

# IMOS-OceanCurrent: Up-to-date ocean information around Australia

Gabriela Semolini Pilo  
David Griffin  
Roger Scott  
Edward King  
... and collaborators



IMOS acknowledges the Traditional Custodians and Elders of the land and sea on which we work and observe, and recognise them as Australia's first marine scientists and carers of Sea Country.  
We pay our respects to Aboriginal and Torres Strait Islander peoples past and present.

# IMOS-OceanCurrent

The screenshot shows the IMOS OceanCurrent homepage. At the top, there's a banner with the text "IMOS OceanCurrent Surface Currents and Temperature Up to date ocean information around Australia." Below the banner is a navigation bar with links for "Maps", "In-water", "News", and "Guided Tour". To the right of the navigation bar are the IMOS logo and the text "Integrated Marine Observing System". The main content area features a map of Australia and surrounding oceans showing sea level anomalies. A specific region off the Western Australian coast is highlighted with a red box and labeled "Adjusted Sea Level Anomaly". To the right of the map, there's a news section titled "OceanCurrent News" with an article about "Cryptic upwelling off Western Australia" by Ming Feng, Toan Bui, and Chari Pattiaratchi, dated 31 May, 2025. The news section includes three small figures (a, b, c) showing temperature and temperature anomalies. Below the news is another article titled "TC Alfred's imprint in the deep ocean" by Gabriela S. Pilo, dated 31 March, 2025. On the far right, there's a sidebar with various data access links: EAC Mooring Array, MyOceanCurrent, Tidal Currents, Follow El Nino with SLA, Animations, Google Earth View, Argo, Current Meters, and Gliders.

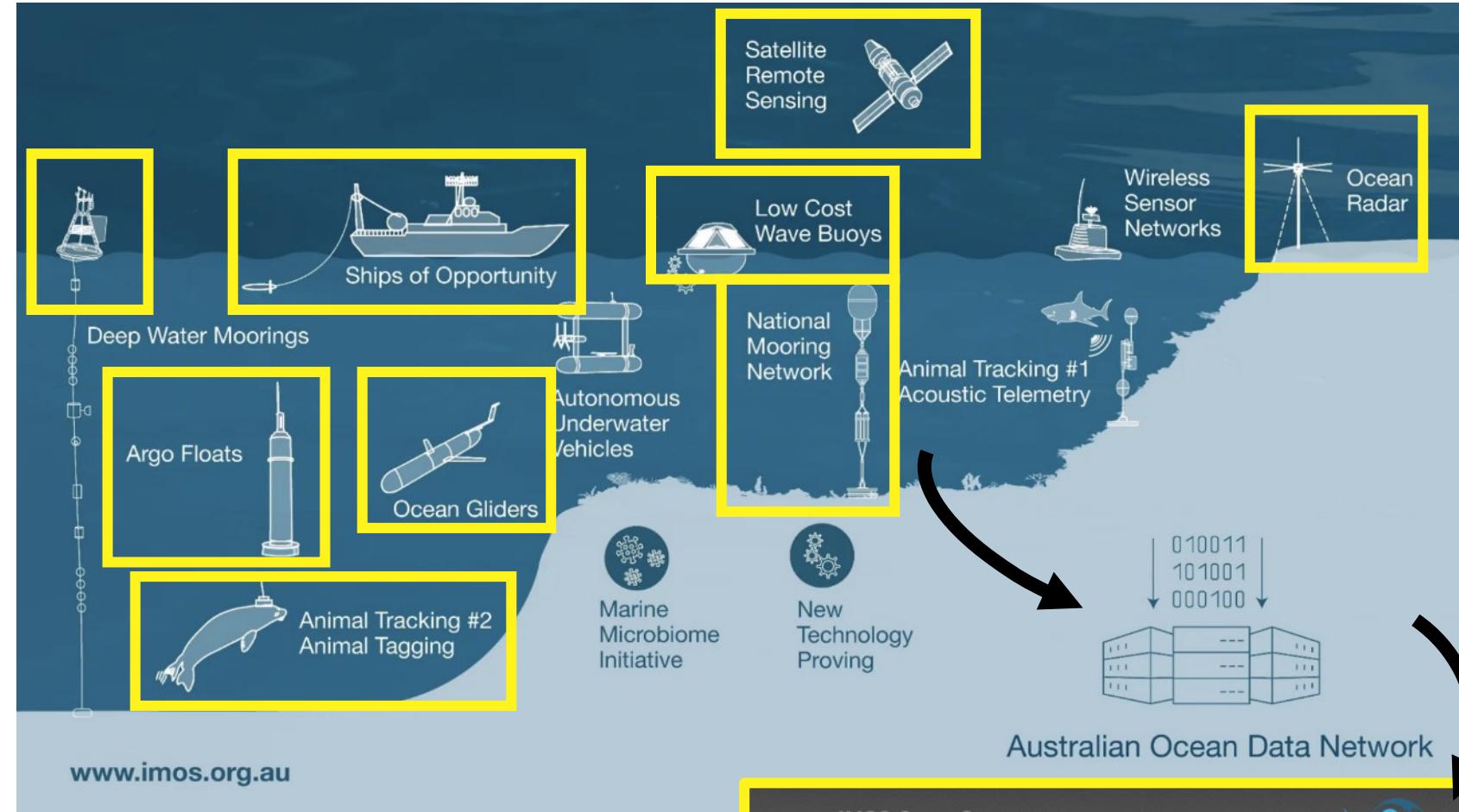
A quick integrated view of ocean data around Australia

