



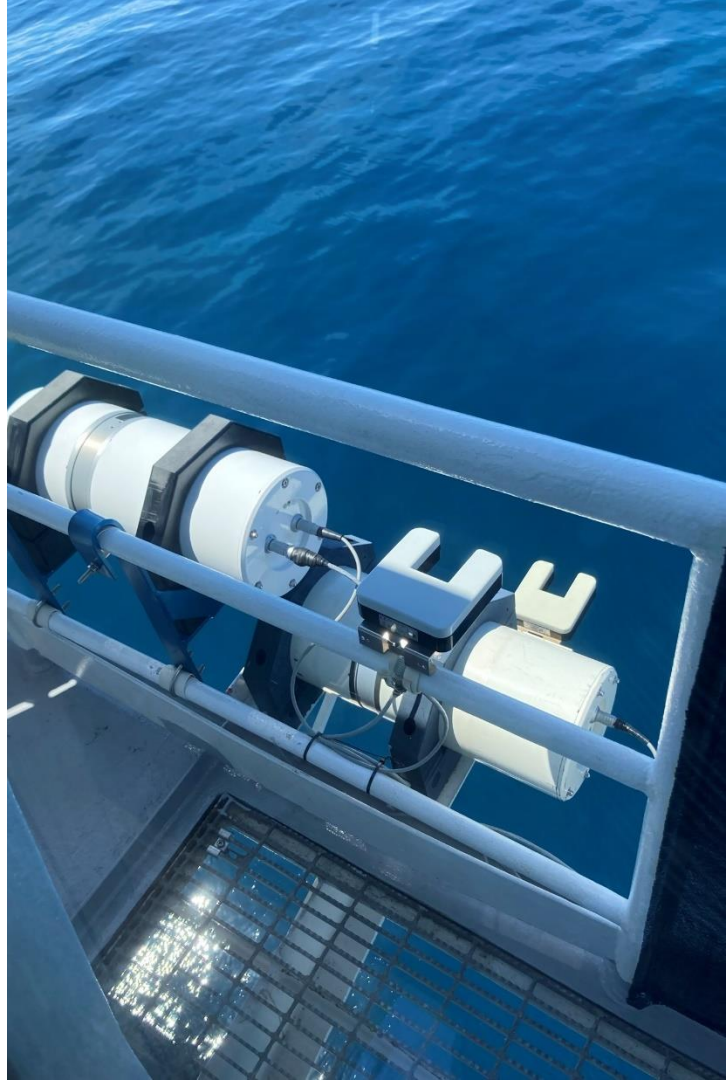
Australian Government
Bureau of Meteorology

ISAR(s) in Australia

ISFRN Workshop

22nd – 23rd April 2024

Nicole Morgan, Helen Beggs and Haifeng Zhang





Australian Government
Bureau of Meteorology

ISAR operations in Australia

CSIRO

- Nicole Morgan

Australian Bureau of Meteorology

- Helen Beggs
- Haifeng Zhang

Australian Antarctic Division

- *Michael Santarossa*



Australian Government
Bureau of Meteorology

ISAR Ships

**CSIRO
RV Investigator**



**Australian Antarctic Division
RSV Nuyina**





Australian Government
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ISAR operations in Australia

CSIRO - ISAR5D_010

- Installed on RV Investigator since 2014
- Completed 60 voyages (1217 days of data)
- Main CPU damaged 2023, unrepairable

CSIRO – ISAR5EE_016

- FRM4SST Workshop 2022
- Intercomparison with ISAR10 on IN2023_E01
- Completed 5 voyages (55 days of data)

CSIRO – ISAR5EX_XX

- Ordered, awaiting delivery

Australian Antarctic Division (AAD) – ISAR5E-013

- Installed and system integration completed

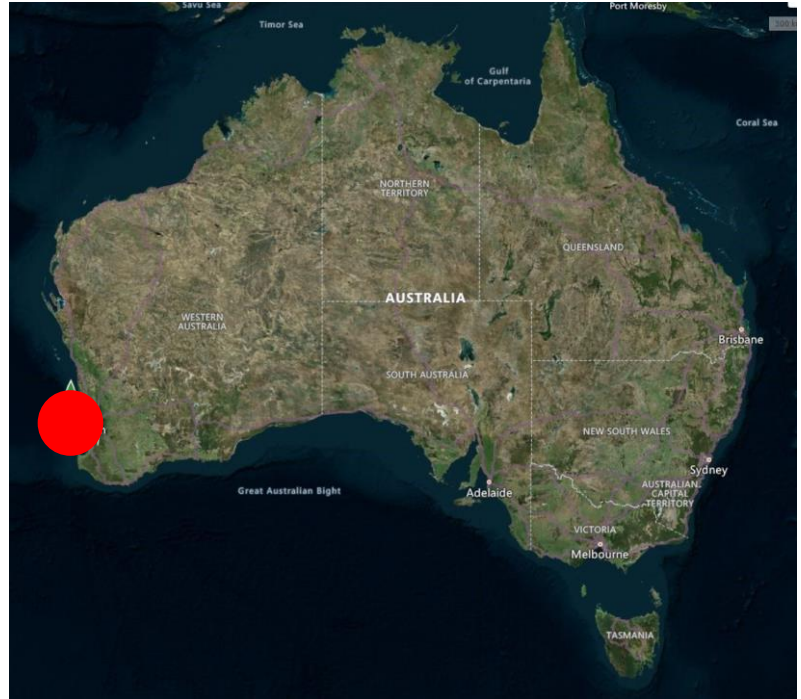
IN2023_E01

- ISAR10 & ISAR16 on board
- Side by side comparison post UK workshop
- Reducing samples per angle for ISAR16 and effect on data quality



IN2023_E01

- ISAR10 & ISAR16 on board
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IN2023_E01

