctor, S. Allen, 2010: The Australian Integrated Marine Observing System: Delivering Data Streams to Address National and International Research Priorities. *Marine Tech Society J.*, **44**(6), 65-72. https://doi.org/10.4031/MTSJ.44.6.13

Pieter R. Wiederhold, cited 2010: True Accuracy of Humidity Measurement. [Available online at http://archives.sensorsmag.com/articles/0997/humidity/index.htm.]

Smith, S. R., K. Briggs, M. A. Bourassa, J. Elya, and C. R. Paver, 2018: Shipboard automated meteorological and oceanographic system data archive: 2005–2017. *Geosci Data J.*, **5**, 73–86. https://doi.org/10.1002/gdj3.59

Smith, S. R., and J. Elya: 2015. Procedure for placing hourly super-observations from the Shipboard Automated Meteorological and Oceanographic System (SAMOS) Initiative into ICOADS**.** COAPS, Tallahassee, FL, USA, 34 pp. Available from Center for Ocean-Atmospheric Prediction Studies, Florida State University, Tallahassee, Florida, 32306-2840, USA and online at http://icoads.noaa.gov/e-doc/other/transpec/samos/SAMOS_RVtoIMMAprocedure_v2p1.pdf.

Smith, S. R., J. J. Rolph, K. Briggs, M. A. Bourassa, 2009: Quality-Controlled Underway Oceanographic and Meteorological Data from the Center for Ocean-Atmospheric Predictions Center (COAPS) - Shipboard Automated Meteorological and Oceanographic System (SAMOS). National Oceanographic Data Center, NOAA. Dataset. doi:10.7289/V5QJ7F8R

Ship schedule references, publicly available only:

AAP vessel is found online at https://www.antarctica.gov.au/antarctic-operations/travel-and-logistics/shipping-and-air-schedules/ (*Nuyina*)

CSIRO vessel is found online at https://www.csiro.au/en/about/facilities-collections/MNF/Voyages-schedules/Voyage-schedules (*Investigator*)

IMOS SAMOS data availability is found online at http://opendap.bom.gov.au/thredds/catalog/imos_samos_archive/catalog.html (*Investigator*, *Nuyina*, and *Tangaroa)*

R2R vessels are found online at https://www.rvdata.us/browse_vessels (*Falkor (too)*, *Healy*, others)

UNOLS vessels are found online at https://www.mfp.us/programme (most other non-NOAA vessels)

USAP vessels are found online at https://www.usap.gov/vesselscienceandoperations/ (*Nathaniel B Palmer)*

Annex A: Notifications and Data Subsets with Verified Issues, Unflagged or Only Partially Flagged (listed by vessel)

The vessels listed here generally do not receive visual quality control. As such, this compilation relies almost entirely on notifications sent to the DAC by vessel operators or email exchanges initiated by the DAC; in many cases the exact cause of any issues and/or the exact date range under impact are unknown.

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Atlantic Explorer	20250506 - 20250508	~2005 - ~0950	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace	Looks like TSG flow shutdown in port at BIOS, Bermuda.		
Atlantic Explorer	20250628 - 20250630	~1900 - ~1725	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace	Looks like TSG flow shutdown in port at San Juan, Puerto Rico.		
Atlantic Explorer	20250712 - 20250713	~1200 - ~0500	TS, TS2, TS3, TS4	B-flags	Sea temperature values being flagged as out of range for values >30C. This is an edge case where the vessel has moved north of 30N and entered the mid-latitude bounds range for our SST range check. These >30C SSTs have been confirmed to be acceptable by comparing to satellite data, which notes upwards of +3C SST anomalies in the region. These data should be considered good values, but as the AE does not get visual QC, these B-flags will remain.		
Atlantic Explorer	20250801 - 20250822	all day	RH	Low variability	The main mast RH sensor has not been ranging outside of 95-100% for several weeks. Hard to define exactly when the problem started as the AE was operating in a saturated environment early in August. As of 8/11, clearly not in agreement with the forward mast RH sensor.	Emily noted: The main met mast RH was still reading higher this morning (8/11). We changed our science-facing display to show the forward mast values for this cruise. The forward is in line with the Bermuda airport weather station which is across the street from us. Sensor was swapped in port around 22 August 2025. Data looking good now.	
Atlantic Explorer	20250925 - 20251013	all day	T2	Foremast and main mast sensors do not compare well, some B flags on T2	Looks like one of the sensors is drifting off calibration. Suspect T2 on the forward mast. The sensors are reading 3-3.5C differences. Problem notable on last cruse, but may have existed before the dates noted here. Use with caution.	Jace noted that they have not made any sensor changes that would account for the return to a 1C difference. They are looking into purchasing T/RH sensors from a different vendor. T2 (fore mast) was the problem. Emily replaced the sensor on 20251125. Do not use data in this period.	

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Atlantic Explorer	20251021 - 20251125	all day - ~1300	T2	sensor do not compare well, some B flags on T2	Large sensor differences have returned. Suspect T2 on the forward mast. The sensors are reading 3-4C differences. Known issue, but not sure why it comes and goes. Use with caution.	Emily reported: The fwd met mast is recording air temp and humidity again! On Friday I took down fwd mast sensor s/n 28623. After testing I put up s/n 28624. It has a different sensor probe now than the one that was having humidity problems previously. First looks at the values seem good compared to the main mast and the airport across the street, but will be watching during this three day cruise.	Difference getting larger as of 4 Nov 2025. Sensor issue continues as of 14 November with difference reaching 6 C. Sensor replaced around 25 November 2025.
Atlantis	20250102 - 20250123	1014 - ~1700	TS2, SSPS, CNDC	smooth trace	Pump off heading into Mexican EEZ.	Shutdown noted by ship techs.	Pumps still off through in-port in San Diego.
Atlantis	20250102	~0930 - ~1400	PL_WDIR3, PL_WSPD3, DIR3, SPD3, RAD_LW, PRECIP3, RRATE3	Flatlined or very spikey data	Suspect birds roosting on WXT.		
Atlantis	20250103	~0300 - ~1400	PL_WDIR2, PL_WSPD2, DIR2, SPD2, PRECIP2, RRATE2, PL_WDIR3, PL_WSPD3, DIR3, SPD3, PRECIP3, RRATE3	Flatlined or very spikey data	Suspect birds roosting on WXTs.		
Atlantis	20250127 - 20250217	nighttime, not every day	DIR2, SPD2, PL_WDIR2, PL_WSPD2, DIR3, SPD3, PL_WDIR3, PL_WSPD3, PRECIP2, PRECIP3, RRATE2, RRATE3, RAD_LW	multiple spikes in data, some B, G flags	Looks like tropical birds are back.		No longer an issue as they pulled into port in San Diego on 20250217
Atlantis	20250217 - 20250224	~1345 - ~1900	TS2, SSPS, CNDC	smooth trace	Pump off heading into port at San Diego.		
Atlantis	20250303 - 20250316	~1845 - ~1925	TS2, SSPS, CNDC	smooth trace	Pump off heading into port at San Diego.		
Atlantis	20250315 - 20250327	nighttime, not every day	DIR2, SPD2, PL_WDIR2, PL_WSPD2, DIR3, SPD3, PL_WDIR3, PL_WSPD3, PRECIP2, PRECIP3, RRATE2, RRATE3, RAD_LW	multiple spikes in data, some B, G flags	Looks like tropical birds are back.		
Atlantis	20250317 - 20250319	~0900 - ~1820	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump secured/off. Likely either a Mexican EEZ issue or high seas resulting from Tehjuantepec wind event.		
Atlantis	20250317 - 20250318	~0900 - 1800	SPD2, SPD3	Lots of G flags	Unique weather event captured when the vessel encountered strong winds from a Tehauntepec gap (north) wind event.		User should treat as good, but extreme, values.
Atlantis	20250327 - 20250407	~0730 - ~2155	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump secured/off entering port in Costa Rica.		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Atlantis	20250419 - 20250502	nighttime, not every day	DIR2, SPD2, PL_WDIR2, PL_WSPD2, DIR3, SPD3, PL_WDIR3, PL_WSPD3, PRECIP2, PRECIP3, RRATE2, RRATE3, RAD_LW	multiple spikes in data, some B, G flags, some time series are smooth/steppy	Looks like tropical birds are back.		Mostly affecting the "3" variables on this occurrence. Particularly big bird event on 20250424, 20250425.
Atlantis	20250504 - 20250601	~2330 - ~2100	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump secured/off entering Mexican EEZ.		
Atlantis	20250610 - 20250615	~2320 - ~2020	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port a Unalaska, AK.		
Atlantis	20250702 - 20250705	1423 - ~2215	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port a Unalaska, AK.		Note: Also a gap in all variables (except navigation) from 1423-2337 UTC on 20250702. Possibly related to TSG shutdown.
Atlantis	20250715 - 20250716	1735 - 0032	TS2, SSPS, CNDC	smooth trace	Techs informed us that the flow to the waterwall was shutdown. Data are not valid, do not use.	TR noted: Atlantis shut down our waterwall from 1735 UTC on 07/15 until 0032 on 07/16. Data was recorded during that time from our seawater sensors (Fluorometer, Transmissometer, Thermosalinograph, SBE45 temp) but is not valid.	
Atlantis	20250718 - 20250720	~0530 - ~2105	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port a Unalaska, AK.		Note: Also a gap in all variables (except navigation) from 1754 - 2132 UTC on 20250718. Possibly related to TSG shutdown.
Atlantis	20250728 - 20150804	~1345 - ~1940	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at Newport, OR.		
Atlantis	20250815 - 20250818	~0840 - ~0240	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at Newport, OR.		
Atlantis	20250829 - 20250905	~0740 - ~2030	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at Newport, OR.		
Atlantis	20250922 - 20250925	~1140 - ~2335	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at Astoria, OR.		
Atlantis	20250930	~1145 - 2359	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at San Diego, CA.	Data feed shutdown at end of 30 Sept so WHOI could test Vaisala issues while in port. Data should resume on 18 October.	
Atlantis	20251017 - 20251018	0000 - ~1800	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at San Diego, CA.	System restarted on 17 October for next cruise with TSG pumps off.	
Atlantis	20251030 - 20251031	1325 - 0300	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at San Diego, CA.	Allison noted they went into port yesterday to pick up a winch, so the flow thru was off from 10/30/2025 13:25 to 10/31/2025 3:00.	

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Atlantis	20251030 - 20251031	1800 - 1115	TS	no data	SBE48 down after power failure.	Allison also noted they had a power glitch while there. The SBE48 usually dies when we have a power issue. The data started up again, but it was out from about 10/30/2025 18:00 to 10/31/2025 11:15.	
Atlantis	20251117 - 20251122	~1640 - 2359	TS2, SSPS, CNDC	smooth trace	Looks like TSG pump shutdown heading into port at San Diego, CA.	Ella noted the Atlantis will be in port until 8 January 2026, so she stopped the SAMOS mailer until early next year.	
Healy	20250606 - 20250618	all day - ~2330	RAD_SW2, RAD_LW2	Missing data	Values of SWZ and LWZ are all NaN in the DCC files.		Data flow for SW and LW sensors restored late on 20250618.
Healy	20250623 - 20250626	intermittent	LAT, LON	Missing data	For several days intermittent dropouts of LAH and LOH have resulted in some 1-minute records not being processed. Expected Nav system issues.	Techs confirmed they are having a lot of problems with all their GPS system. Fix TBD.	
Healy	20250707 - 20250708	~0445 - ~0330	TS, TS2, TS3, CNDC, CNDC2, SSPS, SPSS2	Missing, out of range data (B flags)	Looks like pumps off for the Russian EEZ.		
Healy	20250711 - 20250714	~1545 - ~0140	TS, TS2, TS3, CNDC, CNDC2, SSPS, SPSS2	Missing data	Looks like pumps off for port stop in Unalaska, AK		
Healy	20250716	~0430 - ~2355	TS, TS2, TS3, CNDC, CNDC2, SSPS, SPSS2	Missing data	Looks like pumps off for cruise change over.		
Healy	20250720 - 20250721	~0100 - ~1830	T, RH, DIR, SPD, PL_WDIR, PL_WSPD	missing data	Values abruptly stopped, all values NaN	Christina noted: Unfortunately we had a mishap with the wind sensor. The pole it was on completely broke off and we had to turn off power to bring the pole and sensor down. The RH/Temp should be back on shortly. Don't anticipate the bow wind sensor to come back this season. Maya disabled the bow wind sensor from writing to the daily SAMOS DCC files, so no data for this wind sensor will exist for the remainder of the 2025 field season.	T, RH data restored at approximately 1830 UTC on 20250721.
Healy	20250601 - 20251028	Intermittent	RH, RH2, RH3	missing values	Healy has the longstanding issue with SIO-MET data acquisition software in that when RH reaches 100%, the RH value is set to missing (so supersaturation conditions never recorded). This has been reported in past years as well.		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Healy	20250901 - 20251001	Daytime	T3, RH3	Some B/G flags	The HTP201 (sn: 24071600065955) has been experiencing temperatures during the daytime that can be double the temperatures from other sensors on the vessel. Looks like a diurnal heating problem, though not clear why it is only affecting this sensor. Daytime data should be used with caution.	Bowman noted that they would look at the temperature sensor once the wind dies down. Both temp sensors share the same rad shield. It's possible one came loose.	Problem still exists as of 14 Sept 2025. Since the vessel entered the ice pack, temperatures have been well below freezing and this sensor is comparing well to other T/RH. Problem did not recur when the vessel sailed south out of the ice pack, so either something was fixed/tightened (no email received) or the sensor "self-resolved".
Healy	20250815 - 20250822	0000 - ~0300	TS2, SSPS2, CNDC2	smooth trace	Looks like TSG pump shutdown heading into port at Kodiak,AK.		
Investigator	20250101 - 20250324	all day	PRECIP2	flatlined	Port rain sensor (PRECIP2) flatlined when starboard sensor (PRECIP) reports hourly rainfall. Possible blockage or other failure of port RM Young gauge.	Problem noted, but sensor can not be inspected until next port call. March 2025 - Techs noted: The port rain sensor was installed in Singapore prior to returning to Australia but has not worked since. The problem was thought to be the sensor, which was ruled out, then the communication interface, which was ruled out and finally found to be a cable in the Aerosol lab below the foremast. This was reconnected to the network just prior to sailing on V02 and the sensor is operational again.	Initial date of problem unknown, but occurred well back in 2024.
Investigator	20250207- 20250213	all day - ~0050	RAD_SW2, RAD_LW2	flatlined	Port side radiometers flatlined, likely sensors removed or failed.	Problem noted by Haifeng and he reached out to the operator. Operator replied that there have been several interruptions of network and power during this in port period that may result in data gaps.	
Investigator	20250318 - 20250526	all day - 2240	T, RH	Missing data	Parameters (RHS, ATS) noted to be expected but not in daily files.	the starboard T&RH sensor is currently not in operation. It stopped functioning a couple of days before the end of last voyage and the port period was too short for repairs.	
Investigator	20250505 - 20250526	all day - 2240	PRECIP2	flatlined	Port rain sensor (PRECIP2) flatlined when starboard sensor (PRECIP) reports hourly rainfall. Possible blockage or other failure of port RM Young gauge.	Operator confirmed this sensor failed early in this cruise. Data received are suspect - DO NOT USE.	Initial date of problem unknown, but clearly a recurrence of prior issues with this sensor.

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Investigator	20250505 - 20250526	all day - 2240	PL_WSPD2, SPD2	no flags	Values are half those reported by 1st and 3rd anemometers, both of which compare well to satellite overpass. Looks to be units or sensor problem. NOTE that vessel was steaming directly into the wind, so airflow distortion unlikely given sensor exposure.	Operator confirmed this sensor failed early in this cruise. Data received are suspect - DO NOT USE.	
Kilo Moana	20251114 - 20251120	~2215 - ~1935	TS2, SSPS, CNDC	Smooth data trace	Looks like flow water system shutdown while in port in Honolulu.		
Nathaniel Palmer	20250129 - 20250130	~1630 - 1803	TS, SSPS, CNDC	No flags, but some missing data	Data steps abruptly down from realistic values and flatlines. Suspect flow through shutdown entering New Zealand EEZ.		Values removed from files as of 1830 on 30 Jan 2025. Note: TSG data restarted ~0630 on 14 February 2025.
Nathaniel Palmer	20250203	~0125, ~0140	RAD_SW, RAD_LW, RAD_PAR, T, RH		Sensor cleaning reported by operator.	Around 01:25 UTC on February 3rd, 2025, we cleaned our GUV, PSP, PIR, and PAR sensors. Shortly after, around 01:40, we rinsed our Temp/RH sensor with DI water.	
Nathaniel Palmer	20250203 - 20250206	all day - 0400	P	Lots of B flags	Pressure values unrealistically low (between 4.0-11.2 hPa) following a sensor swap. Data Incorrect: DO NOT USE.	Techs noted they did install our new barometer but got sidetracked by other IT issues before configuring it to work with our system. They configured the new sensor on 20250206 and are seeing realistic values. The units should be in mbar's.	
Nathaniel Palmer	20250325 - 20250403	~1945 - ~1955	TS, SSPS, CNDC	Some B/G flags	Data steps abruptly up from realistic values to values well exceeding intake SBE38. Suspect flow through shutdown.	Techs confirmed that they were getting ice/slush in the intake, so the flow through pumps were turned off. Pumps restarted on 3 April 2025.	