What data is available

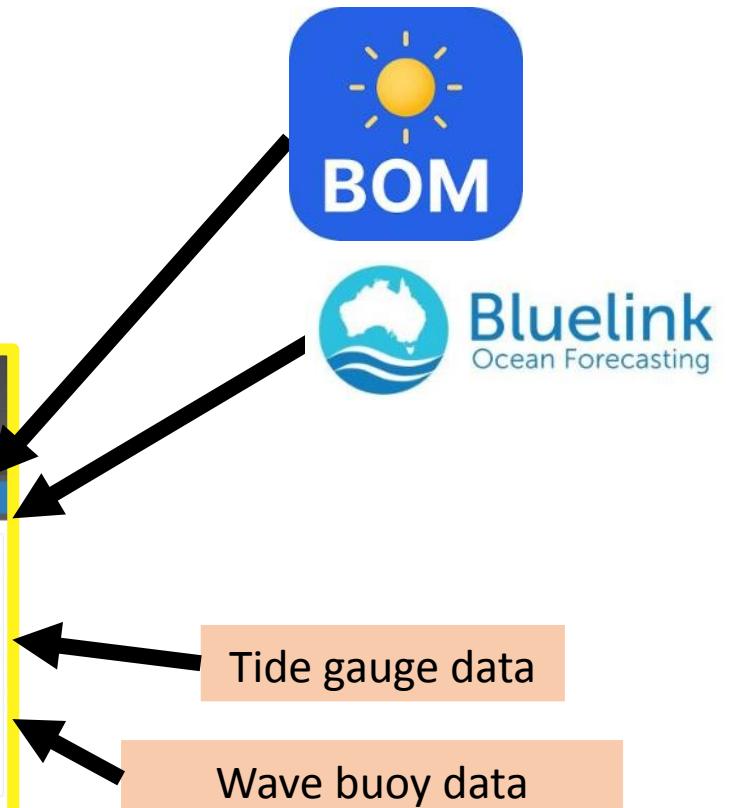
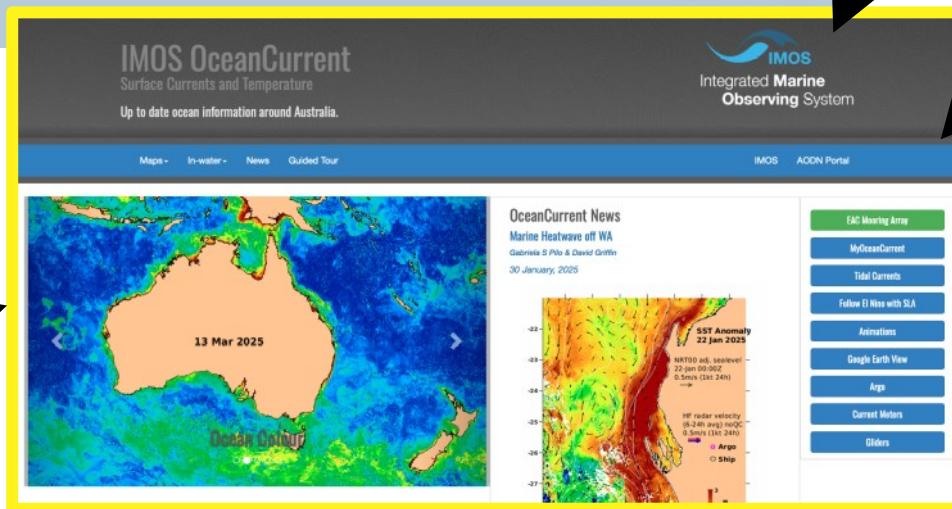
What data types are available

Quick look into case studies

Ready-made figures for copying and pasting (free to use)