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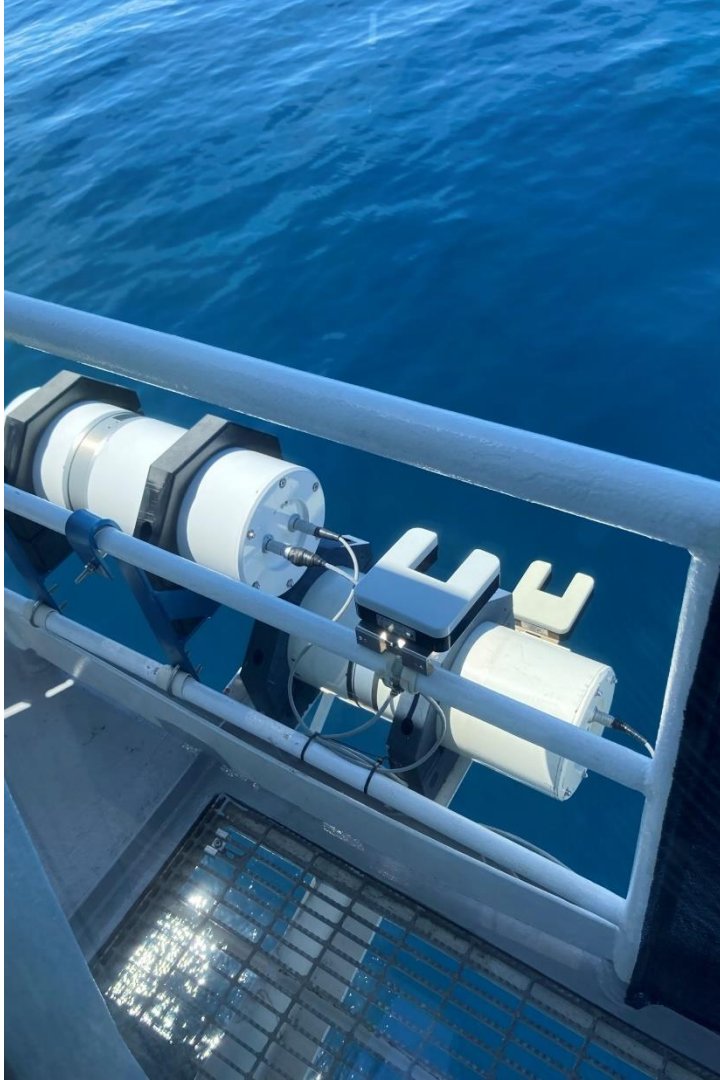




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IN2023_E01

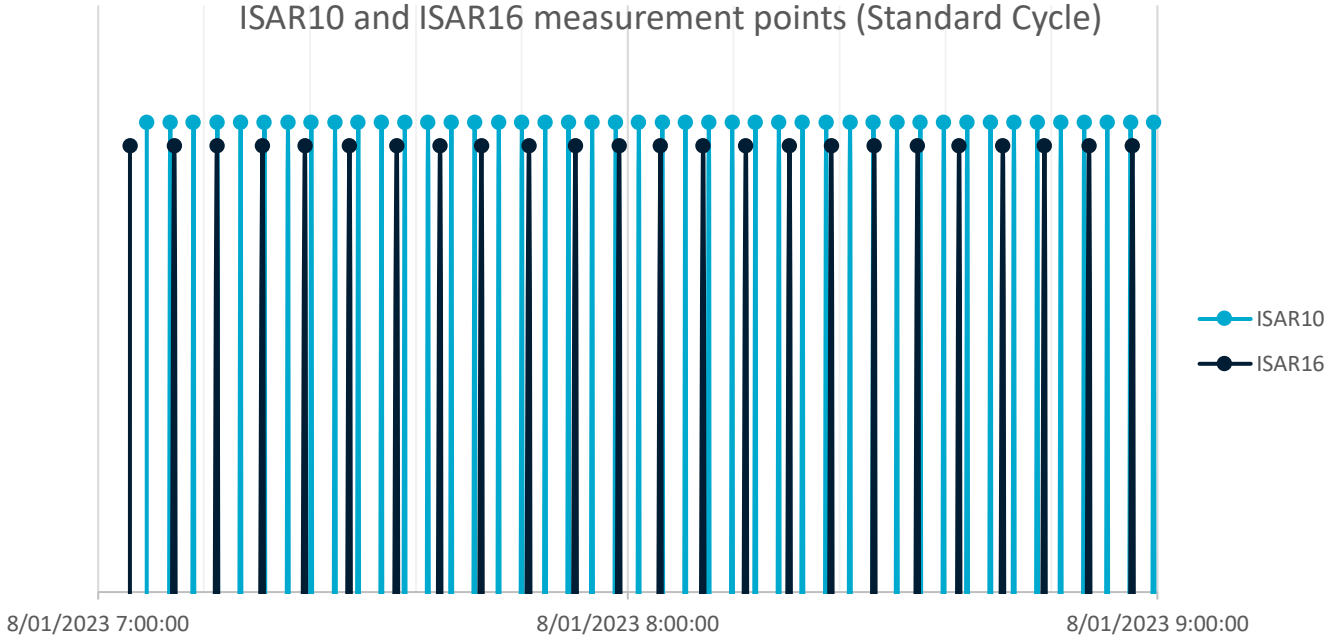
- ISAR10 & ISAR16 on board
- Side by side comparison post UK workshop
- Reducing samples per angle for ISAR16 and effect on data quality





IN2023_E01

ISAR10 and ISAR16 measurement points (Standard Cycle)