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Nathaniel Palmer	20250329 - 20250417	~1450 - ~0445	P, T, RH, RAD_PAR	Some B/G flags, some missing data	Values dropped abruptly to unrealistic values. P/T/RH failed first, then RAD_PAR on 20250330. Could be a matter of the sensors/electronics getting too cold (-22C reported on 3/29).	Techs noted problem on 29 March and At 04:20 UTC, 03/30/25, the barometer sensor and all other sensors on the science mast were cleaned; however, this did not resolve the issue. Techs climbed the mast and everything seemed normal but I noticed soot from the ship's exhaust covering both radiometers and the barometers inlet. I cleaned the areas with ethanol and Kim wipes, and data was temporarily restored. However, a few hours later, the barometer readings intermittently dropped to NaN again. Problem resolved on 17 April when the GUV/DeckBox was replaced.	Note: P stopped being included in daily CSV files sometime in this cruise.
Nathaniel Palmer	20250406 - 20250407	~1900 - ~2359, ~0000 - ~0330	DIR, DIR2, PL_WDIR, PL_WDIR2, SPD, SPD2, PL_WSPD, PL_WSPD2	Flatlined variables, some steps	I noticed the issue on 4/6, but I waited until the next day to see if it persisted, which it did not. Unsure what could have caused it.		
Nathaniel Palmer	20250410 - 20250411	~0500 - 2359	TS, TS2, SSPS, CNDC	No flags, but some missing data	Data steps abruptly down from realistic values and flatlines. Suspect flow through shutdown entering New Zealand EEZ.		Data (SST, TC, TT, SA) removed from daily files on 20250412. Sensor no longer transmitting in port from NZ.
Nathaniel Palmer	20250421 - 20250422	~0030 - 2050	DIR, DIR2, PL_WDIR, PL_WDIR2, SPD, SPD2, PL_WSPD, PL_WSPD2, P, T, RH, RAD_SW, RAD_LW, RAD_PAR	Values stuck at constant values. Some values missing.	Looks like an acquisition failure. Resolved late on 22 April. Reason unknown.		
Nathaniel Palmer	20250510 - 20250512	~1230 - ~1840	TS, TS2, SSPS, CNDC	No flags. Values flatlined	Expect flow system shutdown at Palmer station.		
Nathaniel Palmer	20250515 - 20250516	~0200 - 2359	TS, TS2, SSPS, CNDC	Some G/B flags. Values flatlined	Looks like flow system shutdown entering Chilean EEZ on the way to Punta Arenas.		Variables removed from SAMOS files starting 20250517 once vessel made port.
Nathaniel Palmer	20250524 - 20250526	~2100 - ~1340	DIR, DIR2, PL_WDIR, PL_WDIR2, SPD, SPD2, PL_WSPD, PL_SPD2, P, T, RH, RAD_SW, RAD_LW, RAD_PAR	Missing data	Looks like temporary data outage while in transit.	Operator did note they had a GFI trip periodically during the transit, which may have caused the outage. They are still working on a fix.	

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Nathaniel Palmer	20250717 - 20250723	all day	all variables	no data	Unknown transmission failure.	Lilly noted: We've been having issues with emails we've been producing with our data acquisition system moving off the ship outside of the USAP since Wednesday. I've opened a helpdesk ticket with Denver to see if we can get them flowing again. Problem resolved on 23 July 2025.	
Nathaniel Palmer	20250724	0000-2043	all variables	Smooth data trace		Lilly reported that while working on the data processing code, she accidentally applied the same cleanup to the SAMOS code, causing some weird averaging. The averaging was fixed it as of 20:43 UTC. Data prior to this time should NOT BE USED.	
Neil Armstrong	20250109 - 20250110	1426 - ~2050	TS, TS2, SSPS, CNDC	smooth trace or missing values	looks like pump off prior to departure from home port at WHOI		Note: No data other than time, lat, lon, SOG, and COG in files from 1-8 January 2025.
Neil Armstrong	20250109, 20250110	~1515 - ~1700, ~0530 - ~1630	RAD_LW	B flags	LW values exceeding 1000 W/m2, well out of a realistic range. Reason unknown as sensor has been within a realistic range since.		Does not look to have been a problem since 10 Jan 2025.
Neil Armstrong	20250113 - 20250116	~1230 - ~1330	TS, TS2, SSPS, CNDC	smooth trace or missing values	looks like pump off entering port in Bermuda		
Neil Armstrong	20250120 - 20250128	~2000 - ~1315	TS, TS2, SSPS, CNDC	smooth trace or missing values	looks like pump off entering port in Bermuda		
Neil Armstrong	20250130 - 20250210	~2000 - ~1145	TS, TS2, SSPS, CNDC	smooth trace or missing values	looks like pump off entering port in Bermuda		
Neil Armstrong	20250214 - 20250217	~1800 - ~1200	TS, TS2, SSPS, CNDC	smooth trace or missing values	looks like pump off entering port in Bermuda		
Neil Armstrong	20250218 - 20250225	~1430 - ~1445	TS, TS2, SSPS, CNDC	smooth trace or missing values	looks like pump off during transit to Port Everglades		
Neil Armstrong	20250306 - 20250307	~1800 - ~1145	TS, TS2, SSPS, CNDC	smooth trace or missing values	looks like pump off mid cruise.	Emily confirmed they had rough weather from 3/6 to 3/7 and shut down our underway pumps during that time because they were drawing too much air.	
Neil Armstrong	20250314 - 20250317	~1245 - ~1550	TS2, SSPS, CNDC	smooth trace or missing values	looks like pumps off while in Port Everglades		
Neil Armstrong	20250323 - 20250328	~0255 - ~1500	TS2, SSPS, CNDC	smooth trace or missing values	looks like pumps off while in port at WHOI		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Neil Armstrong	20250325 - 20250327, 20250328 - 20250329, 20250331 - 20250420	0000 - ~0900, ~1600 - ~2230, ~1230 -	RAD_LW	B-flags	LW values spike/step upwards to values exceeding 1200 W/m2. Looks like a sensor malfunction.	We had an inspection on Monday and the ship went dark for about 30 min to do emergency generator testing, maybe buggered the LWR sensor. I have power cycled the met mast just now and we watch the LWR data to make sure it is within expected range. Croy replied that something is causing the PIR voltage to spike to its max, this time it correlated with the rain, so possible water intrusion.	Problem looks to have been resolved during an in port maintenance period. Fix unknown. On 2 May 2025, Sonia noted that they swapped the cabling for the LWR while at WHOI. Hopefully this will resolve this problem.
Neil Armstrong	20250420 - 20250424	~1220 - ~1255	TS2, SSPS, CNDC	smooth trace or missing values	looks like pumps off while in port at WHOI		
Neil Armstrong	20250429 - 20250507	~1320 - ~1950	TS2, SSPS, CNDC	smooth trace	looks like pumps off while in port at WHOI		
Neil Armstrong	20250502 - 20250506	unknown - ~1330	All MET/RAD vars		Mast down for maintenance. Some MET/RAD observations will be suspect during this period, use with caution.	Sonia informed us the met mast was lowered for maintenance of the RAD sensors. They swapped some cables for the LWR. Mast may stay down until they sail. Raised on 6 May 2025.	
Neil Armstrong	20250514 - 20250606	~1700 - ~1430	RAD_LW	B flags	LW values dropping to large negative values (-4000 W/m2), well out of a realistic range. Looks like the cable repair earlier in month did not resolve problem.	Sonia noted that the LW radiometer was having issues again. Sonia emailed on 20250606 stating the LWR sensor had been replaced at WHOI with a newly calibrated Eppley PIR.	Sensor had some good values intermittently, but looks to have failed completely on 20250517. Reasonable data between 29-31 May 2025, but looks to have failed again on 20250601.
Neil Armstrong	20250604 - 20250611	~1430 - ~2300	TS2, SSPS, CNDC	smooth trace	looks like pumps off heading into port at WHOI		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Neil Armstrong	20250608 - 20250914	~0010 - 2359	RAD_LW	B flags	LW values dropping to large negative values (-1000 W/m2), well out of a realistic range. Looks like the sensor replacement on 20250606 did not resolve problem.	Emily replied that they will try to sort out the LW issue. 7 July 2025: Emily noted that we have swapped the sensor, the cable, and the box. We will not have a long enough in-port period to bring the met mast down until August,	Data looked OK for a few days 6/27-6/29, but then went negative again. So problem still exists. Thought the RAD box change on 6/30 would resolve this issue, but the problem returned on 7/2, 7/3, and 7/6. As of 7 July, problem still seems intermittent with periods of possibly good data mixed with really out of range data (negative). Presently plan to keep processing the data because there may be "acceptable" periods, but overall data should be used with caution. Data has looked better (more realistic periods) during the last 10 days of July, but still a few big negative spikes. These seem to correspond to rain events. Sensor data completely in the negative range on 20250814, so sensor is still highly suspect. 20250914 - After over a week without any LWR in a reasonable range, SAMOS decided to discontinue processing this sensor. We will await a resolution to the LWR measurements by WHOI. This may involve changing sensors or manufacturers, RAD interface, or rewiring the mast.
Neil Armstrong	20250629 - 20250707	~2010 - ~1800	TS2, SSPS, CNDC	smooth trace	looks like pumps off heading into port at WHOI		
Neil Armstrong	20250630 - 20250702	~1520 - ~1330	All MET/RAD vars	Step in some time series.	Techs informed us that the Met mast has been lowered in port to repair the LW radiation sensor.	Techs confirmed they swapped the RAD interface box (#222 for #224) on the mast in an effort to repair LW radiation data values. So far LWR looking better.	Mast in down position. Data in this period likely not representative and should be used with caution.
Neil Armstrong	20250723 - 20250724	~0345 - ~1920	TS2, SSPS, CNDC	smooth trace	looks like pumps off heading into port at WHOI		
Neil Armstrong	20250809 - 20250814	~1800 - ~1140	TS2, SSPS, CNDC	smooth trace	looks like pumps off heading into port at WHOI		
Neil Armstrong	20250819 - 20250823	~1100 - ~1600	TS2, SSPS, CNDC	smooth trace	looks like pumps off heading into port at WHOI		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Neil Armstrong	20250830 - 20250907	~1020 - ~1700	TS2, SSPS, CNDC	smooth trace	looks like pumps off heading into port at WHOI		
Neil Armstrong	20250922 - 20250923	~0500 - ~1845	TS2, SSPS, CNDC	smooth trace	looks like pumps off heading into port at WHOI		
Neil Armstrong	20251017 - 20251018	~1230 - ~1355	TS2, SSPS, CNDC	smooth trace	looks like pumps off in port at WHOI	System restarted on 17 October for next cruise with TSG pumps off.	
Neil Armstrong	20251022 - 20251030	starting at 0014, intermittent	Lat, Lon, PL_CRS, PL_SPD	Missing data	Data values NAN in original files. Looks like problem with CNAV. Met data OK, but not processed into daily files.	WHOI team notes they are having problems with their CNAV and are awaiting parts to fix the system. They have changed to the Kongsberg Seapath 380 as their primary navigation. They plan to add this to the daily samos CSV files at the end of their cruise on 8 Nov 2025.	Switchover to use SeaPath for lat, lon, SOG, COG began on 20251110.
Neil Armstrong	20251023 - 20251024	~1900 - ~2035	TS2, SSPS, CNDC	smooth trace	looks like pumps off in port at WHOI		
Neil Armstrong	20251026 - 20251027	~1600 - ~1400	TS2, SSPS, CNDC	smooth trace	looks like pumps off in port at WHOI		
Neil Armstrong	20251027 - 20251030	~2130 - ~1700	TS2, SSPS, CNDC	smooth trace	looks like pumps off in port at WHOI		
Neil Armstrong	20251109 - 20251110	unknown - 2020	TS2, SSPS, CNDC	smooth trace	looks like pumps off in port at WHOI		11/09 data never processed because of lat/lon problems.
Neil Armstrong	20251119 - 20251217	~1130 - ~1230	TS2, SSPS, CNDC	smooth trace	looks like pumps off in port at WHOI		
Neil Armstrong	20251217 - Continued into 2026	~1650 -	TS2, SSPS, CNDC	smooth trace	looks like pumps off in port at WHOI		Continuing into 2026 vessel in port.
Nuyina	20250116 - 20250219	~2300 - ~0500	RAD_LW	Abrupt decline then flatlined at zero.	Problem first noted by Haifeng at ABoM. He reported it to the techs.		
Nuyina	20250222 - 20250225	~1200 - ~0255	RAD_LW	Abrupt decline then flatlined at zero.	Looks like the same problem as earlier this year.	Techs noted: This sensor wasn't replaced (serial number unchanged) & no change to calibration date. The issue was apparently due to cabling. Hopefully no further issues.	
Nuyina	20250307 - Continued in 2026	all day, various times	P	steps in data	Random steps of about 1 hPa of various time lengths. Do not seem correlated to any other atmospheric of ship motion data.		August 2025: Problem seems less notable in recent weeks. Problem seems to continue through the year. Likely an exposure/flow issues. Continues into 2026.

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Nuyina	20250101 - 20250303	0000 - 2200	P	Pressure offset applied by operator.		Bureau of Meteorology informed SAMOS that they applied an offset of -2.88 hPa to Nuyina's underway pressure data from 2024-12-20 to 2025-03-03. This temporary solution was responding to a suspicious sensor overestimation at that time. It was removed following another test which shows that this offset is not necessary. The offset is included in the pressure data supplied in the SAMOS files, so use with caution.	
Nuyina	20250314 - 20250324	~0220 - ~0845	RAD_LW	Abrupt decline then flatlined at zero.	Looks like the same problem as earlier this year. Maybe the cable problem has returned.		No reason for fix provided.
Nuyina	20250519 - 20250606	~0900 - ~0445	RAD_LW	Abrupt step down, then flatlined at zero.	Looks like the same problem as earlier this year. Maybe the cable problem has returned.	Operator acknowledged the problem, but repair will have to wait for next port call.	Data started looking better around 1930 on 20250526, but sensor clearly failed again around 0720 on 20250530. Also some periods of reasonable data on 20250603 - 20250605 when they made port in Hobart. Problem looks to have been resolved on 20250606 at Hobart, though no reason was provided.
Nuyina	20250519 - 20250524	all day - ~1200	DIR, SPD	Spikes to zero, E-flags	Spikes only in true winds, not platform winds. Looks like true wind calculation problem.		Problem resolved, though no reason given.
Nuyina	20250702 - 20250902	~0030 - ~0230	PL_WDIR3, PL_WSPD3, DIR3, SPD3	flatlined	Values all dropped to zero and stayed there. Possible sensor removal or malfunction in port.	Operator confirmed this sensor has been removed for calibration during in port period at Hobart, Australia.	Looks like sensor reinstalled early on 2 September 2025 in Hobart.
Nuyina	20250901 - 20250903	~0900 - ~0730	PL_WDIR, PL_WDIR2, DIR, DIR2	Relative winds in poor agreement (180 degree difference) following a gap in data.	Since the vessel is in port at the time, looks like a sensor was swapped and reinstalled in the incorrect orientation. The result is incorrect true winds, but at present, can not tell which sensor is the issue.	Issue reported to vessel by Haifeng at ABoM.	Problem resolved on 9/3, though no information regarding the fix was provided.

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Nuyina	20251018 - 20251030	~0500 - 2359	RAD_LW	30 minute steps in data, not seen in RAD_LW2	Unknown sensor issue. Use data with caution.	Also noted by Haifeng at ABOM on 20251023. He contacted the operator. 20251026 Tech replied: The cable for the starboard LW radiometer was re-terminated during the recent maintenance period, but clearly this hasn't fixed the issue. I had a quick look at the sensor/cable a couple of days ago and nothing seemed obviously wrong, but once we're parked up in the ice at Davis I'll disconnect and reconnect the sensor properly. Unfortunately there's not much we can do beyond this to troubleshoot at sea.	
Nuyina	20251109 - 20251118	all day	RAD_LW	30 minute steps in data, not seen in RAD_LW2	Unknown sensor issue. Use data with caution. Looks to be recurrence of problem from earlier in this cruise.		Stopped transmitting data once they reached Hobart, AU.
Nuyina	20251201	all day	RAD_LW	30 minute steps in data, not seen in RAD_LW2	Unknown sensor issue. Use data with caution. Looks to be recurrence of problem from last cruise, but only lasted one day.		
Nuyina	20251216 - 20251231	all day	RAD_LW	30 minute steps in data, not seen in RAD_LW2	Unknown sensor issue. Use data with caution. Looks to be recurrence of a prior problem.		Problem seems to have self-resolved.