## Lots of ocean information around Australia

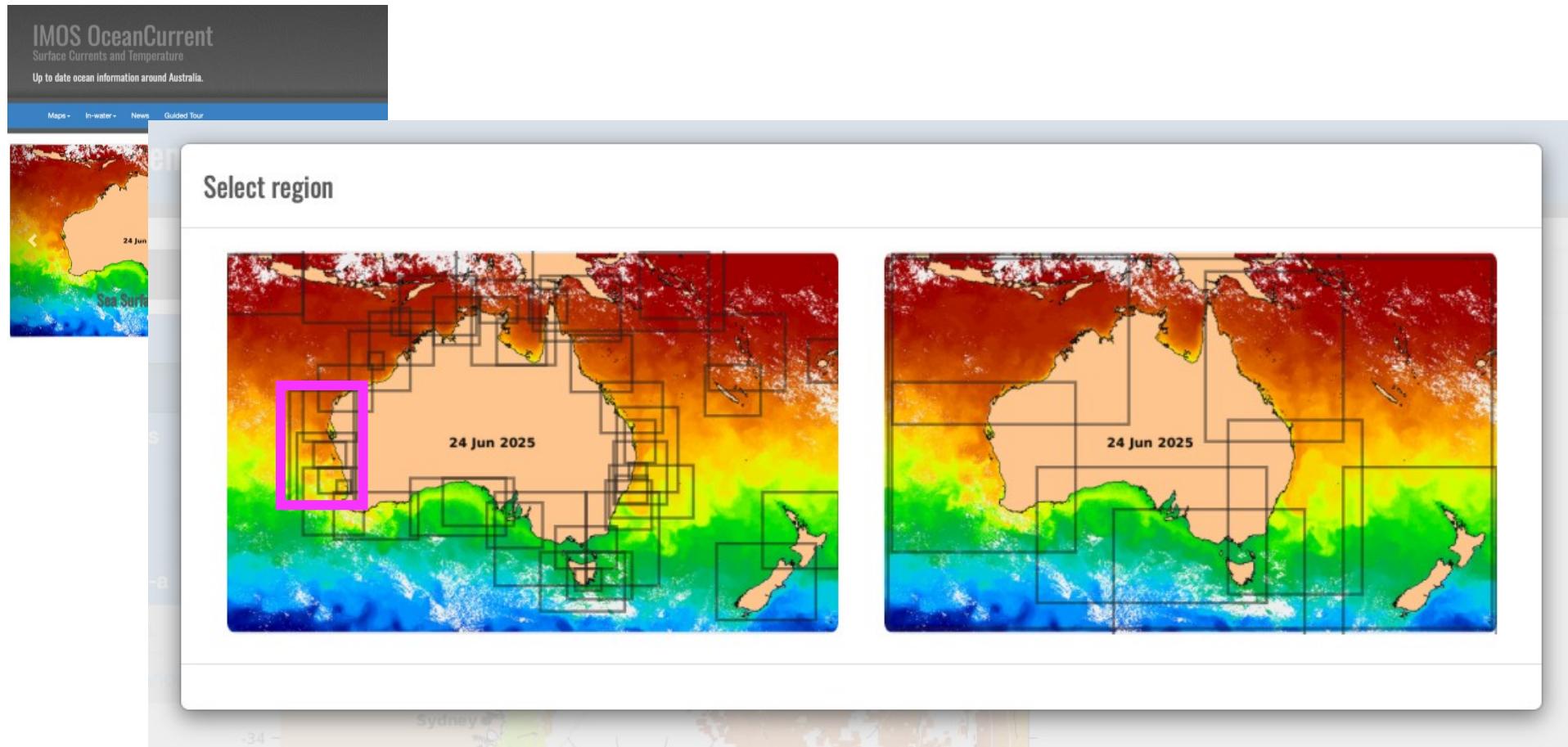


## Two case studies

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# Case Study #1: A quick look into the ocean conditions off WA during the 24/25 summer

## Start looking at Sea Surface Temperature (SST) maps



Select region

◀ ⏪ 29 Jun 2025 ⏩ C SST 🔍 ⓘ Permalink

Snapshot SST

Four hour SST

6-Day SST &amp; Centiles

Climatology

SST Anom vs Time

Snapshot Chlorophyll-a

Adj. Sea Level Anom.

Non-Tidal Sea Level Anom.

## Data sources

SST L3S-6d ngt  
(1992-2017)SST L3SM-6d ngt  
(2018-now)

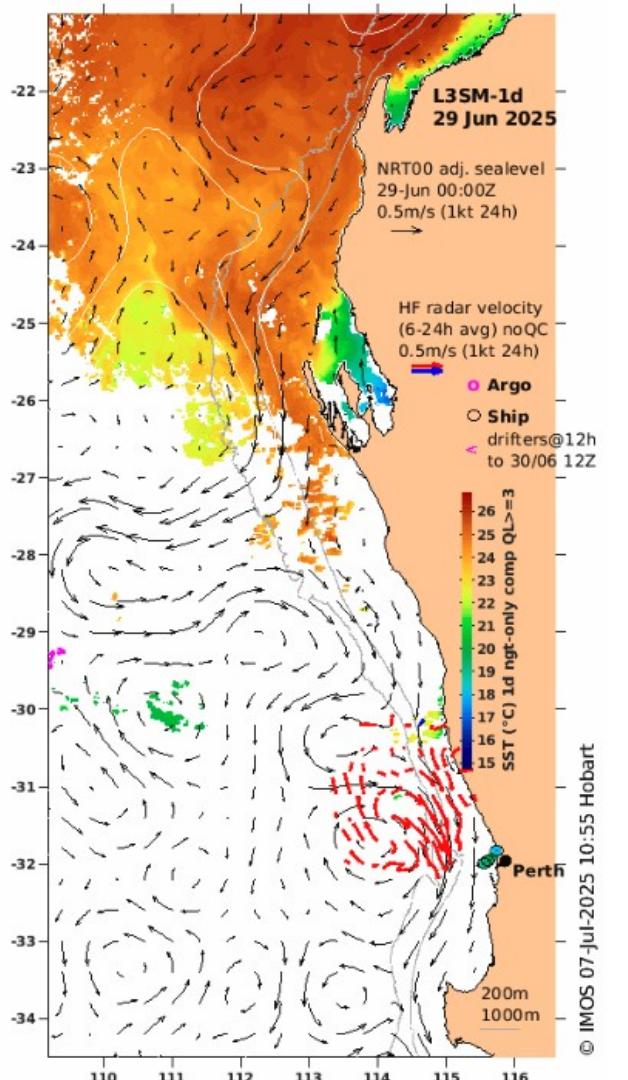
GSLA

SSTAARS

## Legend

- Argo
- ◆ Glider
- Radar
- > Drifter
- Ship

Click for more information



Landing page 📧 latest map available

Case Study #1: A quick look into the ocean conditions off WA during the 24/25 summer

Case Study #1: A quick look into the ocean conditions off WA during the 24/25 summer

## Select region

Snapshot SST

Four hour SST

6-Day SST &amp; Centiles

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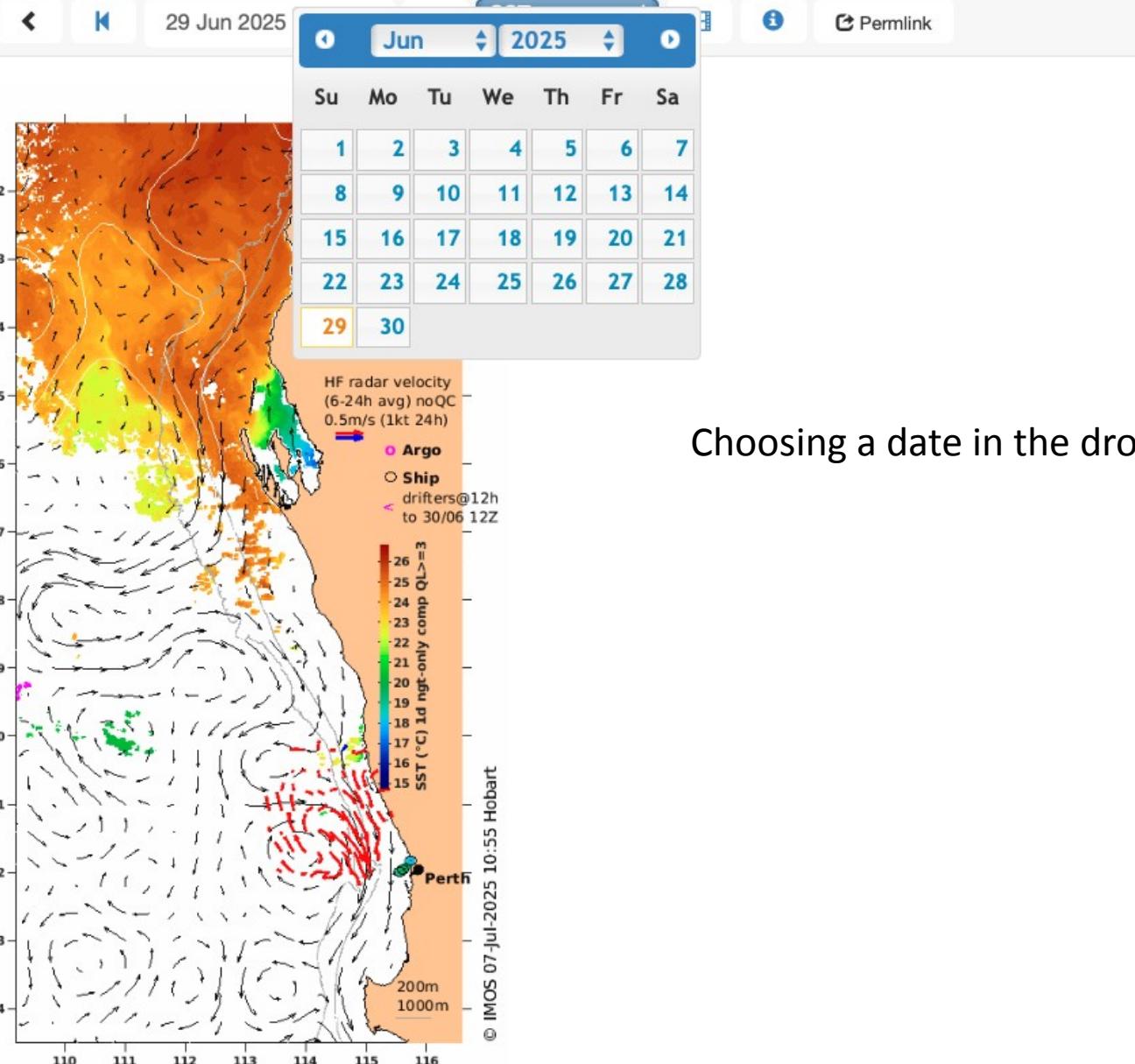
GSLA