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IN2023_E01





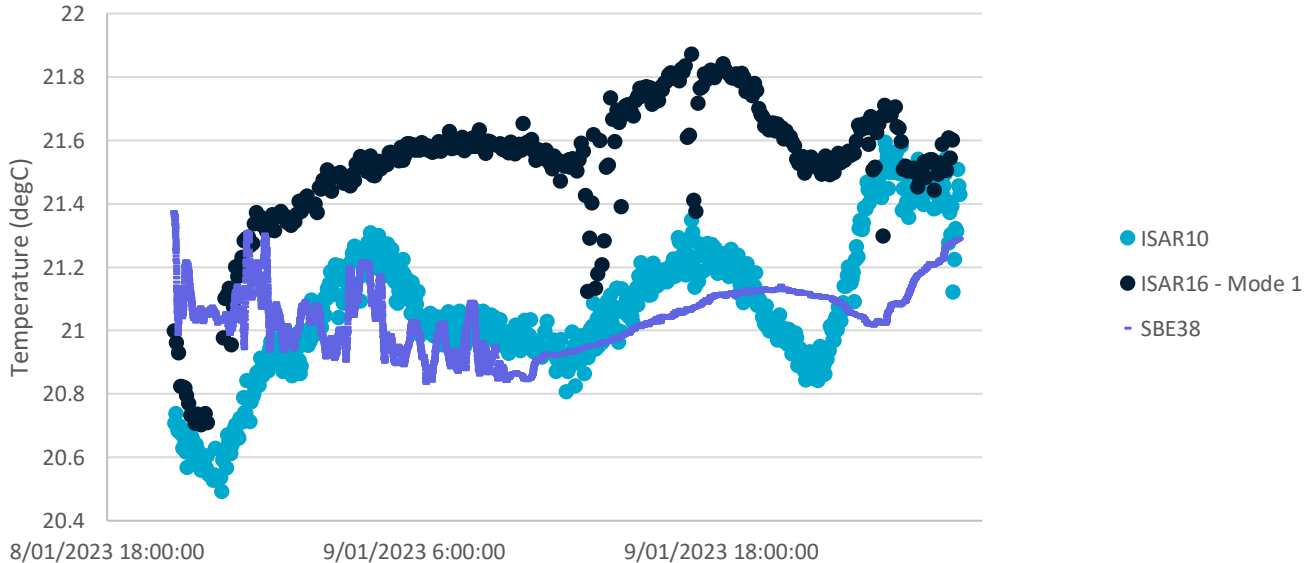
IN2023_E01 – Measurement Cycle Timing

Sampling Mode	Instrument	Ambient BB	Heated BB	Sky	Sea	Average Time
Default	ISAR10	30	30	10	40	2:40
Default	ISAR16	30	30	10	40	5:01
Mode 2	ISAR16	20	20	7	27	3:22
Mode 3	ISAR16	15	15	5	20	2:32