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Nuyina	20251229 - 20260106	0404 - 2359	DIR, PL_WDIR, SPD, PL_WSPD	No / bad data.	Sensor lost in storm.	Operator informed us of loss of both foremast sensors during a storm. "We lost fore_1 anemometer at 2025-21-29 04:25 and fore_2 slightly beforehand at 2025-21-29 04:04 the ones denoted with fore_1 and fore_2 are somewhere in the Southern Ocean. The forward webcams caught the loss of them, it makes for a riveting watch, when we get home and publish the data I recommend watching the webcam feed from 2025-12-29. For a short period of time, they were conducting a test which resulted in data coming through fore_2 from 2025-12-31 01:42 to 08:48 on the same day, this data is actually from another wind sensor so best to ignore it."	Techs followed up to say sensors were lost when they hit a 13.1 m wave in a storm. Processing for these parameters disabled on 1/7/2026, pending repairs later in February.
Nuyina	20251229 - 20260106	0425 - 2359	DIR2, PL_WDIR2, SPD2, PL_WSPD2	No / bad data.	Sensor lost in storm.	Operator informed us of loss of both foremast sensors during a storm. See notes from associated DIR/SPD event.	Techs followed up to say sensors were lost when they hit a 13.1 m wave in a storm. Processing for these parameters disabled on 1/7/2026, pending repairs later in February.
Revelle	20250418 - 20250601	all day	SPD, DIR, PL_WDIR, PL_WSPD	E-flags, suspect data trace	Since they left shipyard in Tampa, the true winds have been showing steps, changes associated with changes in ship motion. And the SPD looks very similar to the PL_WSPD). Assume some type of anemometer orientation issue or a mix of average/spot values in true wind calculations. Also potential original units issue for wind speed.	We have seen the wind issue and troubleshooting what we can from the lab. If we need to change the orientation, we will have to wait to get to Woods Hole and have someone go up and look at it. We will be in Woods Hole from 4/29 to 5/8. On 20250514 we were informed that the config settings for RMYoung wind sensor on MET mast and it appears to be suffering from a mix-up of Cal parameter values that were assigned in the MET .acq file. This may be the reason for the suspect winds from this sensor. Data are incorrect and should not be used.	
Revelle	20250423 - 20250424	~1230 - ~0415	TS, TS2, TS3, CNDC, CNDC2, SSPS, SSPS2	Values constant or missing. Some B flags.	Looks like TSG flow shutdown (perhaps Bahamian EEZ).		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Revelle	20250424 - 20250428	0000 - 2359	CNDC, SSPS	Some B/G flags, some missing data	Looks like failure of internal conductivity sensor in bow thruster SBE45	Bowman confirmed the problem and that they hope to address during in port at WHOI. TSG was swapped on 29 April 2025.	Note: data no longer in file as of 29 April 2025 when they are at WHOI dock.
Revelle	20250429 - 20250530	0000 - 0500	TS2, CNDC2, SSPS2	smooth data trace	Looks like TSG flow shutdown in port at WHOI.		Shutdown continued during transit from WHOI and back to drydock in SC. Ended when they sailed from SC on their way back to WHOI.
Revelle	20250501 - 20240604	intermittent	RAD_SW2	Bflags	SW values frequently spiking upwards to over 60,000 W/m2. Looks like an overflow/possible missing value issue.	Max reported that the spikes are actually supposed to be small negative values.	Resolved as of the 20240604 file.
Revelle	20250529 - 20250604	all day	PL_WSPD2, SPD2	B/G flags	Winds from the WXT are way higher than those from the repaired bow sonic and satellite overpasses. Looks like some type of units problem.		
Revelle	20250613 - 20250617	all day	TD	D flags	TD values frequently spiking up to ~6550 C, possible overflow issue, similar to recent SWR issue	Max agrees that it looks similar and will look into the documentation	
Revelle	20250617 - 20250629	intermittent	PL_WDIR2, PL_WSPD2	B flag spikes	Appears every couple of days, possibly a missing/fill value being used for 1-minute averages		
Revelle	20250824 - 20250825	~0730 - 2359	T3	Temperature too high relative to other sensors	T3 rises to 35 C unexpectedly for a number of hours before going back down to 15 C on 8/24	Looking into replacing the Vaisala HTP201 with a spare when they get the chance	T3 seems to have stopped being reported at some point prior to 8 Dec 2025. Sensor looks to have been replaced on 20251211 near 1445 UTC.
Revelle	20250418 - 20250830	all day	PRECIP	Negative values	Precipitation accumulation is consistently around -0.5 mm, which does not make sense	Noticed issues with RM Young before, looking into replacing with spare when they get the chance	
Revelle	20250917 - 20250924	~0008 - 2359	RH, RH2	disagreement between values	The E+E HTP201 (RH2) is about 10-20 percent higher than the WXT (RH). ~~This is likely due to the instruments being in close proximity to each other and other instruments on the same mast.~~	Sandra says the difference has been reset.	
Revelle	20250917 - 20250923	~1911 - 0826	TS, TS2, TS3, SSPS, CNDC, SSPS2, CNDC2	smooth trace	looks like pumps off for a port stop in Tórshavn, Faroe Islands		
Revelle	20250901 - 20250929	~0830 - 2359	PRECIP	Flatlined	RM Young precipitation accumulation has been stuck at 0.5 mm since beginning of the month. It was previously stuck at negative values since transmission started this year in March.	Sandra stated "we expect the RM Young is failing." The PRECIP variable is no longer being processed on live.	

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Revelle	20251012 - 20251106	Intermittent	SPD, PL_WSPD	B flag spikes	Intermittent spikes all day (occasionally increasing in frequency) that go up to ~100 m/s	Michael said that there are a number of stow away birds as they work in the tropical Atlantic causing this issue	
Revelle	20251006 - 20251010	~0930 - 2359	TS, TS2, TS2, SSPS, SSPS2, CNDC, CNDC2	missing variables	Looks like pumps off for a port stop in Mindelo, Cape Verde Islands		
Revelle	20251112 - 20251118	~0900 - 2359	TS, TS2, TS2, SSPS, SSPS2, CNDC, CNDC2	missing variables	Looks like pumps off for a port stop in Mindelo, Cape Verde Islands		
Revelle	20251203 - 20251213	~1110 - ~1830	TS, TS2, TS2, SSPS, SSPS2, CNDC, CNDC2	missing variables	Looks like pumps off for a port stop in Mindelo, Cape Verde Islands		
Revelle	20251212 - 20251231	all day	T3	B/G flags	Values for this EE08 are~10C cooler than the RMY and WXT sensors (T, T2 respectively). Sensor is obviously off (may be a calibration/offset problem). The sensor is reporting correct RH values. Do Not Use T from this sensor.	Maya replied noting that they are waiting on the new temp coefficients for this sensor. It is a new sensor and does not have any previous calibrations. This is the reason the T3 values are low, but RH is good.	continued into early 2026.
Revelle	20251229 - 20251231	~0600 - 2359	TS, TS2, TS2, SSPS, SSPS2, CNDC, CNDC2	smooth trace	looks like pumps off in port at Punta Arenas, Chile		continued into early 2026. Processing for these parameters disabled on 1/7/2026, pending repairs later in February.
Revelle	20251212	all day	PRECIP	no flags	Sensor may not be working. WXT reported two small rain events (1 mm each), which RMY did not capture. Events may be too small for RMY, so we will continue to monitor.		Planned to monitor sensors for larger rain event in 2026.
Sally Ride	20250116 - 20250125	all day - ~1730	TS, TS2, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in San Diego, part of sensor refresh before 2025 cruises.		
Sally Ride	20250128 - 20250201	~2130 - ~1700	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in San Diego		NOTE: TS, SSPS, and CNDC exhibited some shark tooth patterns up until about 0800 on 20250202. Likely flow or sea state issue, USE WITH CAUTION.
Sally Ride	20250128 - 20250131	~0400 - ~1800	RAD_PAR	Values unrealistic	Around 0400, PAR stepped upwards to unrealistic nighttime values. Thereafter PAR trace does not match diurnal curve of SW radiation. Suspect sensor failure.	Howie noted there was some work on the tie downs on the mast during this period, but does not recall any splices or cables being affected. Techs plan to check the sensor when they return to port on 13 Feb.	
Sally Ride	20250212 - 20250220	~2230 - ~1800	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in San Diego		
Sally Ride	20250302 - 20250308	~2330 - ~1820	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in San Diego		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Sally Ride	20250315 - 20250322	~1330 - ~1620	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in San Diego		
Sally Ride	20250325 - 20250327	~2045 - ~1540	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in San Diego		
Sally Ride	20250330 - 20250404	~2000 - ~1615	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in San Diego		
Sally Ride	20250412 - 20250415	~0330 - ~0520	TS, TS4, CNDC, SSPS	Smooth data trace, some B flags. Lots of noise in TS4 but trace follows smoother TS. Neither match TS3 which is vessel's hull sea temperature.	looks like pumps in bow thruster room are off. Reason unknown.	Techs confirmed bad weather shutdown.	
Sally Ride	20250412 - 20250415	~0330 - ~0520	TS2, SSPS2, CNDC2	Shark fin features periodically through time series. Some G flags.	Probably flow rate issues.	Techs confirmed bad weather shutdown.	
Sally Ride	20250417 - 20250422	~0400 - ~2130	RAD_PAR	flatlined values	Techs noted sensor failure.	Techs reported PAR failed sometime around APR 17 0400 UTC. It started reading ~200 in the middle of the night and has not changed since. We will not have an opportunity to replace it until April 21st when we are back in port. Techs inspected sensor and found pin corrosion. Once that was mitigated the sensor was reinstalled an the data values returned to expected range.	
Sally Ride	20250421 - 20250425	~1300 - ~1930	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps are off while Ride is in Oakland, CA		
Sally Ride	20250426 - 20250430	~2200 - ~1600	TS, TS4, CNDC, SSPS	Smooth data trace, some B flags. Lots of noise in TS4 but trace follows smoother TS. Neither match TS3 which is vessel's hull sea temperature.	looks like pumps in bow thruster room are off, possibly a result of high sea state, given wind speeds exceeding 25 m/s.		Shutdown continued into port in Newport, OR.
Sally Ride	20250428 - 20250430	~1600 - ~1600	TS2, CNDC2, SSPS2	smooth data trace	Looks like TSG shutdown entering port in Newport, OR.		
Sally Ride	20250511 - 20250516	~1300 - ~2220	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps off for a port stop in Newport, OR		
Sally Ride	20250518 - 20250521	~1100 - ~1300	TS4	Smooth data trace	SBE38 data values deviating significantly from SBE45, also in the bow thruster room.	Tech confirmed that because of bubbles, they switched from the bow thruster intake to the seachest. When this happens there is no flow to the bow thruster SBE38, but the SBE45 is fed water from the seachest.	Resolved entering port at Newport, OR.
Sally Ride	20250521 - 20250522	~1300 - ~0400	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps off for a port stop in Newport, OR		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Sally Ride	20250522 - 20250526	~0400 - ~1830	TS4	Smooth data trace	SBE38 data values deviating significantly from SBE45, also in the bow thruster room. Looks like bow thruster intake is off.		
Sally Ride	20250525 - 20250526	~1830 - ~2130	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps off for a brief port stop in Newport, OR		
Sally Ride	20250530 - 20250608	~0300 - ~2045	TS, TS2, TS4, CNDC, CNDC2, SSPS, SSPS2	Smooth data trace, some B flags	looks like pumps off for port stop in Newport, OR		
Sally Ride	20250612 - 20250622	~0600 - ~1920	TS, TS2, SSPS, SSPS2, CNDC, CNDC2	Shark fin features periodically through time series. Some G flags.	Probably flow rate issues.		
Sally Ride	20250630 - 20250630	~1220 - 1900	RH	G flags	RH fell to low values that are not reasonable, could be one off issue		
Sally Ride	20250705 - 20250708	~0000 - ~2345	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SPSS2	Smooth data trace	Looks like pumps off at port in Newport, OR		
Sally Ride	20250713 - 20250718	~0000 - ~1630	TS, TS2, TS4, SSPS, SSP2, CNDC, CNDC2	Smooth data trace	Looks like pumps off at port in San Diego		
Sally Ride	20250729 - 20250812	~1930 - ~1605	TS, TS2, TS4, SSPS, SSP2, CNDC, CNDC2	Smooth data trace	Looks like pumps off at port in San Diego		
Sally Ride	20250806 - 20250806	1600 - 2030	RAD_SW, RAD_LW, RAD_PAR	Missing data	Operator reached out that the radiometer shields were removed and SW radiometer was unplugged. SWR had missing data, with some spikes/dips in data in LWR/PAR.		
Sally Ride	20250814 - 20250815	~1813 - ~1530	T, RH	Unrealistic or bad values	T fell to negative values while transiting from San Diego to Newport, RH suddenly dropped 40% but suddenly went back up to normal	Harpoon notes that they were in bad weather and the sensors got wet, will be looked at when they get to port. Appears to mostly have been fixed with the occasional spike still appearing.	
Sally Ride	20250814 - 20250817	all day	T	B/G flags	Temperature drops to unrealistic values (-20 to -40 C)	Operator says this happened due to rough weather and the sensors getting wet, will look at sensor when they get in port	
Sally Ride	20250816 - 20250818	~2030 - ~1745	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in Newport, OR		
Sally Ride	20250823 - 20250905	~0100 - ~2110	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in Newport, OR		
Sally Ride	20250909 - 20250916	~0000 - ~1745	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in Newport, OR		
Sally Ride	20250918 - 20250918	~0830 - ~1345	TS, TS2, SSPS, CNDC	Shark fin features in data	Probably flow issues		
Sally Ride	20250919 - 20250920	~1924 - ~2100	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in Newport, OR		
Sally Ride	20250920 - 20250927	~2030 - ~1730	TS4	smooth trace	SBE38 data values deviating from SBE45, also in the bow thruster room. Looks like bow thruster intake is off.		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Sally Ride	20250929 - 20251010	~2150 - 2000	TS, TS2, TS3, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in Alameda, CA		
Sally Ride	20251012 - 20251107	all day	T	B/G flags	Sensor reporting unrealistic negative values while in port in San Diego	Brent noted that sensor was failing, replaced sensor on 20251106	
Sally Ride	20251016 - 20251021	~2310 - ~2030	TS, TS2, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in Alameda, CA		
Sally RIde	20251102 - 20251109	~1945 - ~1715	TS, TS2, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in San Diego, CA		
Sally Ride	20251118 - 20251126	~2330	TS, TS2, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in San Diego, CA		
Sally Ride	20251202 - 20251219	~2230 - ~0230	TS, TS2, TS4, CNDC, CNDC2, SSPS, SPSS2	smooth trace	looks like pumps off for a port stop in San Diego, CA		
Sally Ride	20251205 - 20251208	2119 - 1800	DIR, PL_WDIR, SPD, PL_WSPD, P, P2, T, T2, T3, RH, RH2, PRECIP, RAD_SW, RAD_LW, RAD_PAR	No data	Suspect sensors not logging during mast maintenance. Ended when Tair sensor was replaced on 08 December.		
Sally Ride	20251230 - 20251231	1210 - 2359	RH2	Sensor failure	RH2 recording significantly smaller values than RH	Bowman reported that the sensor failed on 12/30	continued into early 2026.
Sally Ride	unknown - 20251212	unknown - ~2245	P, P2	no flags	Around 12 Dec 2025 when the Sproul and Sally Ride were both in port in San Diego, a comparison revealed the barometer on the Ride to be reporting 8-10 hPa lower values than the Sproul. The Sproul has two independent barometer that were similar values, so Ride barometer was suspect. Likely this was a slow degradation of the barometer over time as there was no obvious step in values in previous months. Keep in mind when using these data.	Barometer swapped around 2245 on 12/12. Values stepped up about 10 hPa with new barometer and compare favorably with Sproul.	
Sikuliaq	20250106 - 20250109	~2300 - ~2359	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Pohnpei. Data suspect: use with caution		
Sikuliaq	20250125 - 20250203	all day - ~1900	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Honolulu. Data suspect: use with caution		
Sikuliaq	20250206 - 20250210	~2000 - ~1840	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Honolulu. Data suspect: use with caution		
Sikuliaq	20250214 - 20250310	~1800 - ~1800	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Honolulu. Data suspect: use with caution		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Sikuliaq	20250315 - 20250403	~1800 - ~1940	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Honolulu. Data suspect: use with caution		
Sikuliaq	20250405 - 20250410	~1945 - ~2359, ~0000 - ~0245, ~1845 - ~2359	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Honolulu. Data suspect: use with caution		
Sikuliaq	20250721 - 20250724	~1500 - ~1500	T2	B-flags	Air temperature drifted up to anomalously high values with strong solar radiation. Thought this was a heating problem, but the anomalous values continued for several days (b-flagged). Possible sensor issue.	Operator confirmed anomalously high temperatures in Seward for the last few days, so suspect these data may be correct. User should treat as good, but extreme, values.	
Sikuliaq	20250726 - 20250727	Intermittent	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock while operating near Chignik, AK. Data suspect: use with caution.		
Sikuliaq	20251009 - 20251013	~1900 - ~1800	TS5	Values look too warm	Values 3-4C higher than IR SST sensor while vessel in port at Seward, AK. Suspect no flow through SBE38 on centerboard. Data suspect, do not use.	Jenny replied: vessel had an attempted departure but tied up again due to mechanical issues. The 38 on the centerboard was left on after we tied up. The sensor is in the water, but you are right there is not good flow since we aren't moving and so the warming is probably from the ship. Please flag this data. I turned the sensor off (~1800 UTC on 13 Oct) and will turn it back on once we are underway.	
Sikuliaq	20251124 - 20251126	~1700 - ~0400	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Honolulu. Data suspect: use with caution		
Sikuliaq	20251217 - 20251226	~1730 - ~1000	TS, TS2, TS3, TS5, SSPS, SSPS2, CNDC, CNDC2	No data		Techs informed us that the Sikuliaq entered the Tahitian EEZ today and they secured the waterwall. SAMOS should continue to get daily Met data, with occasional bird interference. Expecting to clear EEZ around 25 Dec.	Note: TS5 returned to data files on 20251223.
Sikuliaq	20251219 - 20251222	~1800 - ~2000	TS4	some B/G flags	Values anomalously high and tracking with solar radiation. I believe the IR sensor is pointing at shore or dock in Pape'ete. Data likely erroneous, do not use.		