SSTAARS

## Legend

- Argo
- ◆ Glider
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- > Drifter
- Ship

Click for more information



Choosing a date in the drop-down calendar

Select region

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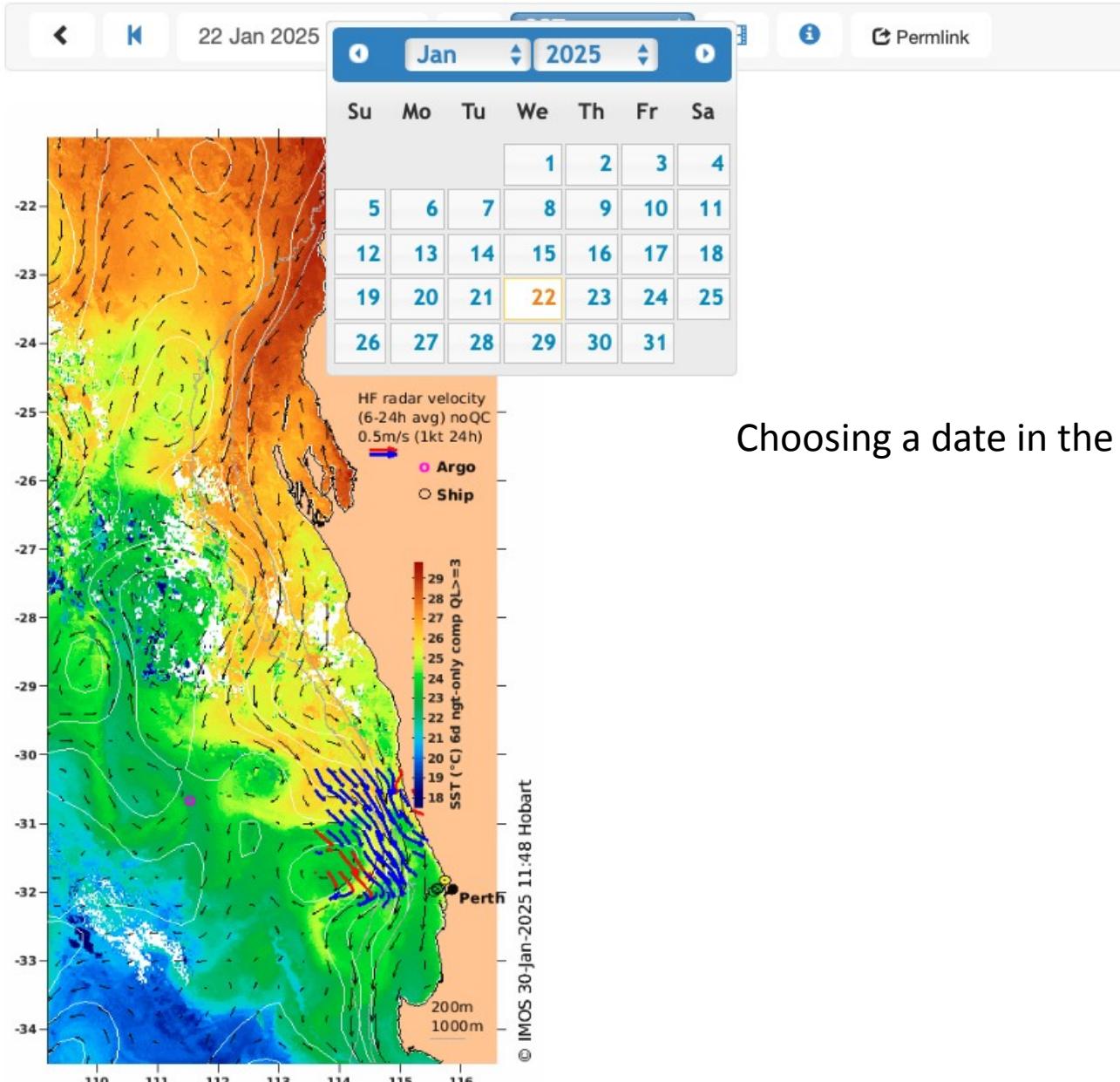
GSLA