IN2023_E01 – Default Measurement Cycles

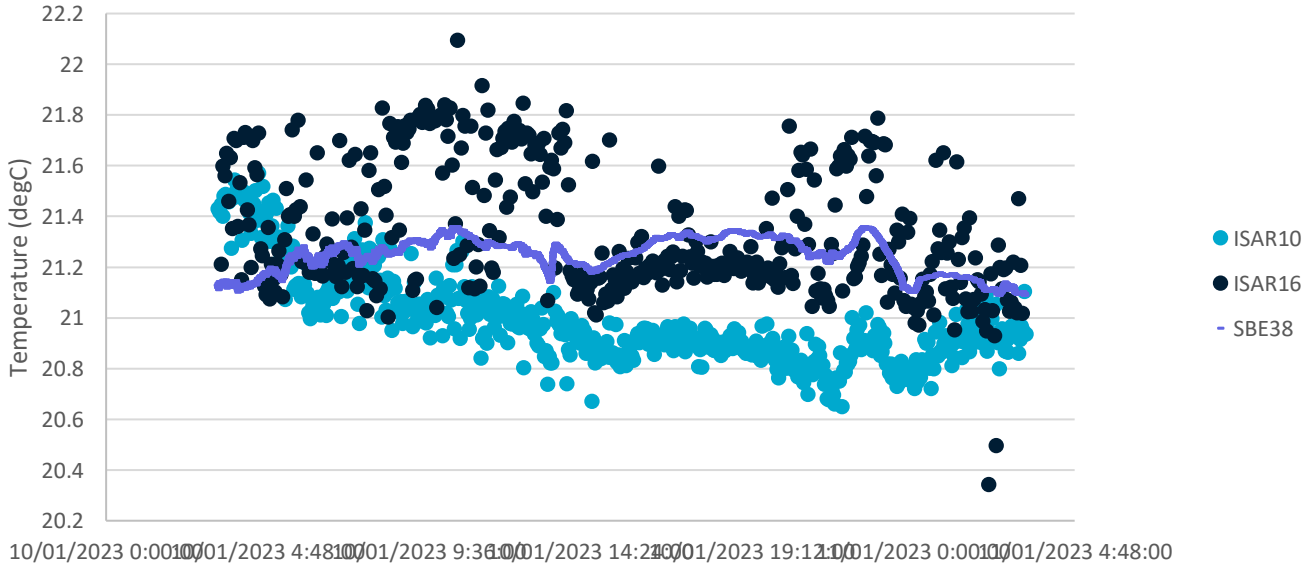
Sampling Mode 1





IN2023_E01 – Sampling Mode 2

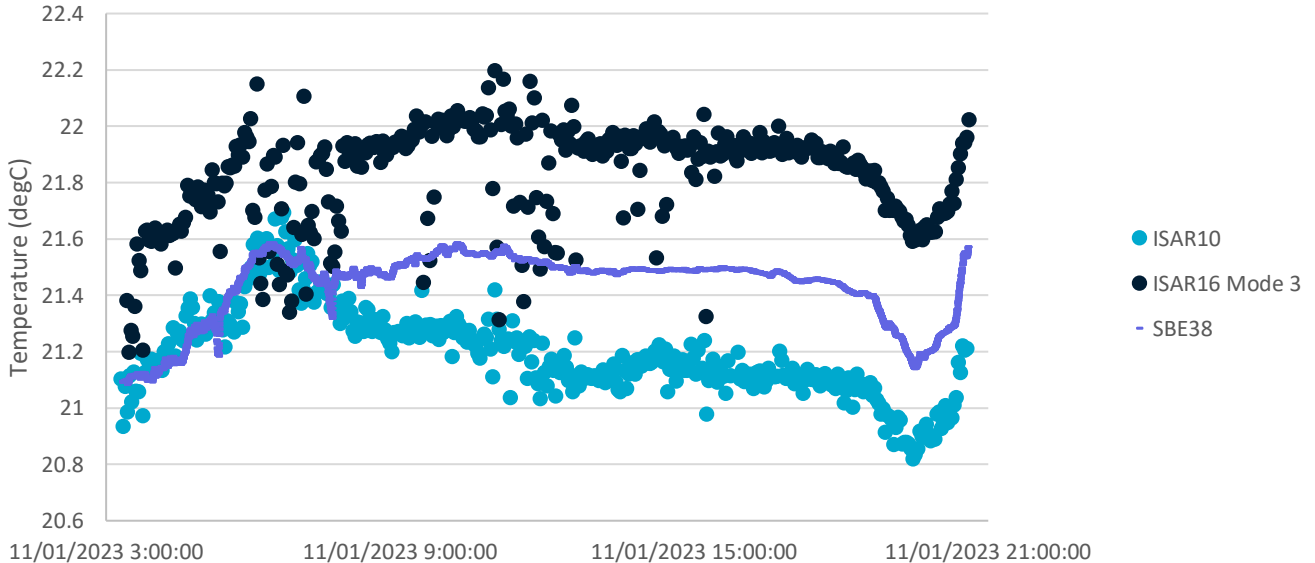
Sampling Mode 2 - all data





IN2023_E01 – ISAR10 default ISAR16 Mode 3

Sampling Mode 3





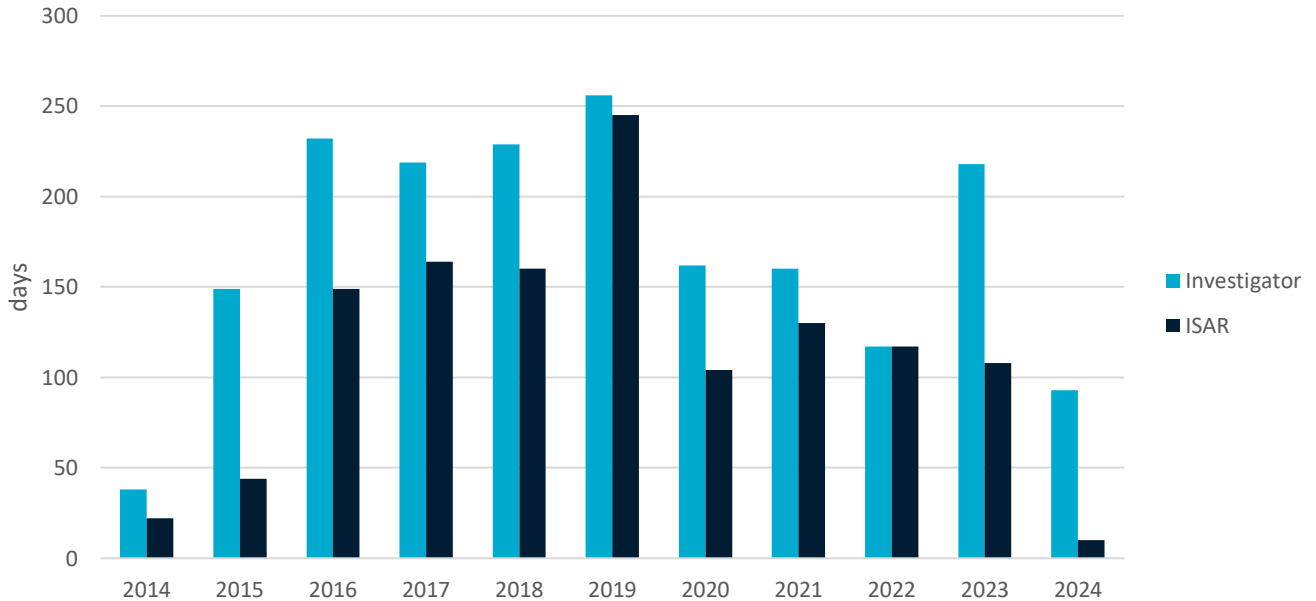
IN2023_E01 (Average SST – SBE38)