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Sproul	20241104 - 20250212	~0312 - ~1640	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for port stop in San Diego		
Sproul	20250110 - 20250116	all day - ~2000	RAD_SW	Values unrealistic	RAD_SW radiation trace seems to be mimicking RAD_LW. A comparison to the data from the Atlantis, docked nearby, confirms the RAD_SW are in error (do not use). This issue has existed since they installed newly calibrated Eppley SW and LW sensors on the Sproul. Reason unknown.	After a lot of other attempts at a fix, the SPP was swapped with a new sensor. Looks to have resolved problem.	
Sproul	20250120 - 20250415	all day - ~1745	T	Values reading high.	ATT is running about 3C higher than the RTT on the Sproul.	RTT sensor replaced. ATT and RTT now closer to 1C difference.	Originally thought that the new air temperature sensor on the Sproul was good, and the RH sensor was the issue. More recent data when both the Sproul and Sally Ride (e.g, 2 Feb 2025) were working near the Channel Islands makes SAMOS analyst think the new air temp sensor on the Sproul is the issue. Temp/RH values from 3 sensors on Sally Ride compare well with the T/RH sensor on the Sproul.
Sproul	20250213	~0600 - ~1700	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for port stop in San Diego		
Sproul	20250214 - 20250312	~0130 - ~1550	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for port stop in San Diego		
Sproul	20250313	~0000 - ~1545	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for brief port stop in San Diego		
Sproul	20250314 - 20250320	~0030 - ~1540	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250323 - 20250326	~2100 - ~1530	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250326 - 20250403	~1930 - ~1550	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250410	all day	RAD_LW	Downward spikes in data	Numerous downward spikes, one as low as 0.8 W/m^2 compared to the usual 400 (flagged B).		Problem seems to have resolved and reason unknown.
Sproul	20250414 - 20250512	~0101 - ~1430	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250502 - 20250504	intermittent	T	B, G flags	T values spike/stepping down to unrealistic values (-30C). Looks like sensor failure.		Problem seems to have "self" resolved.
Sproul	20250513 - 20250515	~0200 - ~1700	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250516 - 20250521	~1400 - ~1520	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250522 - 20250531	~0230 - ~1500	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250530 - 20250614	~1400 - 1542	T	Spikes down, sometimes to negative values. B, G flags	Looks like sensor is failing. This RMY 41342 does not compare well with nearby E+E HTP201.	Sensor was replaced as of 6/16/25.	Last spike was seen on 6/14/25, no spikes after then.

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Sproul	20250531-20250601	~2320 - ~1500	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250601-20250608	~2359 - ~1410	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250609 - 20250611	~0130 - ~0345	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250612 - 20250614	~0115 - ~1450	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250615 - 20250618	~0100 - ~1530	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250701 - 20250710	~1430 - ~1545	TS2, SSPS, CNDC	smooth data trace	looks like pumps off for a port stop in San Diego		
Sproul	20250711 - 20250805	~0000 - ~1545	TS2, SSPS, CNDC	Smooth data trace	Looks like pumps off at port in San Diego		
Sproul	20250716 - 20250718	1445 - 2359, 0000 - 2359, 0000 - 1400	RAD_SW, RAD_SW2, RAD_LW, RAD_LW2, RAD_PAR	Dips in data	Radiometer data has odd dips up and down in SW and LW and a near complete flatlining in PAR. Returns to normal on 7/18.	Operator let SAMOS know that the radiometer was taken down and covered with a trash bag briefly during this period	
Sproul	20250819 - 20250910	~1415 - ~2000	TS2, SSPS, CNDC	smooth trace	looks like pumps off for a port stop in San Diego		
Sproul	20251024 - 20251112, 20251117 - 20251123	all day	SPD2, PL_WSPD, P, P2, P3, P4, T, T2, T3, TD, RH, RH2, TS2, PRECIP, PRECIP2	B/G flags	Multiple sensors spiking all day	Maya took a look on 20251114 after a day cruise, but all sensors appeared to stop spiking in the 20251112 file. Went away during port, but came back on 20251117 and was possibly fixed by 20251123	
Sproul	20250829 - 20250909	~0330 - ~1815	TS2, SSPS, CNDC	smooth trace	looks like pumps off for a port stop in San Diego, CA		
Sproul	20250914 - 20251018	~2359 - ~1555	TS2, SSPS, CNDC	smooth trace	looks like pumps off for a port stop in San Diego, CA		
Sproul	20251020 - 20251117	~0130 - ~2330	TS2, SSPS, CNDC	smooth trace	looks like pumps off for a port stop in San Diego, CA		
Sproul	20251120 - 20260317	~2225 - 1508	TS2, SSPS, CNDC	smooth trace	looks like pumps off for a port stop in San Diego, CA		
Sproul	20251205 - 20260128	~1800 - 2120	T	No data	Techs informed us that they removed the Sproul's Tair sensor to move it to the Sally Ride. No ETA on when the sensor will be replaced on the Sproul. Processing for T has been discontinued until the sensor is replaced.	Cora notes: We have removed an AT sensor from Sproul but have left the MET module (TMP73) intact. We have installed that AT sensor on Sally Ride and have updated MET acq accordingly. Removal and installation times: Removed from sproul: 18:00 UTC Dec 5th 2025 Installation on Ride: 18:00 UTC Dec 8th 2025	

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Sproul	20251208 (maybe earlier) - 20260120	periodic	RAD_LW	No flags, but data too high.	The Eppley LW radiometer (sn 38303F3) is again reporting a lot of spikes/steps in the data to unrealistic values (>500 W/m2) that are not supported by the LW from your Kipp and Zonen sensor (and are way out of range for the Sproul's location). I believe the Eppley is failing.	Eppleys removed from Sproul on 1/23	
Sproul	20251208 (maybe earlier) - 20251211	all day	PRECIP	No flags	Unrealistic data trace. The RM Young 50202 rain sensor (sn 1185 in our metadata) is clearly providing erroneous reports. The data trace for precipitation volume goes up and down 3-5 mm per day, on days when the WXT is reporting no rainfall at all. Something is amiss with the sensor.	Brent power cycled the RM Young 12/16 and issue resolved, though there was no instance of this issue occurring between 12/12 and 12/16.	
Tangaroa	20250120 - 20250220	all day	TS	Shark fin steps in data, some B/G flags	Unrealistic values, but not flagged	Haifeng noted this pattern to the operator and they replied with the following: Yes, I can confirm that the temperature is wrong. This most likely due to water flow issues. The problem is that the SBE38 uses ships plant and pumps which is at the mercy of ship requirements. This always happens when the Tangaroa is in Antarctic waters as they switch to a different pump on the AC units. Data suspect - do not use.	20250220 - end of cruise back in NZ.
Tangaroa	20250227 - 20250402	all day	all vars	No data	Tangaroa team informed SAMOS that the vessel would be in shipyard until the end of May 2025. TSGs and other sensors have been pulled for calibration.		
Tangaroa	20250704-20250911	all day - ~0155	TS	Bias in data	Looks like a step change in the data down 1C around 0155 on 11 September. May have been flow reset. Data compare well to GRHSST satellite data after this time.	Andrew noted that out the SST is out by about 1 degree to high, it should be flagged as bad, I have asked the engineer to increase the water flow to it. Not certain when this issue started, so users should examine the SST data carefully prior to use. Turns out sea water flow pumps were off.	

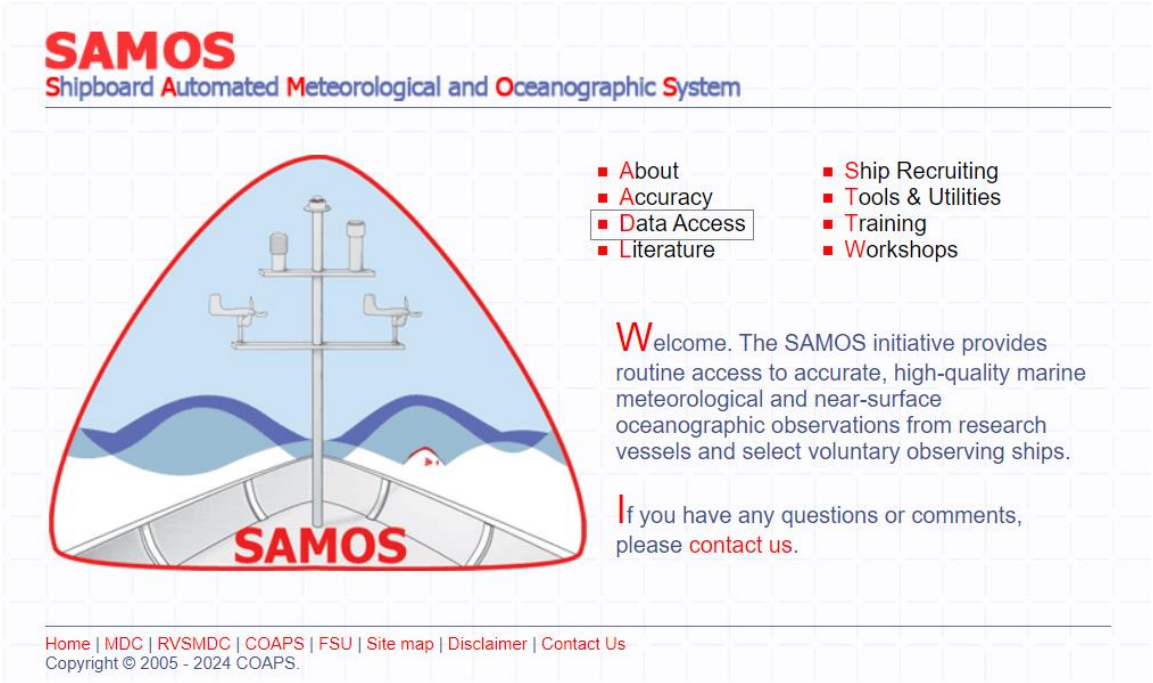
Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Tangaroa	20250704 - 20250923	all day	PRECIP	no flags, but data curve not representative of precipitation volume	Looking at the data for 7 Sept you will see the precip trace rises and then falls over the course of the day. Rises make sense if it is raining, but the drops of 0.5-1 mm seem pretty big to be either evaporation from the sensor or some signal of water movement in the sensor based on sea state. This pattern is noted most days.	Andrew asked the engineer to do a power reset on the sensor, which looks like it occurred around 1840 UTC on 11 Sept. Problem seems to have recurred around 1940 UTC on 13 September. They hope to inspect the sensor during an upcoming port stay. 20250923 - Andrew noted: removed the rain gauge today and will send it away for a service.	
Tangaroa	20250912 - 20250923	~0800 - 2359	TS	Bias in data	Steady rise in TS values starts around this time. We were informed of problems with the sea water flow pumps starting around this time.	Andrew stated The engineer has noted : "Currently no flow thru the FWD sea suction, the SVP pump is also out of action, the A/C pump is still gassing up so now off also." Data should not be used.	
Tangaroa	20251112 - 20251231	all day	PRECIP	no flags, but data curve not representative of precipitation volume	Similar to the previous issue, rain accumulation data rises and falls throughout the day. Looks like a return of the incorrect capacitance readings (maybe the metallic grit is back).	Andrew suspects the sensor may have picked up some grit while tied up in the lab prior to installation. Some extensive ceiling work may have impacted the sensor. They plan to pull the sensor and check it back in the lab soon.	Value have, in fact been negative for some time (since early December 2025). Turns out the rain gauge is back at Greta Point and their electronics engineer has taken it apart he will put it back together soon, and then we will test it. Tangaroa is back early February, when it will be reinstalled. Data values likely just stray voltage getting into data log. DO NOT USE. Issue seems to have been resolved with new sensor installed in 2026.
Thompson	20250103	~1400 - ~2000	PL_WSPD, PL_WDIR, SPD, DIR	Some B/G flags	Lots of random spikes in the data. Looks like the birds are back!		
Thompson	20250131 - 20250203	nighttime	PL_WSPD, PL_WDIR, SPD, DIR	Some B/E/G flags	Lots of random spikes in the data. Looks like the birds are back!	Techs notified SAMOS that the birds are back.	
Thompson	20250307 - 20250320	all day	RAD_SW	B-flags	Values stuck around -196 W-m2. Out of range. DO NOT USE.	Elizabeth swapped a fuse into the power source which resolved the problem.	Problem resolved during Perth port call.
Thompson	20250724, 20250725	1015-1600, 0600-0640	Lat, Lon, DIR, DIR2, DIR3, SPD, SPD2, SPD3, PL_SPD, PL_CRS	B, G, F, L flags	Unrealistic, wavy data trace	Operator notified SAMOS of problems with their POSMV which impacted the calculation of true winds. Data in these periods SHOULD NOT BE USED.	

Vessel	date	Time in File (UTC)	variable	problem	DQE comments	Operator Comments	Additional Notes
Thompson	20251204 - 20251225	0910 - 2359	PL_WDIR, DIR, SPD	Sonic anemometer winds do not agree with main mast sensors	See tech notes. Confirmed with satellite overpass that it looks like sonic anemometer is installed 180 degrees off. DO NOT USE.	Jenn noted the sensor was removed from the mast and reinstalled by the yard, and they think they put it in backwards. Around 8 Dec, they got up on the mast and worked on the sensor, but the problem still is not resolved.	Resolved when sensor was replaced on 26 December.
Thompson	20250720 - 20250722	~1530 - ~0220	TS, TS2, SSPS, CNDC	smooth trace	Looks like TST pump shutdown.	Mackenzie noted: We are having issues with our pumps so the seawall is secured while the engineers work on it. We should be up and running in the next 12 hours or so.	