SSTAARS

## Legend

- Argo
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- > Drifter
- Ship

Click for more



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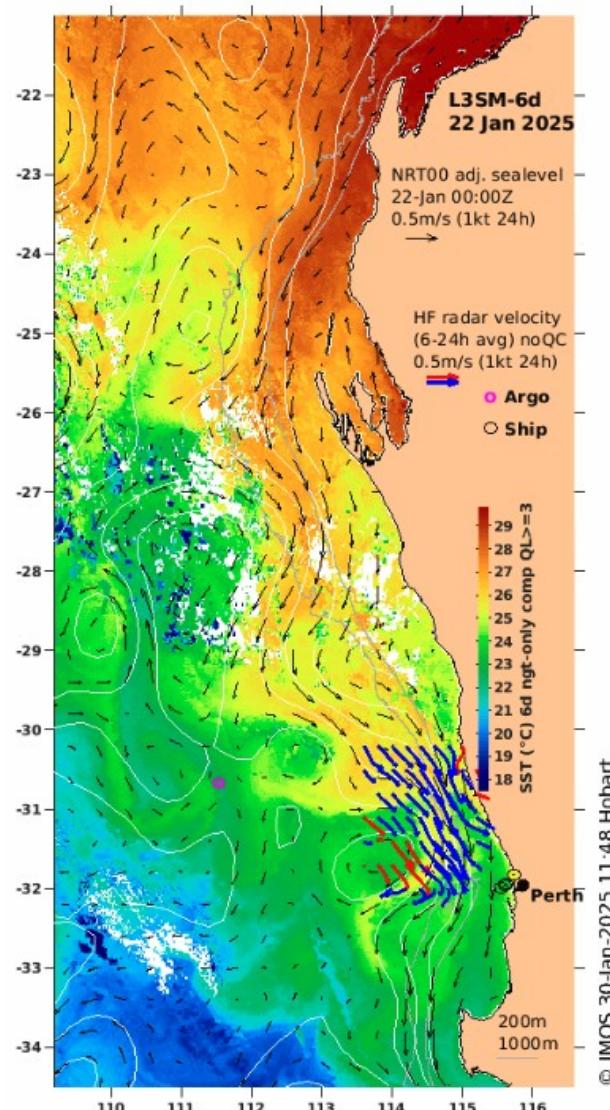
GSLA

SSTAARS

## Legend

- Argo
- ◆ Glider
- Radar
- > Drifter
- Ship

Click for more

◀ ◀ 22 Jan 2025 📅 C ▶ ▶ SST ⤵ ⤶  ⓘ 🔗 Permalink


## What are we seeing?

- Colours ↗ SST
- Not many clouds
- Black arrows ↗ geostrophic currents calculated from satellite data
- Red/Blue arrows ↗ total surface velocity from High Frequency land-based radar
- Some eddies offshore

But how do these temperatures relate to previous summers?

Want to download and analyse this data?  
Tutorial this afternoon!

- Select...
- Hour SST
- 6-Day SST & Centiles
- Climatology
- SST Anom vs Time
- Snapshot Chlorophyll-a
- Adj. Sea Level Anom.
- Non-Tidal Sea Level Anom.

#### Data sources

SST L3S-6d ngt  
(1992-2017)

SST L3SM-6d ngt  
(2018-now)