Mode	ISAR10 (mK)	ISAR16 (mK)
Mode 1	230	391
Mode 2	306	204
Mode 3	131	398



CSIRO data

Investigator and ISAR data





Status of Processed Data

Write ISAR SST

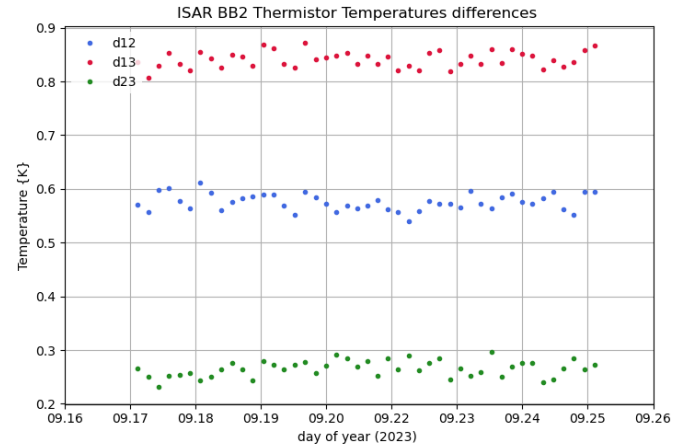
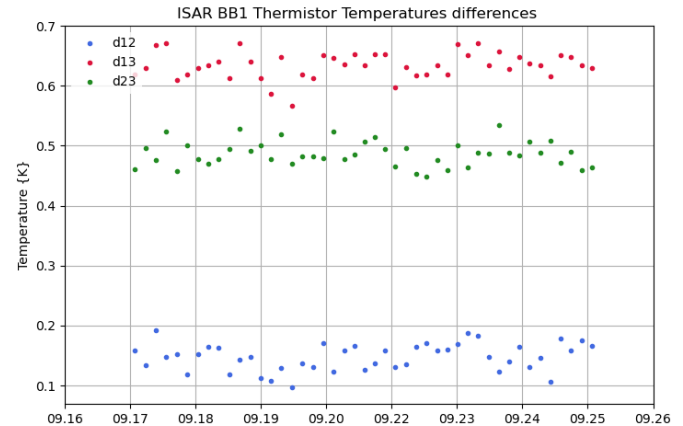
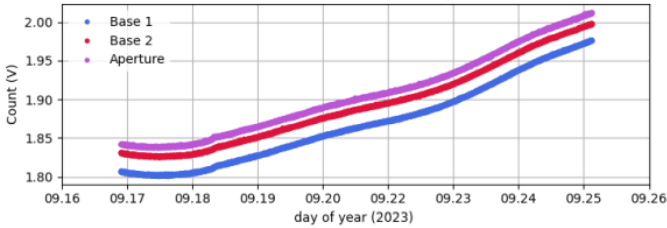
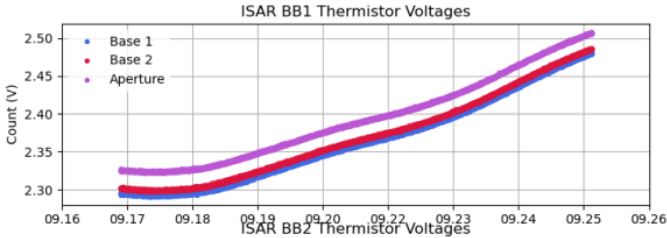
v3.1 23 completed voyages