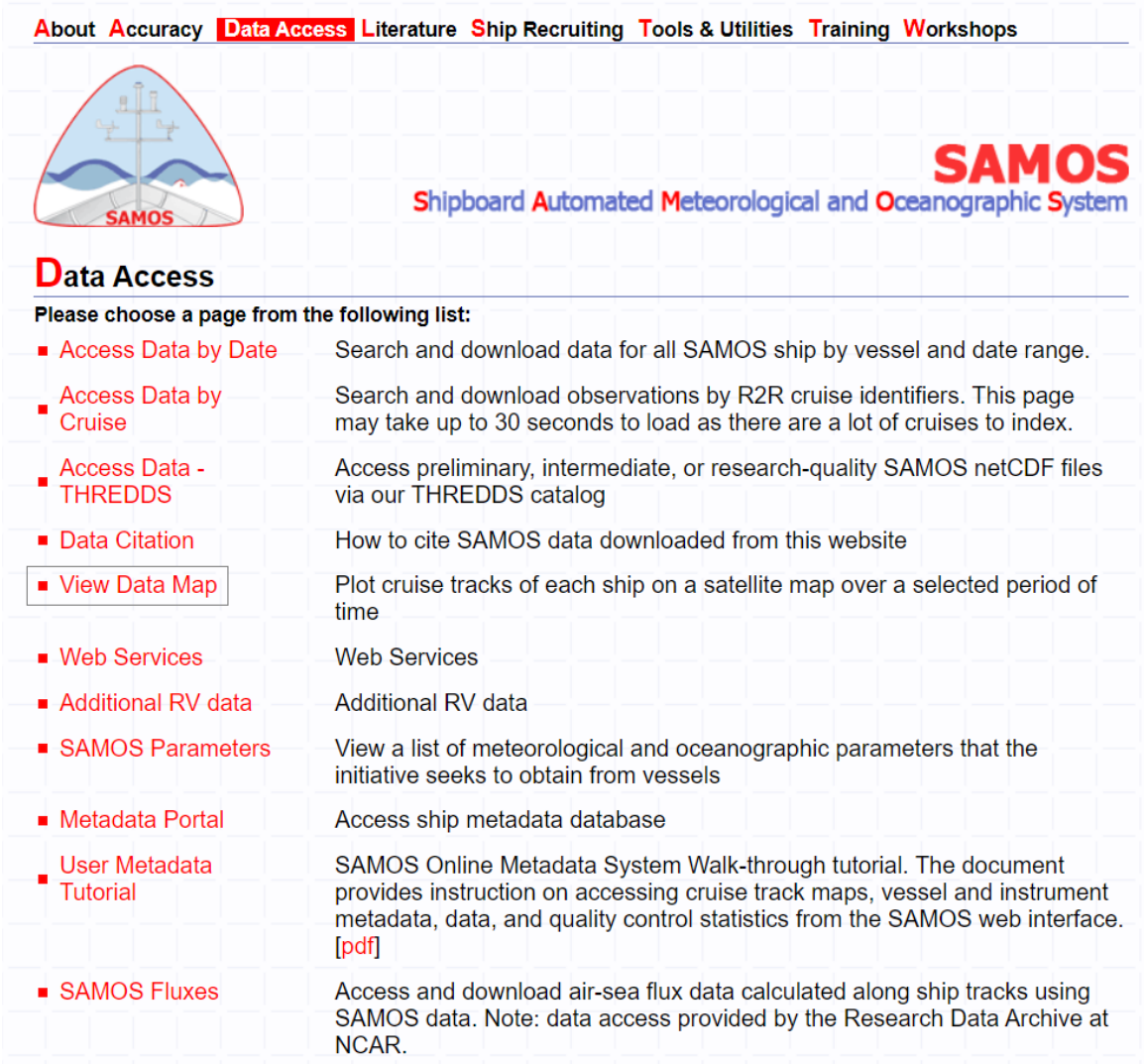
Annex B: SAMOS Online Metadata System Walk-through Tutorial

PART 1: the end user
(NOTE PART 2 for the SAMOS operator not included this version; user login currently restricted. Contact samos@coaps.fsu.edu with metadata updates.)

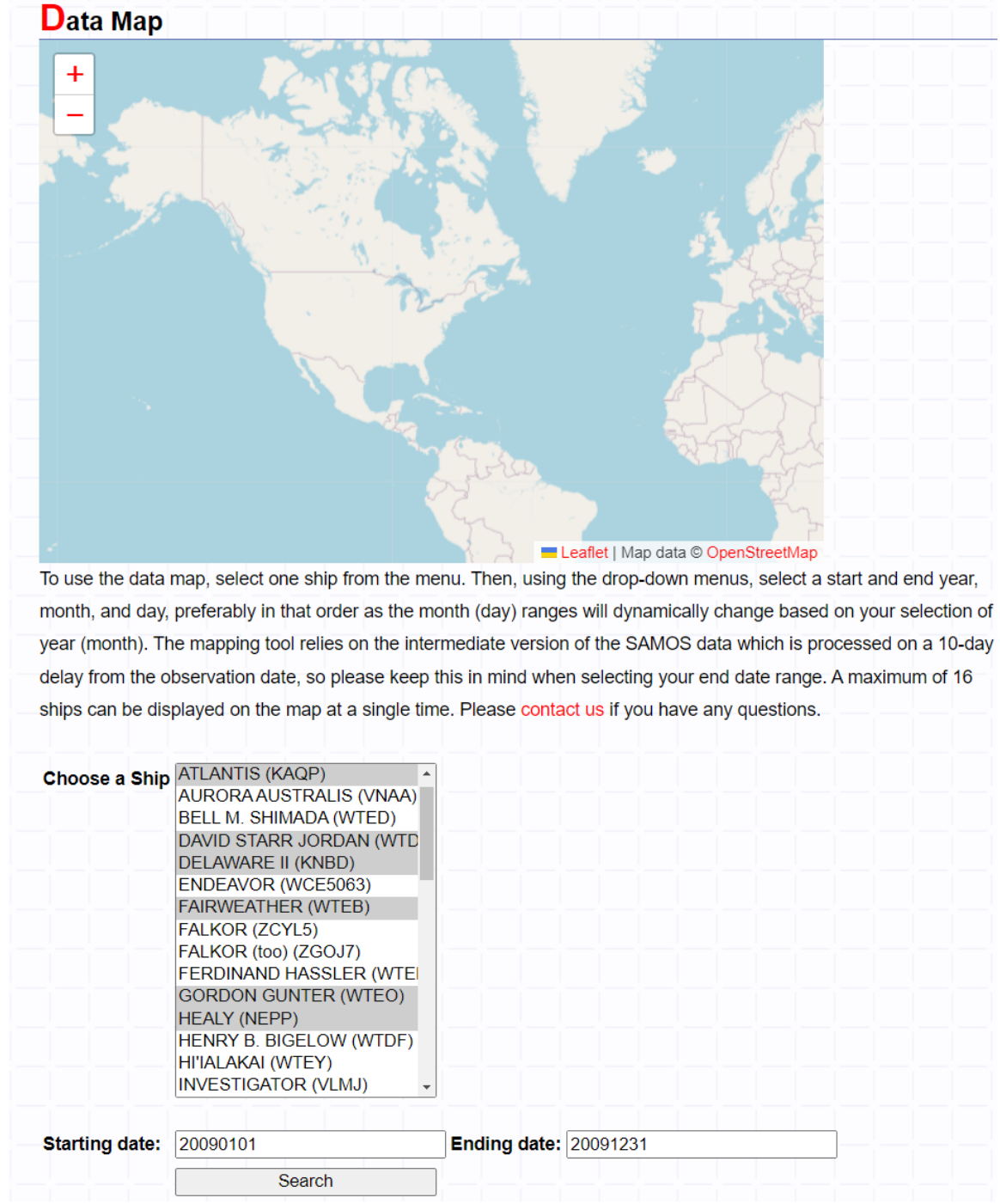
The SAMOS public website can be entered via the main page at
https://samos.coaps.fsu.edu/html/



By choosing the Data Access link (boxed area), the user can access preliminary, intermediate, and research-quality data along with graphical representations of data availability and quality. As an example, consider the user who wants to find 2009 in situ wind and temperature data for the north-polar region. The first step would be to identify which ships frequented this area in 2009. To do so, choose Data Map on the Data Access page:

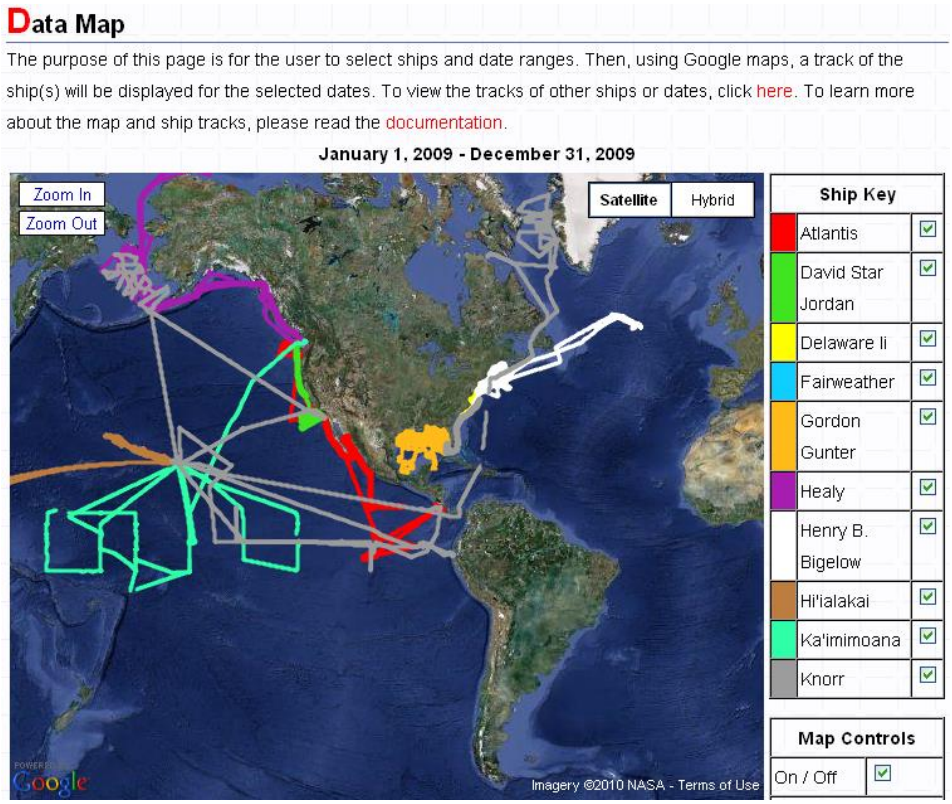


The user highlights a set of ships from the available list (16 ships may be chosen at a time):



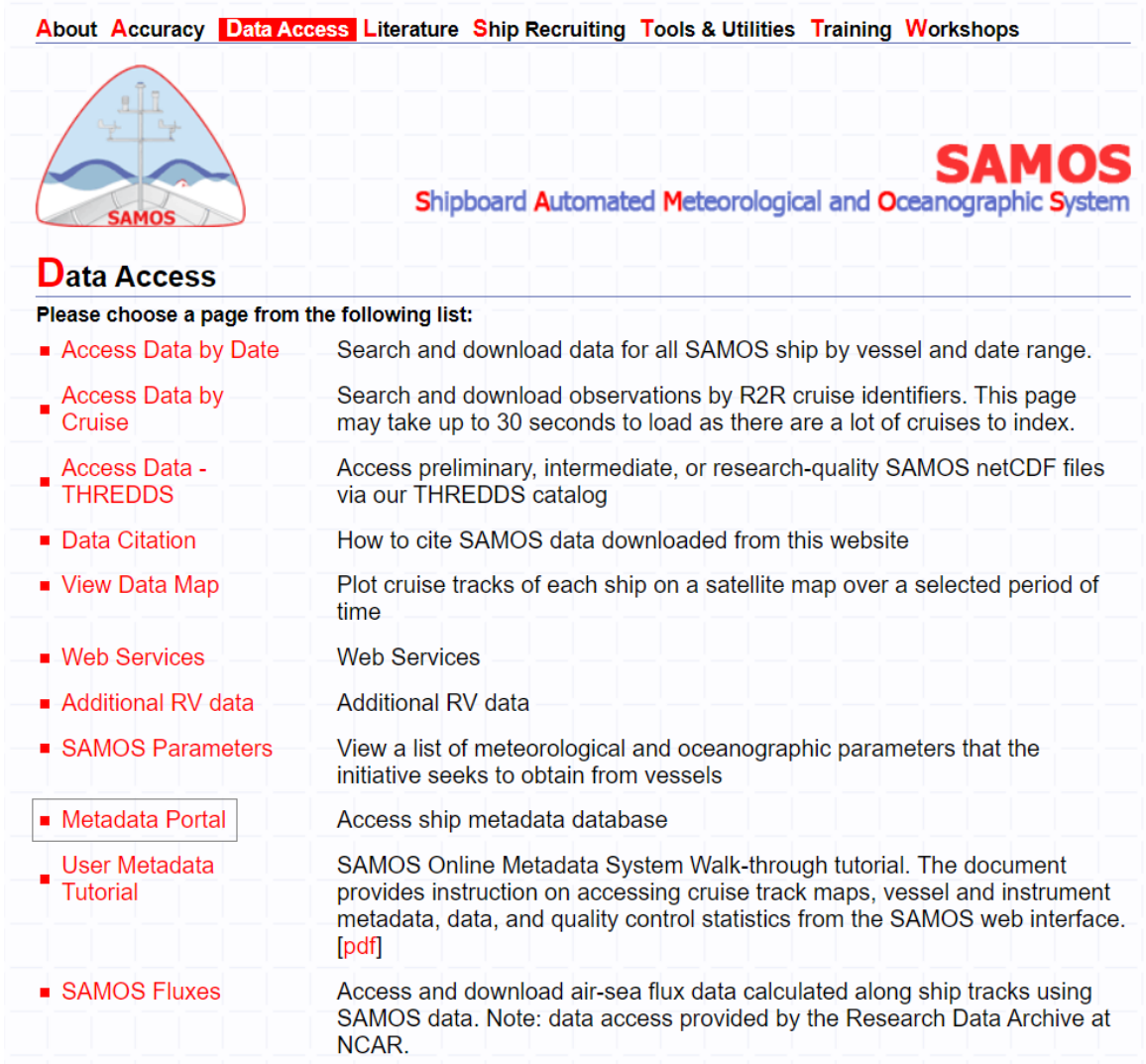
** NOTE: THE MAP TOOL IS IN NEED OF ADDITIONAL UPDATES. THE PRESENT TOOL WILL CREATE MAPS FOR A SINGLE SHIP AND SHORT PERIOD OF TIME, BUT IT IS VERY SLOW TO GENERATE THE PLOT. WE ARE WORKING TO COMPLETE THIS UPDATE AS SOON AS POSSIBLE.

By entering a date range of January 1, 2009 to December 31, 2009 and clicking "search," a map is displayed showing all the selected ship's tracks for the year 2009:

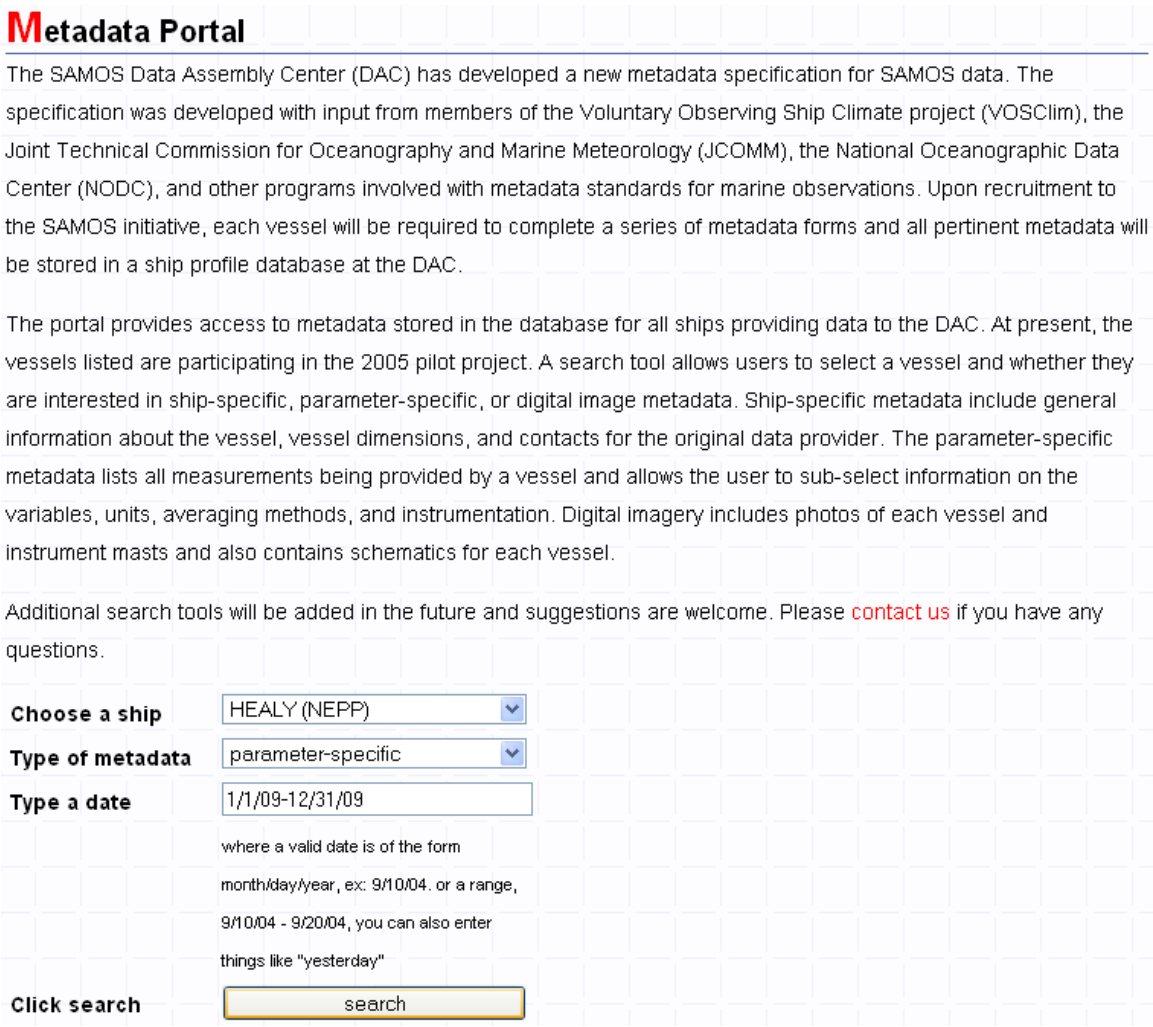


** NOTE: THE ABOVE IMAGE IS FROM THE PREVIOUS MAP TOOL (NO LONGER IN USE) AND IS FOR DEMONSTRATION PURPOSES ONLY. THE PRESENT TOOL IS EXPECTED TO FUNCTION SIMILARLY ONCE UPDATES TO THE TOOL ARE COMPLETED.