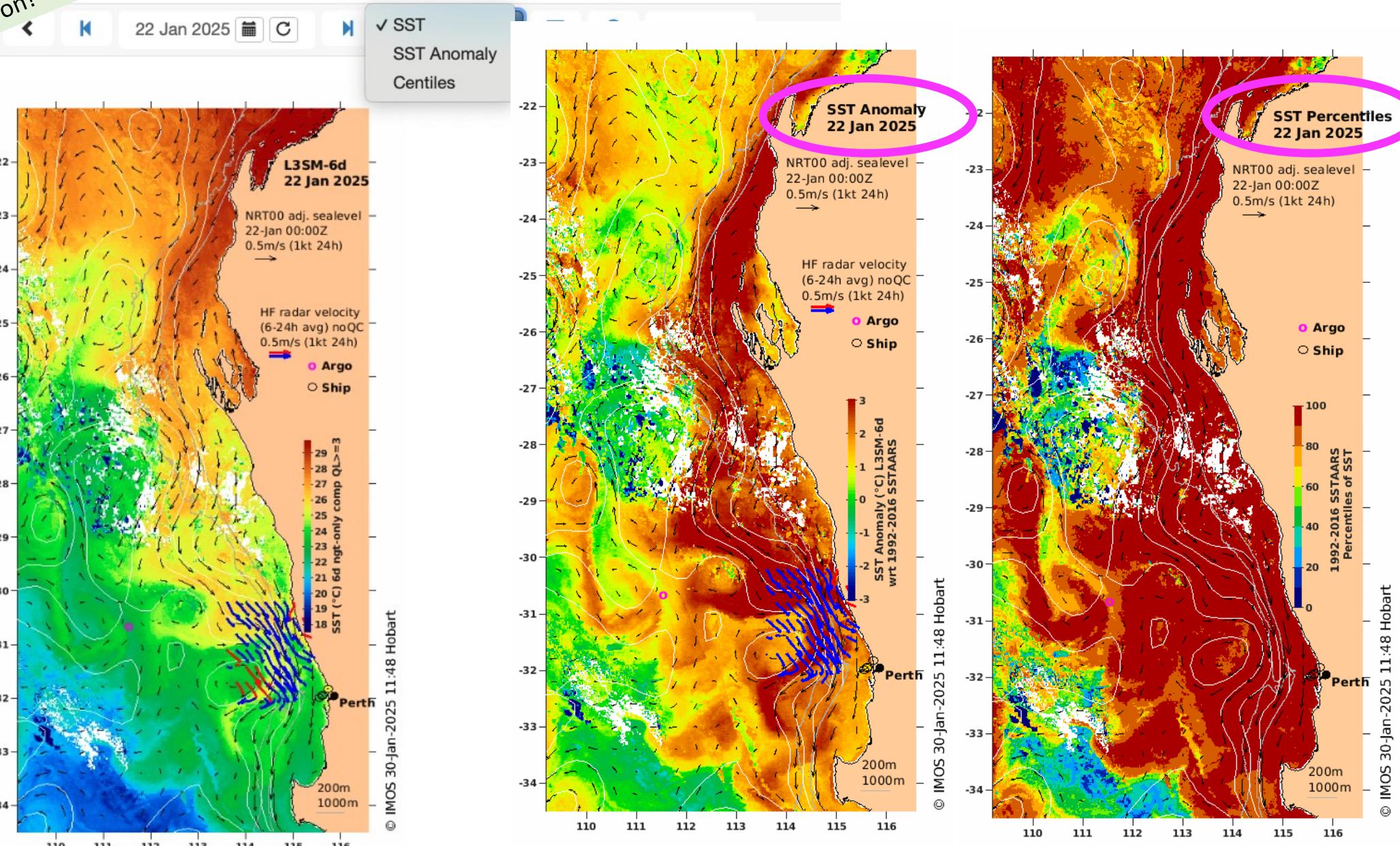
GSLA

SSTAARS

#### Legend

- Argo
- ◆ Glider
- Radar
- > Drifter
- Ship

Click for more



Case Study #1: A quick look into the ocean conditions off WA during the 24/25 summer

Select region

Snapshot SST

Four hour SST

6-Day SST &amp; Centiles

Climatology

SST Anom vs Time

Snapshot Chlorophyll-a

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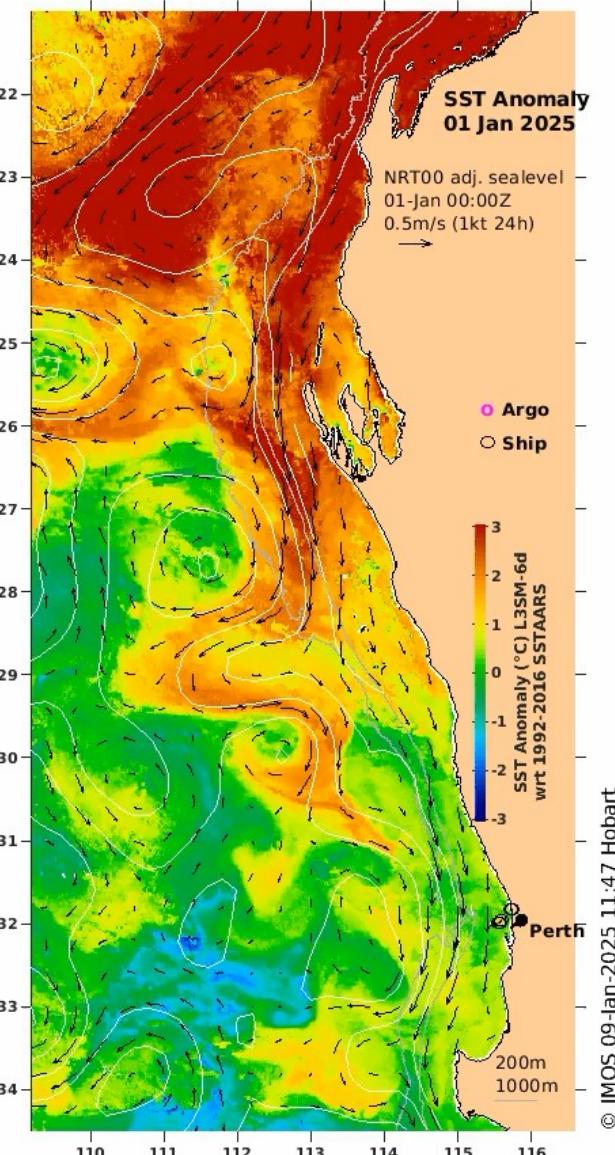
GSLA

SSTAARS

## Legend

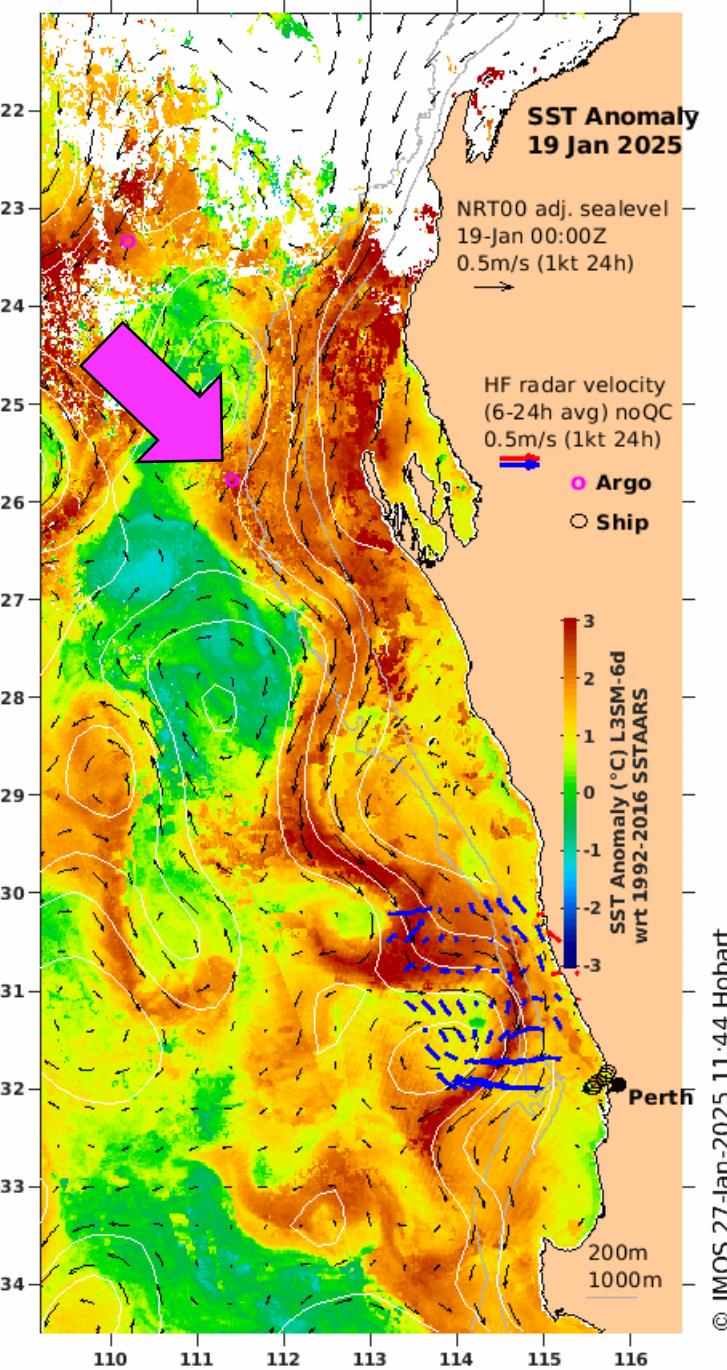
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- > Drifter
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Click for more information