v3.8 14 completed voyages

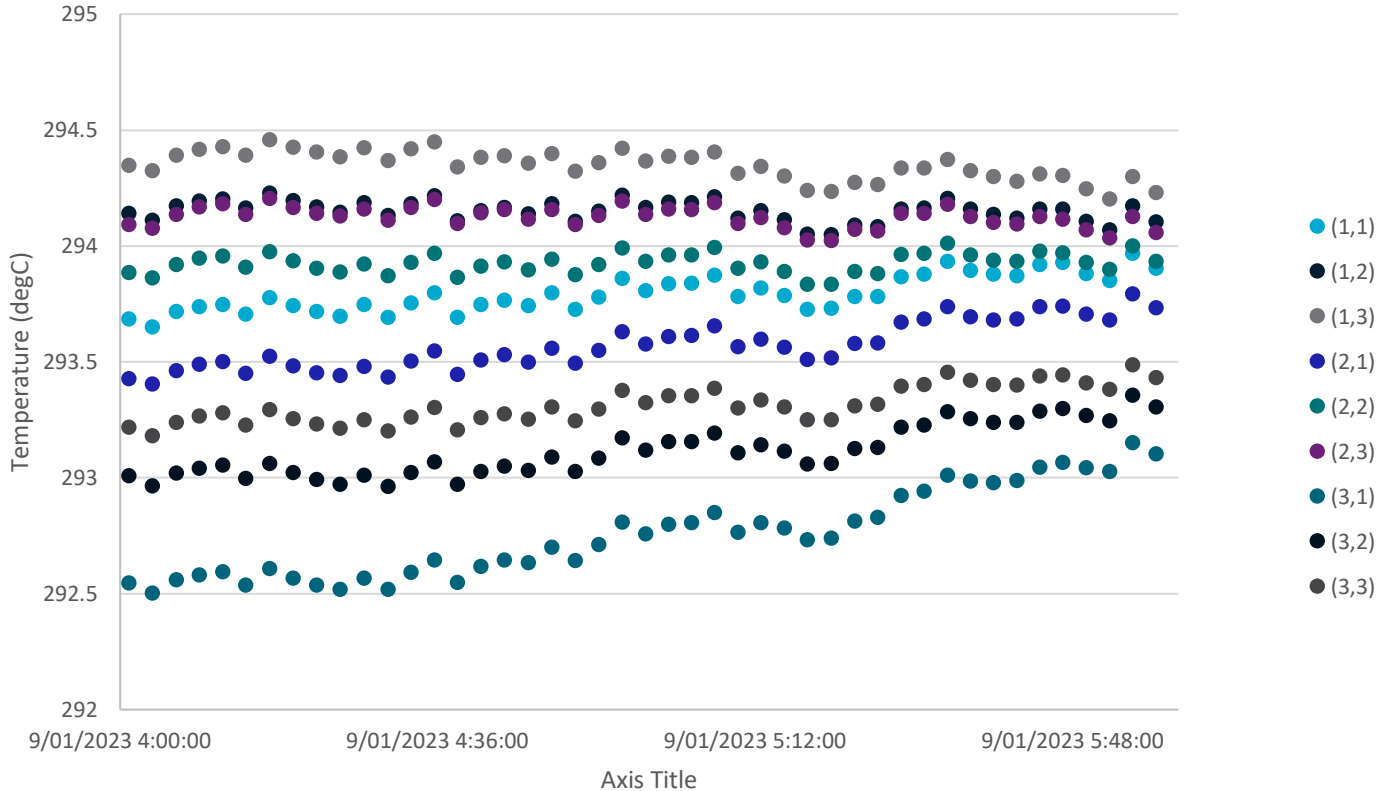
v5.6 5 completed voyages

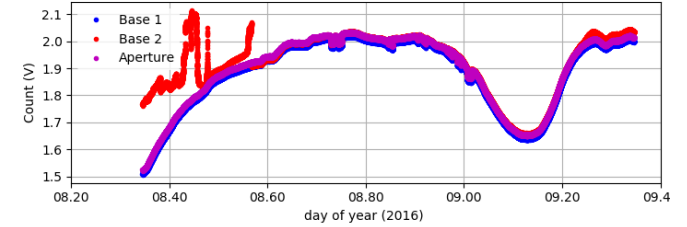
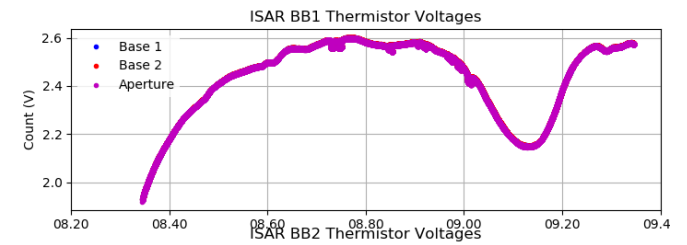
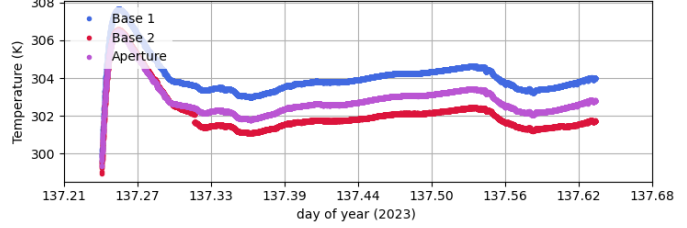
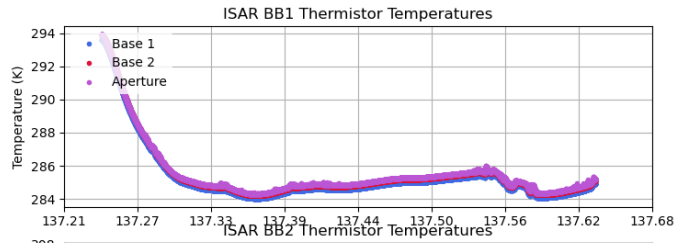
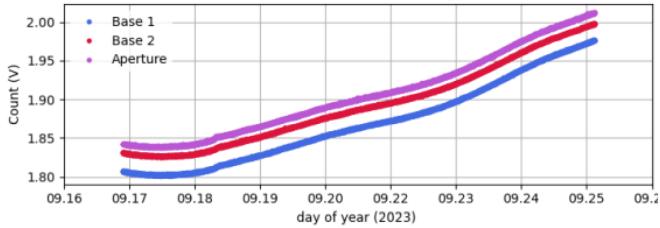
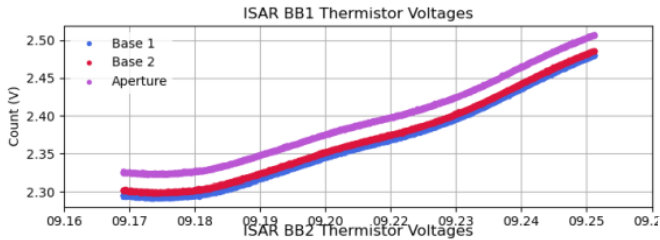
Unsubmitted data:

24 voyages (2020 – onwards)