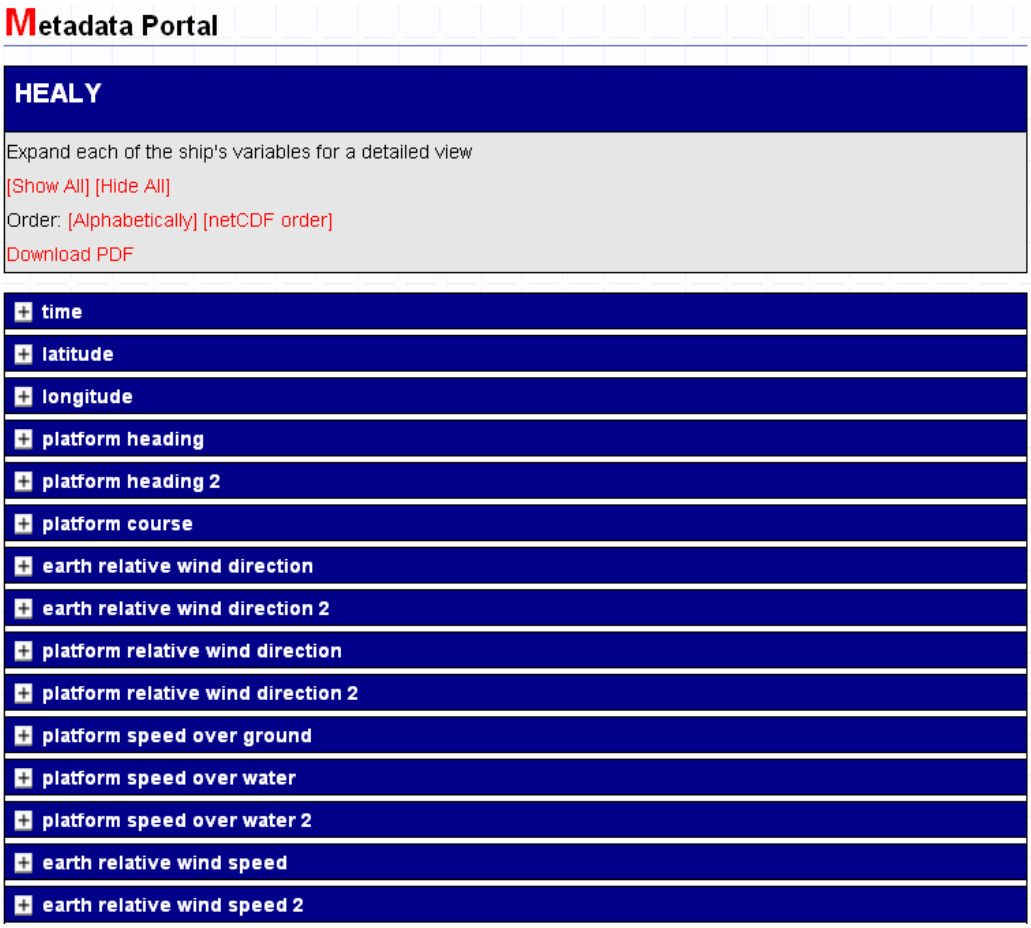
Now the user can see that both the *Healy* and the *Knorr* cruised in the north-polar region in 2009. The next step might be to see what parameters are available on each ship. Returning to the Data Access page, the user this time selects the Metadata Portal:



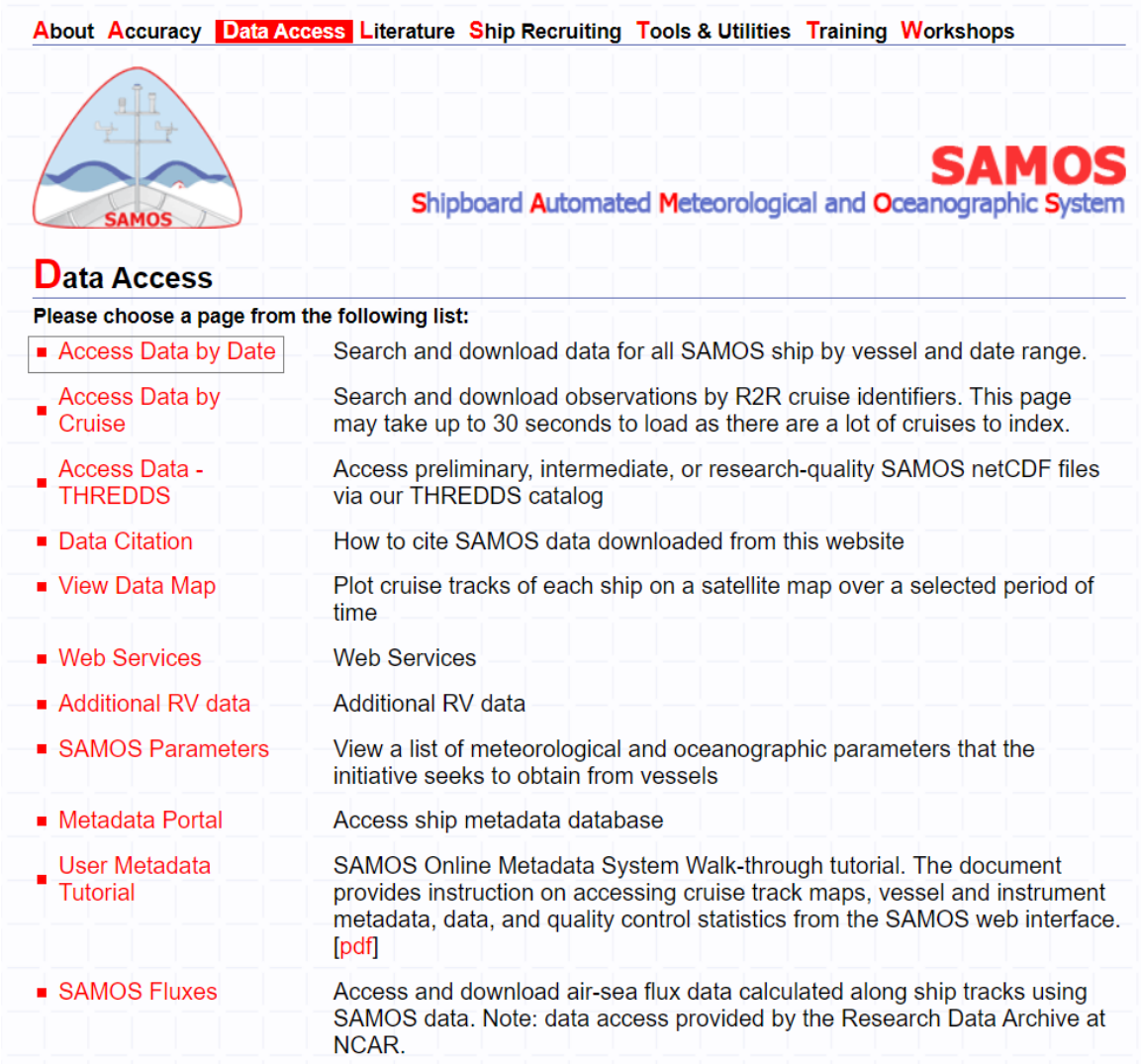
and first inputs the proper information for the *Healy*:



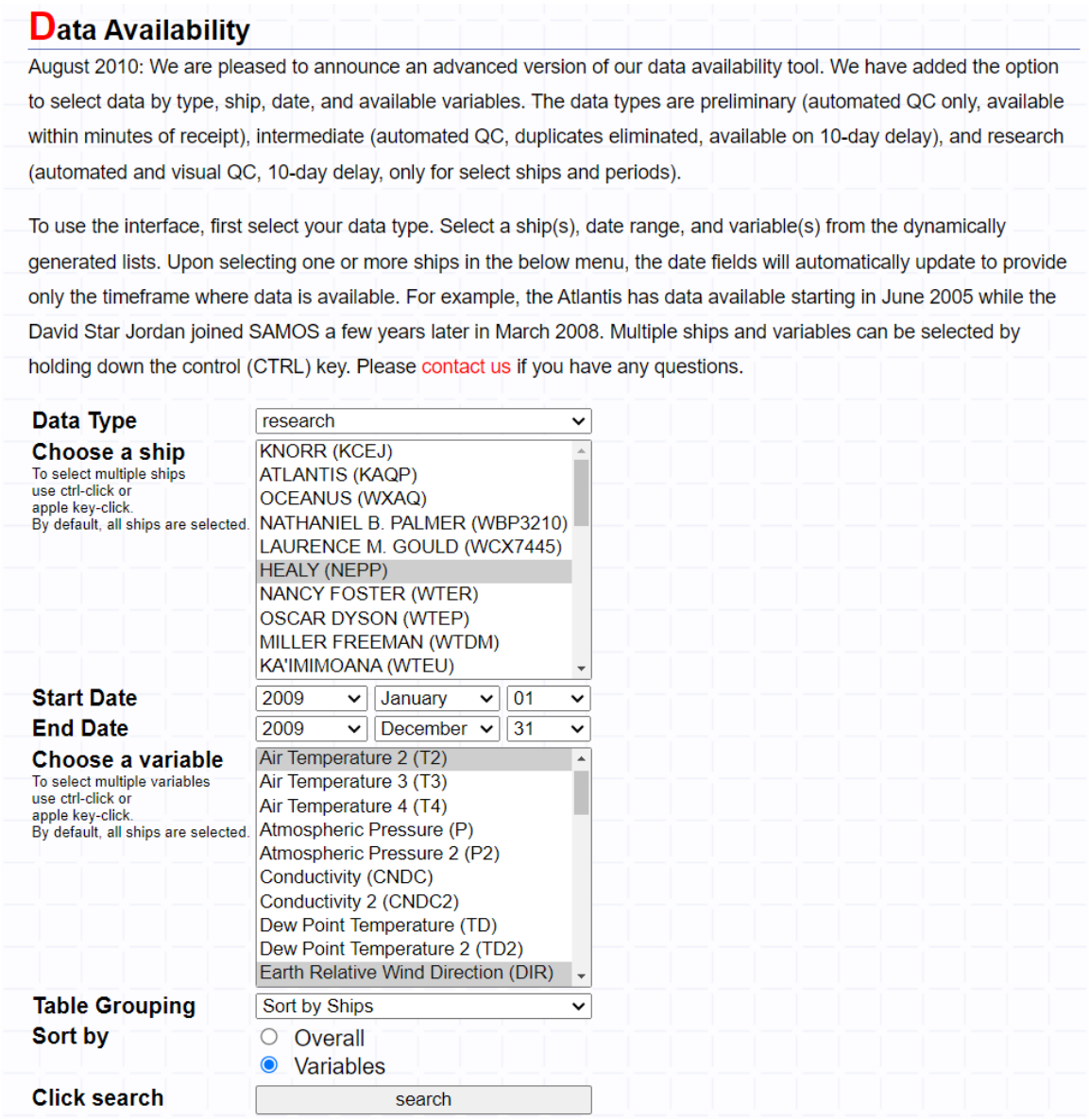
The result, once "search" is clicked, is an exhaustive list of all parameters available from the *Healy* in 2009:



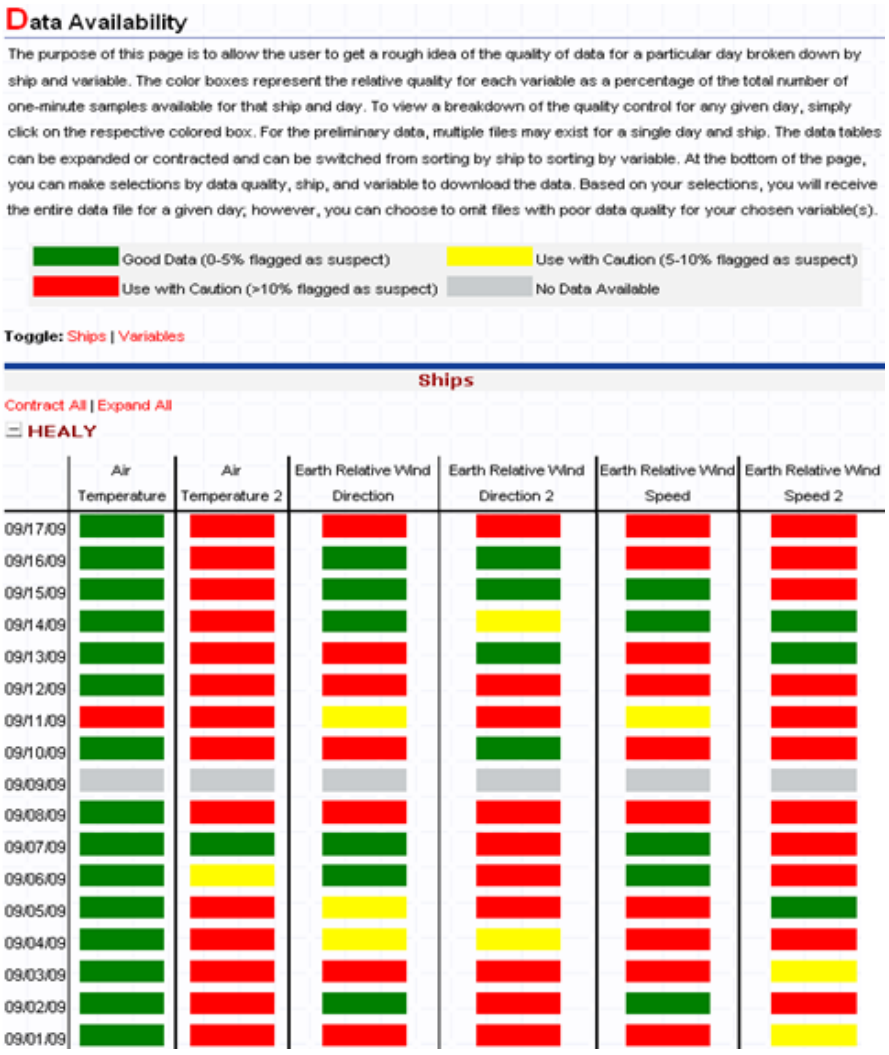
A thorough investigation of the list (note: image is truncated) tells the user the *Healy* did in fact provide both wind and temperature data in 2009. (Throughout the online SAMOS system, clicking on a "+" will yield further information; in this case the result would be metadata for the individual parameters.) Now the user will want to know the quality of the wind and temperature data. To find that, he returns once again to the Data Access page and this time chooses Access Data by Date:



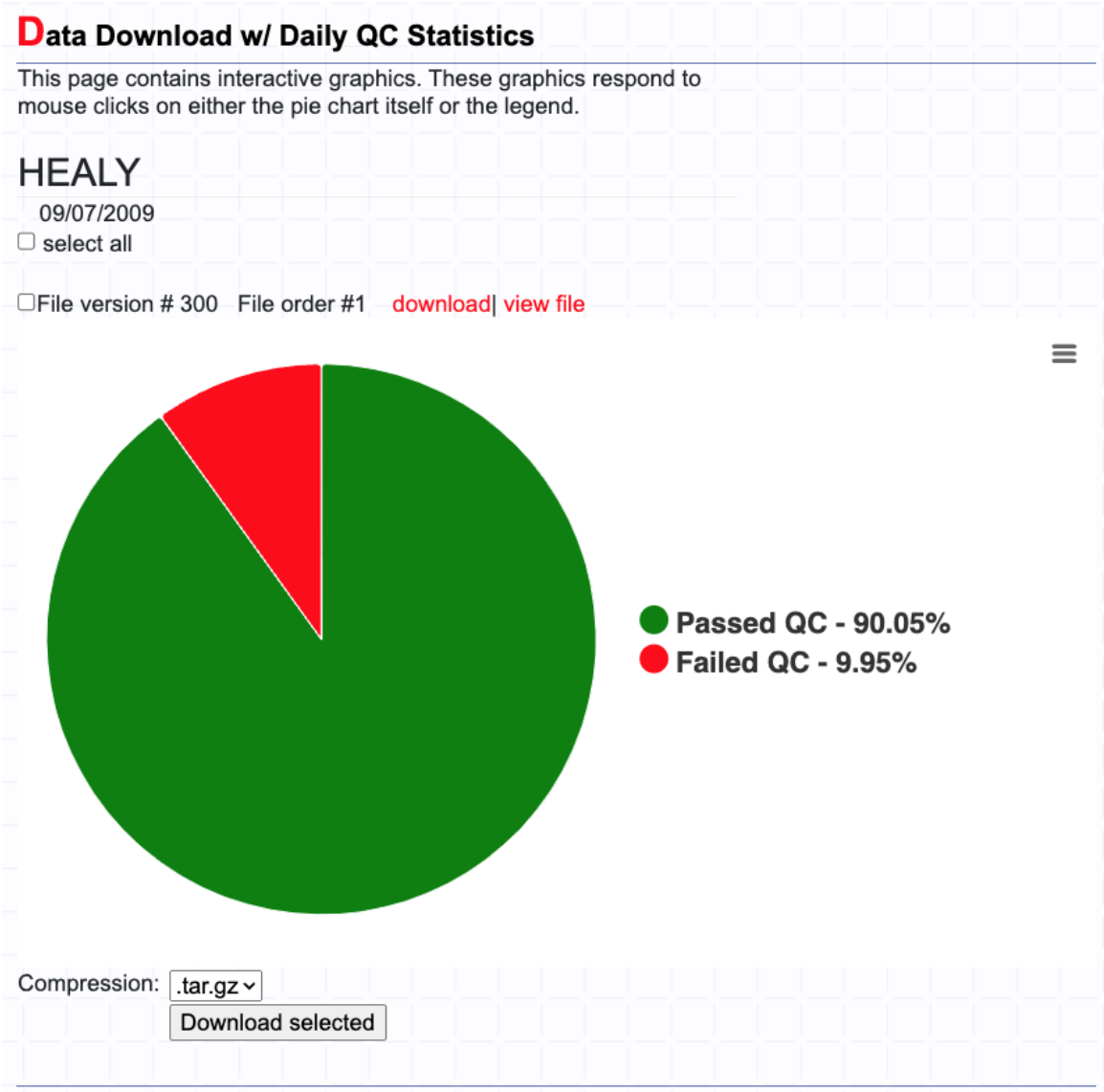
After selecting the *Healy* along with the desired parameter(s), date range, and data version (preliminary, intermediate, or research), noting that the default date range and available parameters will change once a vessel and data version are selected, and then clicking "search":



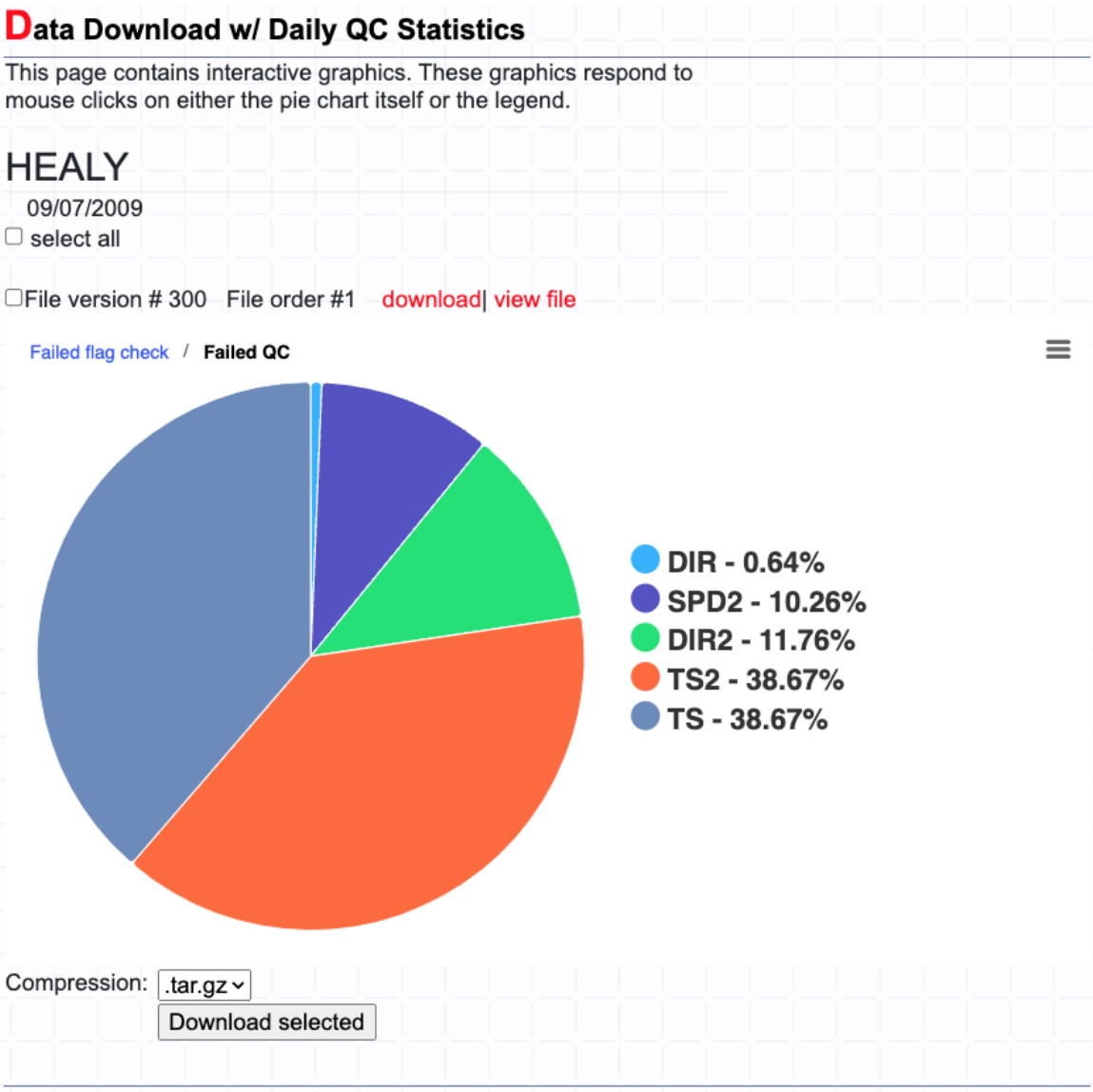
the user arrives at a timeline showing on which days in 2009 the Healy provided data for the chosen parameter(s), as well as the quality of that data for each calendar day (note: image has been customized):



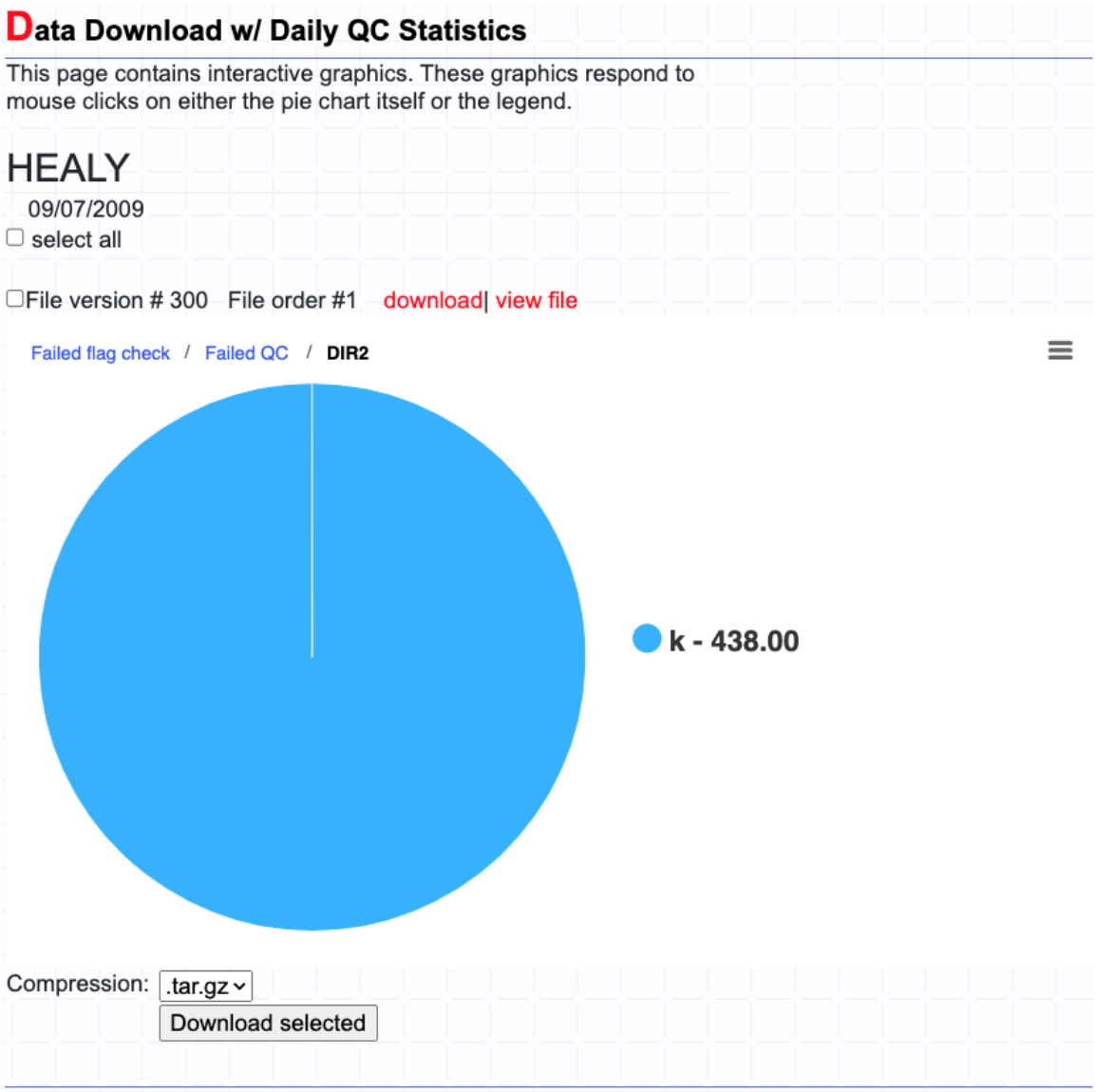
Color-coding alerts the user to the perceived quality of the data. As explained in the key at the top of the page, green indicates "Good Data" (with 0-5% flagged as suspect), yellow indicates "Use with Caution" (with 5-10% flagged as suspect), and red indicates a more emphatic "Use with Caution" (with >10% flagged as suspect). A grey box indicates that no data exists for that day and variable. In this case, the user can automatically see that on 09/07/09 all the *Healy's* temperature data and the winds from the first wind sensor are considered "Good Data." More detailed flag information, as well as information pertaining to all other available parameters, can be found by simply clicking on any colored box. As an example, by clicking over the red bar for DIR2 on the date 09/07/09 a user can find out more specific information about data quality to determine whether the wind data might also be useful. When the red bar is clicked, the user is first directed to a pie chart showing overall quality:



Clicking over the red pie slice showing the percentage of data that failed quality control yields a more in-depth look:

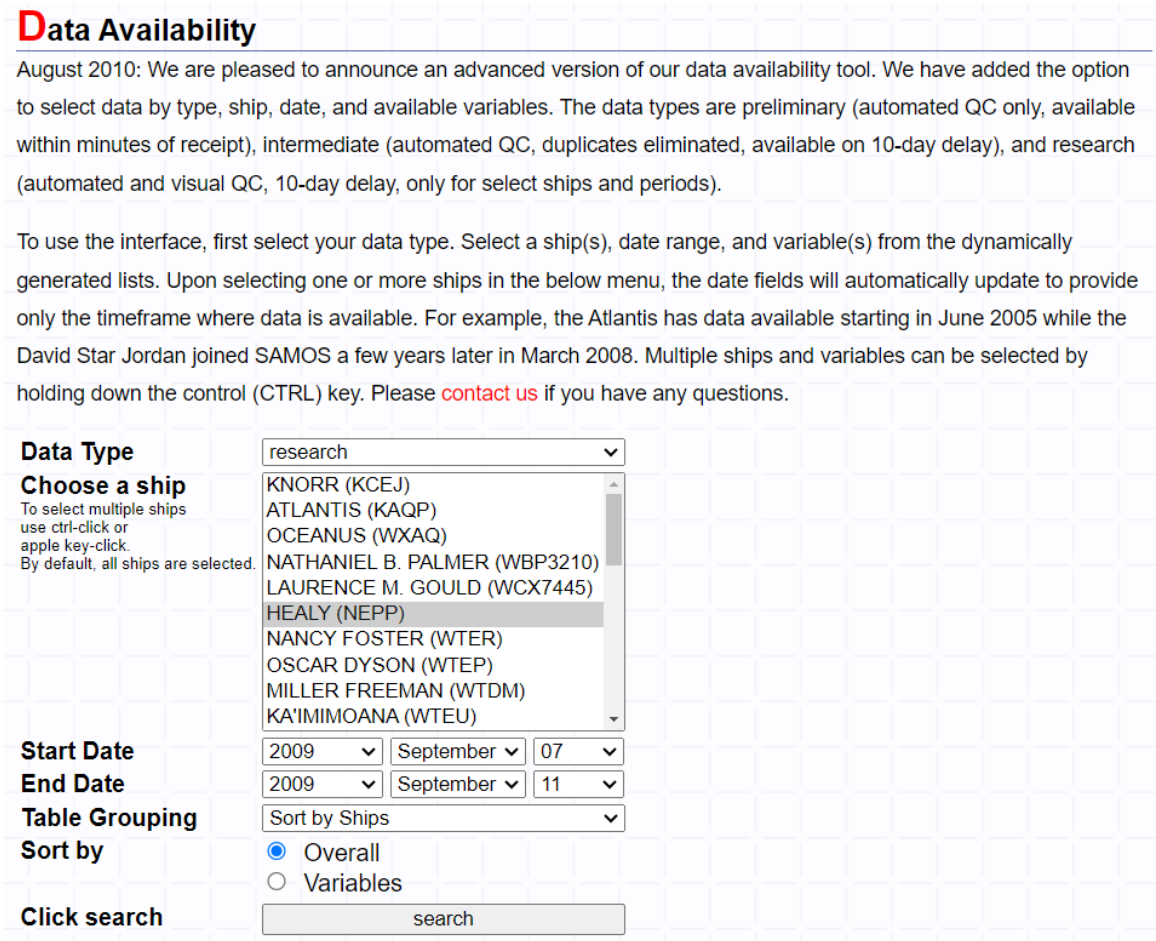


The user can now check to see precisely what types of flags were applied to the second wind sensor data, as only a portion of the data were flagged and they may still be usable. By clicking on the green pie slice for "DIR2", he determines that "caution" flags were applied to a portion of the data:

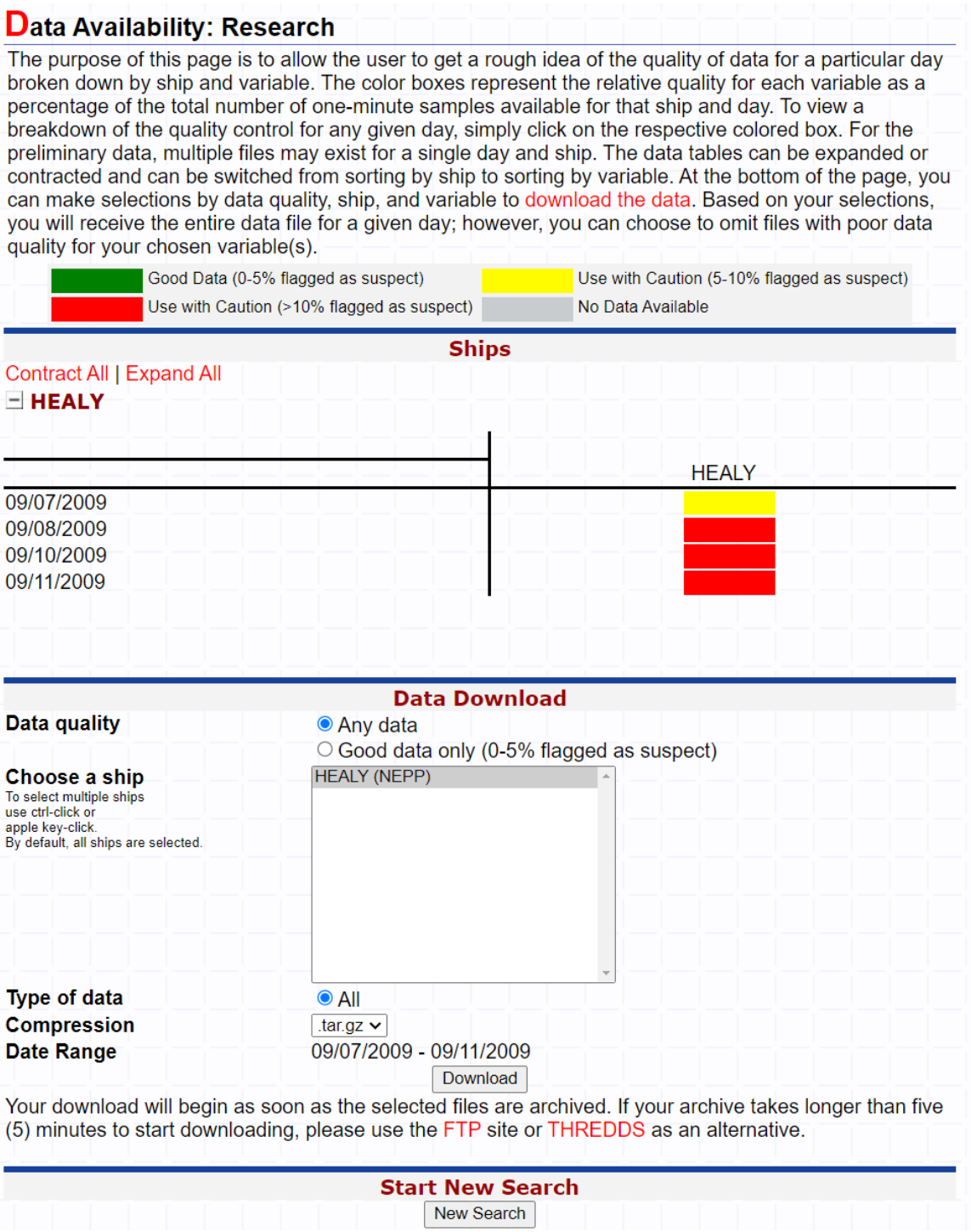


In this example, the user might repeat these steps to evaluate the quality of "SPD2" for 09/07/09. In the end, perhaps he decides the second wind sensor data will also be useful to him and now he would like to download the data. There are a couple of ways to accomplish this: By toggling a check mark in either the "File version # 300" box or the “select all” box and choosing the preferred file compression format (".tar.gz" in this case) on this or any of the pie chart pages, the 09/07/09 file containing all available parameters for that date is downloaded once "Download selected" is clicked. (Note that the entire file must be downloaded; individual parameters are not available for singular download at this time.) Or the user may simply click “download” (in red) to automatically begin download of the NetCDF file without any compression. Let us assume that, after careful consideration of the quality of wind and temperature data from the *Healy* for the period from 09/07/09 to 09/11/09, the user decides he would like to download all available data from that period. To do this, the user can return to the Data Availability page, select the

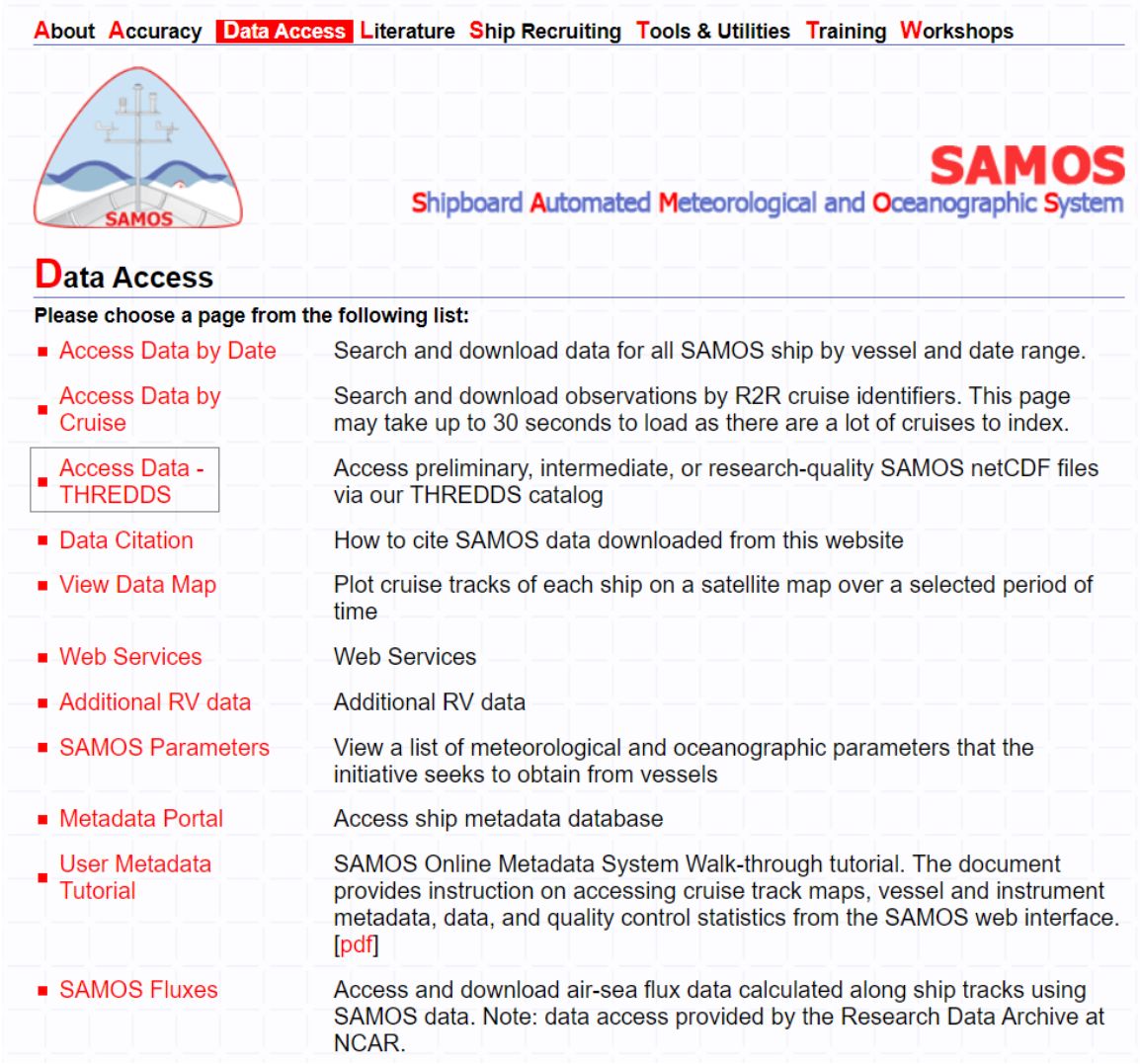
Healy, desired date range, and data version as before, but this time simply select the "Overall" sorting choice and click search:



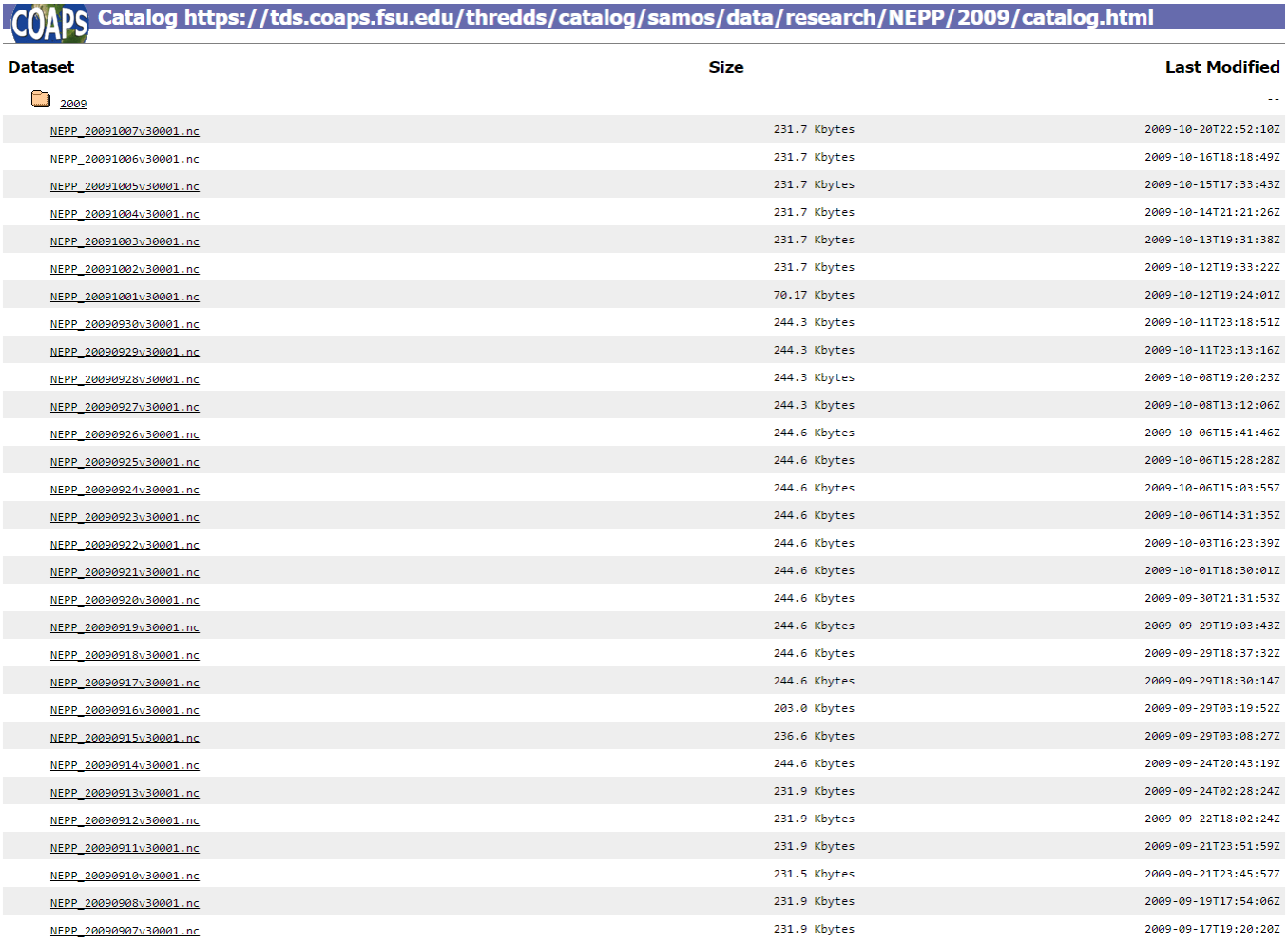
From here he can choose the desired compression type and download the entire selected range of data with one click of the Download button:



Alternatively, he may return to the Data Access page and choose Access Data - THREDDS, where he will also have an opportunity to choose multiple files for download:



The desired files can be accessed by descending into the Research Ship Data > NEPP > 2009 THREDDS folder:



Catalog https://tds.coaps.fsu.edu/thredds/catalog/samos/data/research/NEPP/2009/catalog.html

Dataset	Size	Last Modified
2009		--
NEPP_20091007v30001.nc	231.7 Kbytes	2009-10-20T22:52:10Z
NEPP_20091006v30001.nc	231.7 Kbytes	2009-10-16T18:18:49Z
NEPP_20091005v30001.nc	231.7 Kbytes	2009-10-15T17:33:43Z
NEPP_20091004v30001.nc	231.7 Kbytes	2009-10-14T21:21:26Z
NEPP_20091003v30001.nc	231.7 Kbytes	2009-10-13T19:31:38Z
NEPP_20091002v30001.nc	231.7 Kbytes	2009-10-12T19:33:22Z
NEPP_20091001v30001.nc	70.17 Kbytes	2009-10-12T19:24:01Z
NEPP_20090930v30001.nc	244.3 Kbytes	2009-10-11T23:18:51Z
NEPP_20090929v30001.nc	244.3 Kbytes	2009-10-11T23:13:16Z
NEPP_20090928v30001.nc	244.3 Kbytes	2009-10-08T19:20:23Z
NEPP_20090927v30001.nc	244.3 Kbytes	2009-10-08T13:12:06Z
NEPP_20090926v30001.nc	244.6 Kbytes	2009-10-06T15:41:46Z
NEPP_20090925v30001.nc	244.6 Kbytes	2009-10-06T15:28:28Z
NEPP_20090924v30001.nc	244.6 Kbytes	2009-10-06T15:03:55Z
NEPP_20090923v30001.nc	244.6 Kbytes	2009-10-06T14:31:35Z
NEPP_20090922v30001.nc	244.6 Kbytes	2009-10-03T16:23:39Z
NEPP_20090921v30001.nc	244.6 Kbytes	2009-10-01T18:30:01Z
NEPP_20090920v30001.nc	244.6 Kbytes	2009-09-30T21:31:53Z
NEPP_20090919v30001.nc	244.6 Kbytes	2009-09-29T19:03:43Z
NEPP_20090918v30001.nc	244.6 Kbytes	2009-09-29T18:37:32Z
NEPP_20090917v30001.nc	244.6 Kbytes	2009-09-29T18:30:14Z
NEPP_20090916v30001.nc	203.0 Kbytes	2009-09-29T03:19:52Z
NEPP_20090915v30001.nc	236.6 Kbytes	2009-09-29T03:08:27Z
NEPP_20090914v30001.nc	244.6 Kbytes	2009-09-24T20:43:19Z
NEPP_20090913v30001.nc	231.9 Kbytes	2009-09-24T02:28:24Z
NEPP_20090912v30001.nc	231.9 Kbytes	2009-09-22T18:02:24Z
NEPP_20090911v30001.nc	231.9 Kbytes	2009-09-21T23:51:59Z
NEPP_20090910v30001.nc	231.5 Kbytes	2009-09-21T23:45:57Z
NEPP_20090908v30001.nc	231.9 Kbytes	2009-09-19T17:54:06Z
NEPP_20090907v30001.nc	231.9 Kbytes	2009-09-17T19:20:20Z

Simply click on each file individually and be presented with multiple, clickable Access choices:

THREDDS/OPeNDAP

THREDDS Data Server

Catalog https://tds.coaps.fsu.edu/thredds/catalog/samos/data/research/NEPP/2009/catalog.html

Dataset: 2009/NEPP_20090907v30001.nc

- *Data format:* netCDF
- *Data size:* 231.9 Kbytes
- *Data type:* GRID
- *ID:* samos/data/research/NEPP/2009/NEPP_20090907v30001.nc

Documentation:

- SAMOS at COAPS
- **rights:** Center for Ocean-Atmospheric Prediction Studies

Access:

1. **OPENDAP:** /thredds/dodsC/samos/data/research/NEPP/2009/NEPP_20090907v30001.nc
2. **WMS:** /thredds/wms/samos/data/research/NEPP/2009/NEPP_20090907v30001.nc
3. **HTTPServer:** /thredds/fileServer/samos/data/research/NEPP/2009/NEPP_20090907v30001.nc
4. **FTP:** //data.coaps.fsu.edu/pub/samos/data/research/NEPP/2009/NEPP_20090907v30001.nc

Dates:

- 2009-09-17T19:20:20Z **(modified)**

Creators:

- **SAMOS**
  - *email:* samos@coaps.fsu.edu
  - *//samos.coaps.fsu.edu/*

Publishers:

- COAPS
  - *email:* samos@coaps.fsu.edu
  - *//www.coaps.fsu.edu*

Viewers:

- Godiva2 (browser-based)
- NetCDF-Java ToolsUI (webstart)
- Integrated Data Viewer (IDV) (webstart)