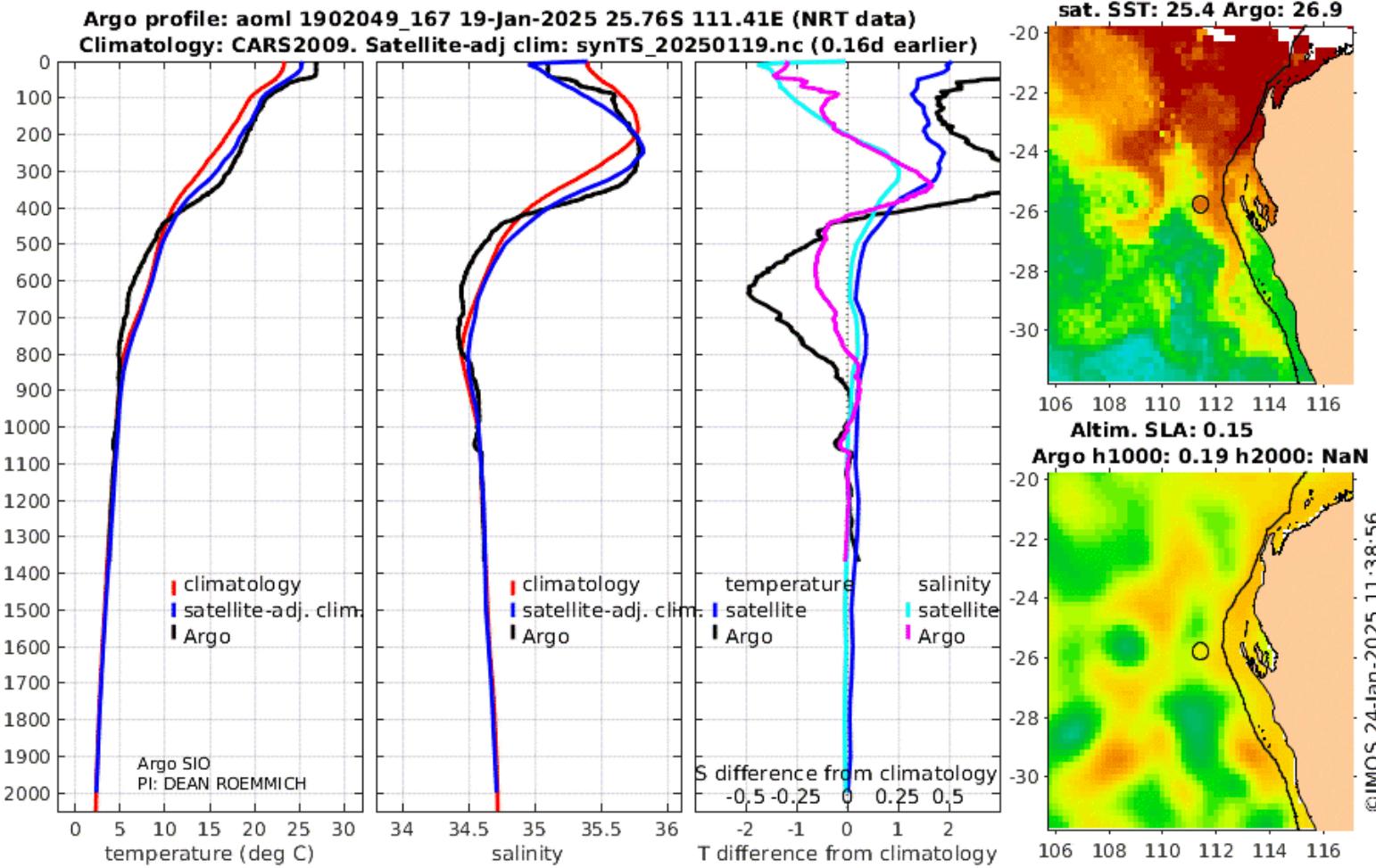
◀ ▶ 22 Jan 2025 📅 🕒 SST Anoma▴ ☰ 🔗 Permalink

Case Study #1: A quick look into the ocean conditions off WA during the 24/25 summer