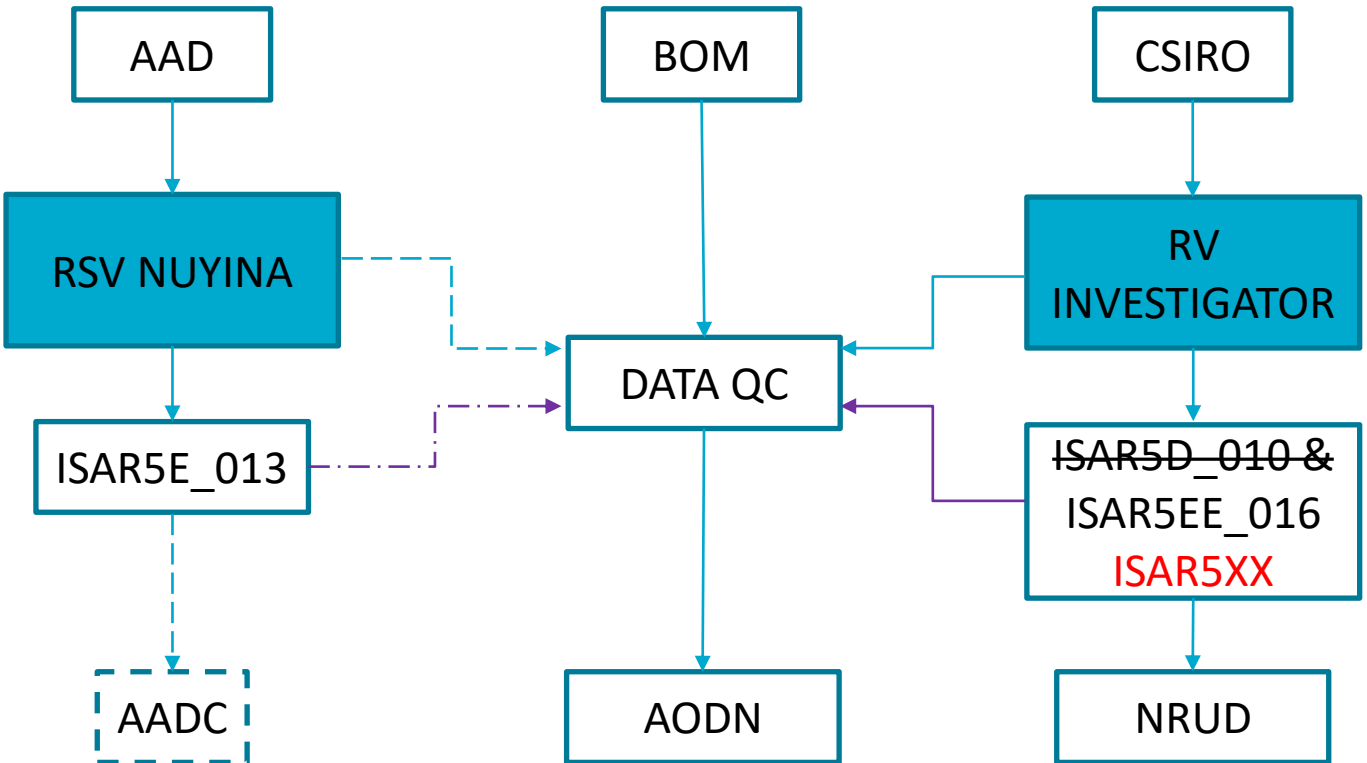
ISAR10 Results varying used thermistors





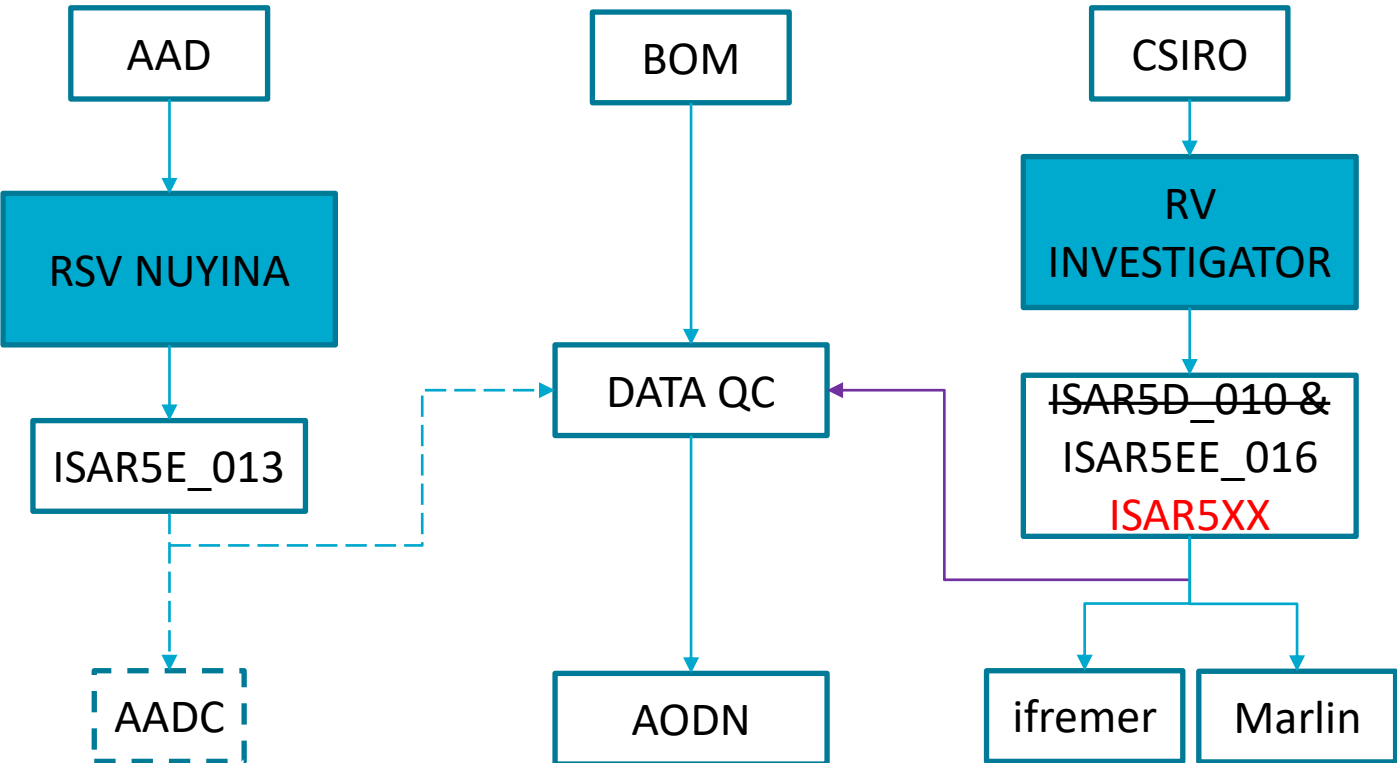


ISAR operations in Australia (Real-time)





ISAR operations in Australia (Processed)





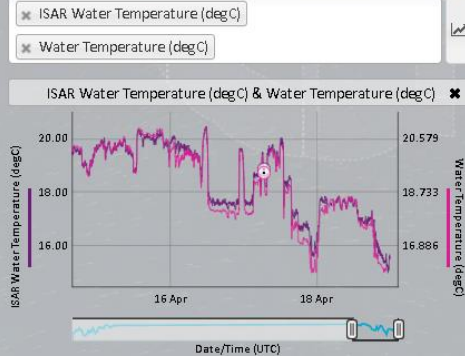
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ISAR data storage

CSIRO - Realtime

<https://www.cmar.csiro.au/data/underway/>

On Graph



https://www.cmar.csiro.au/data/underway/

Survey | in2022_v02

Live Camera

Perth

Region
Derwent Estuary; Tasmania coast; Tasman Sea; New Zealand coast; Southwest Pacific Ocean

Starting location
Hobart

Ending location
Hobart

GPS locations
1667

Temporal Extents
2022-03-18 22:23 to 2022-04-19 00:00

Project Leader(s)
Dr Jutzeler (UTAS)

Contributors

Description
The aim of this project is to link the behaviour of deep submarine eruptions with the morphology of their deposits. Modelling calculations of sediment mass fluxes will permit the first-ever hazard mapping scheme for submarine volcanoes globally (tsunamis and sediment flows), and provide new ore vectoring strategies for exploration in Australia.

Position: 42.50270, 147.36944
Time: 2022-04-19 00:00
Wind: N @ 5.4 knots
Distance: 2171.98 nmi
Speed (IG): 9.10 knots



ISAR data storage

CSIRO - Processed

<https://marlin.csiro.au/geonetwork/srv/eng/catalog.search#/metadata/bdf91f86-2968-4711-873e-2761383bb207>



Back to search

Download Views

RV Investigator ISAR/SST Sea Surface Temperature Data Overview (2014 onwards)

On going

Overview

This record describes the ISAR/SST Sea Surface Temperature data collected on the RV Investigator Voyages from 2014 onwards. The infrared SST autonomous radiometer (ISAR) is a self-calibrating instrument capable of measuring in situ sea surface skin temperature to an accuracy of 0.1 K. The SST Radiometer is mounted on the port bridge wing, approximately 19.593m above the summer load line. The RV Investigator ISAR skin SST data are also supplied both in real-time (http://thredds.aodn.org.au/thredds/catalog/MOS/SOOP/SOOP-ASF/MLMJ_investigator/meteorological_sst_observations/catalog.html) and in delayed mode after reprocessing (http://thredds.aodn.org.au/thredds/catalog/MOS/SOOP/SOOP-ASF/MLMJ_investigator/meteorological_sst_observations/2016/ISAR-QC/catalog.html) and http://thredds.aodn.org.au/thredds/catalog/MOS/SOOP/SOOP-ASF/MLMJ_investigator/meteorological_sst_observations/2017/ISAR-QC/catalog.html). These reprocessed files will be particularly valuable for satellite SST validation (as the ISAR measures SST at the same depth as measured by satellites) and are currently (2017) being used by EUMETSAT for Sentinel-3 SST validation and to JMA and Oceans University China for Himawari-8 SST validation. Further information can be found in the data and documentation links below.



Download

RV Investigator survey information including voyage plans and summaries
 Download

Voyage Reports

Spatial extent



ISAR data storage

IMOS Real time

http://thredds.aodn.org.au/thredds/catalog/IMOS/SOOP/SOOP-ASF/VLMJ_Investigator/meteorological_sst_observations/catalog.htm

Dataset

📁 2022

IMOS_SOOP-ASF_MT_20220101T000000Z_VLMJ_FV01_C-20220102T040010Z.nc
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Integrated Marine
Observing System

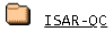


ISAR data storage

IMOS QC Processed

http://thredds.aodn.org.au/thredds/catalog/IMOS/SOOP/SOOP-ASF/VLMJ_Investigator/meteorological_sst_observations/20XX/ISAR-QC/catalog.html
*20XX = Year (2015, 2016 etc.)

Dataset



IMOS_SOOP-ASF_MT_20210507T230100Z_VLMJ_FV01_ISAR-QC_C-20220622T064744Z.nc
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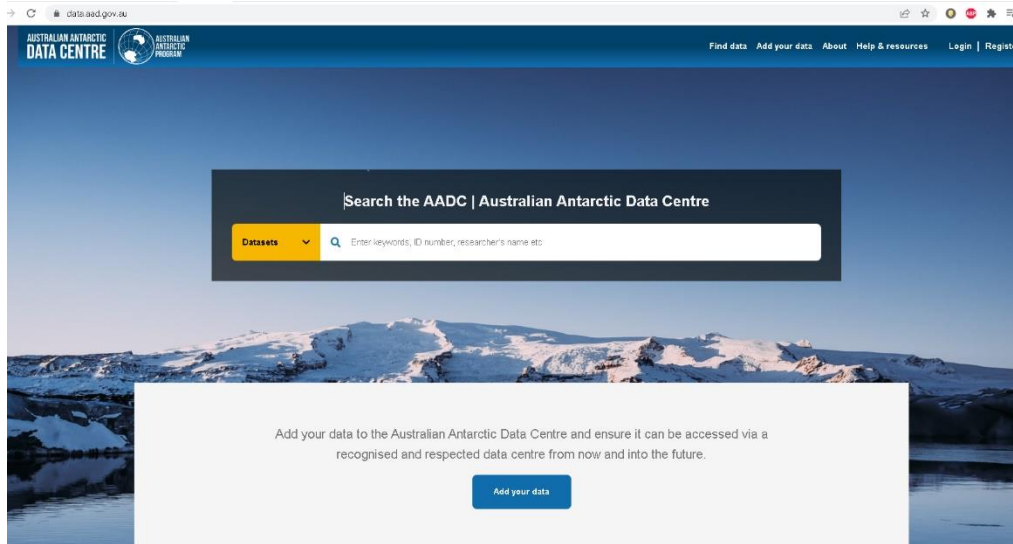


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ISAR data storage

AAD Data

<https://data.aad.gov.au/>

A screenshot of the Australian Antarctic Data Centre (AAD) website. The browser address bar shows 'data.aad.gov.au'. The website header includes the 'AUSTRALIAN ANTARCTIC DATA CENTRE' logo and the 'AUSTRALIAN ANTARCTIC PROGRAM' logo. A navigation menu contains links for 'Find data', 'Add your data', 'About', 'Help & resources', 'Login', and 'Register'. The main content area features a dark blue search bar with the text 'Search the AADC | Australian Antarctic Data Centre'. Below the search bar is a white input field with a magnifying glass icon and the placeholder text 'Enter keywords, ID number, researcher's name etc'. To the left of the input field is a yellow button labeled 'Datasets' with a dropdown arrow. Below the search bar is a white box with the text 'Add your data to the Australian Antarctic Data Centre and ensure it can be accessed via a recognised and respected data centre from now and into the future.' and a blue button labeled 'Add your data'. The background of the website is a scenic image of a snowy mountain range.



Australian Government

Bureau of Meteorology

Questions?

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Mechatronics Engineer
National Facilities and Collections

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nicole.morgan@csiro.au



- BoM employs an automated QC method based on SAMOS (<http://samos.coaps.fsu.edu>) QC for all IMOS ship meteorological and SST measurements
- Tests in order of application for VLMJ:
 1. Verify existence of time, lat, lon for every record
 2. Flag data not within physically possible bounds
 3. Flag non-sequential and/or duplicate times
 4. Flag positions where vessel over land
 5. Flag unrealistic vessel speeds
 6. SST and SSPS: Flag data measured when port drop keel not extended
 7. Exhaust contamination test T,RH
 8. True wind test
 9. Flag data failing statistical test: flag step, discontinuity or spike
 10. Climatology test (SST more than 3K above/below Bureau's most recent SST analysis in vessel location – either RAMSSA or GAMSSA)
- Once any datum's flag is changed, it will not be altered by any subsequent test.



Merge of re-processed ISAR with co-located meteorological data

- ISAR observation time matched to closest meteorological time.
- Upper time-limit of 1 minute for time-match otherwise ship has moved on.
- Manual QC of merged files - flag failed sensors, remove un-navigated observations, de-spike selected meteorological variables.
- QC of re-processed radiometric sea temperature is via total uncertainty.
- Real-time bulk sea temperatures passing all except climatology, statistical tests sent to GTS (FM13 SHIP, FM62 TRACKOB, BUFR proposed). ISAR not sent to GTS.
- Real-time ISAR, bulk SST, meteorological data uploaded to AODN daily.
- Post-cruise, merged re-processed ISAR and meteorological files supplied to AODN.