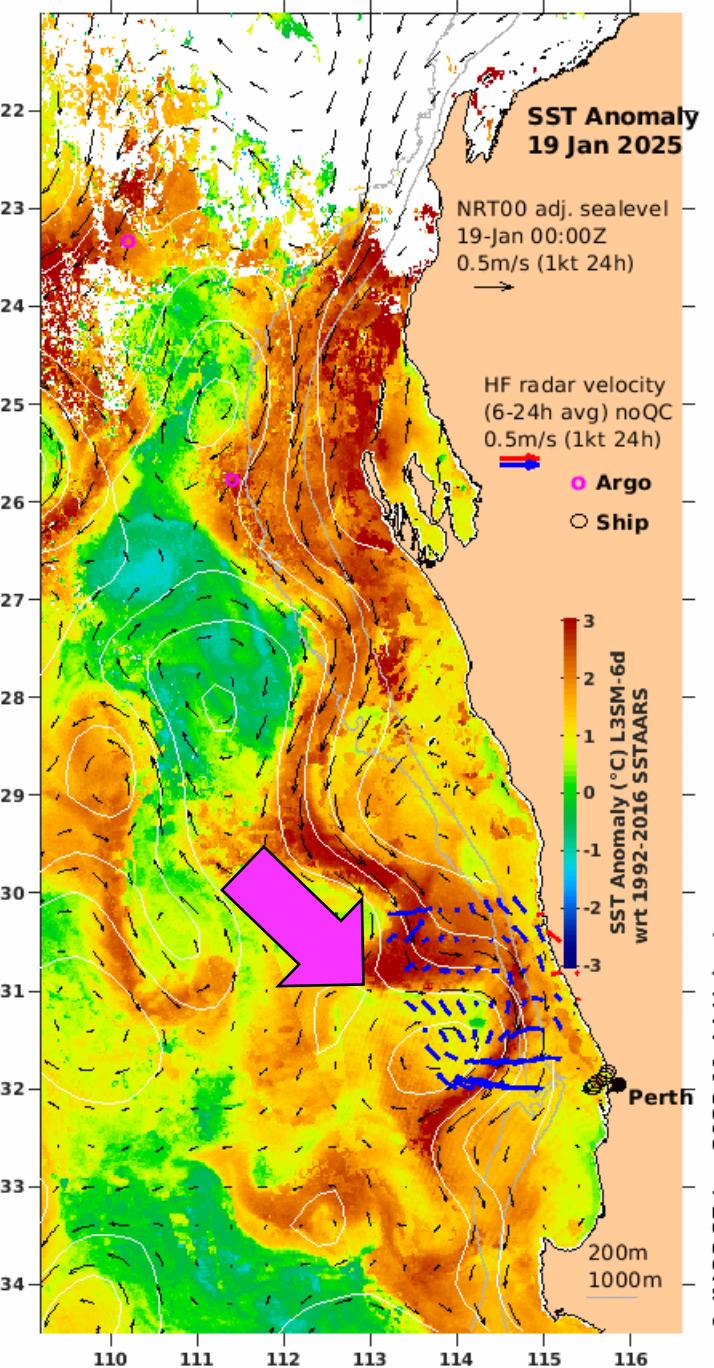
Case Study #1: A quick look into  
the ocean conditions off WA  
during the 24/25 summer



The figure also shows other data available:  
Argo floats & HF radar



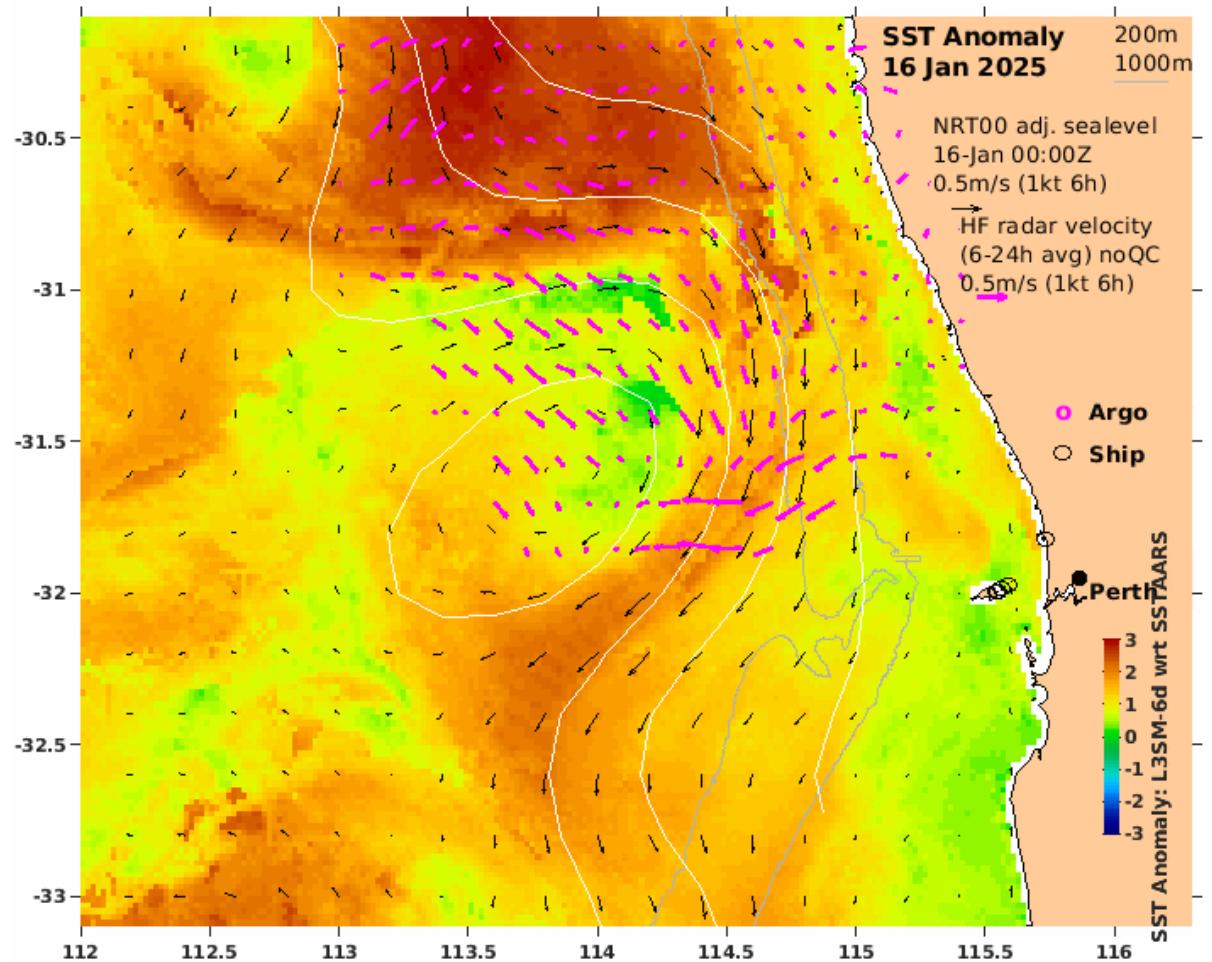
Case Study #1: A quick look into  
the ocean conditions off WA  
during the 24/25 summer



HF Radar data

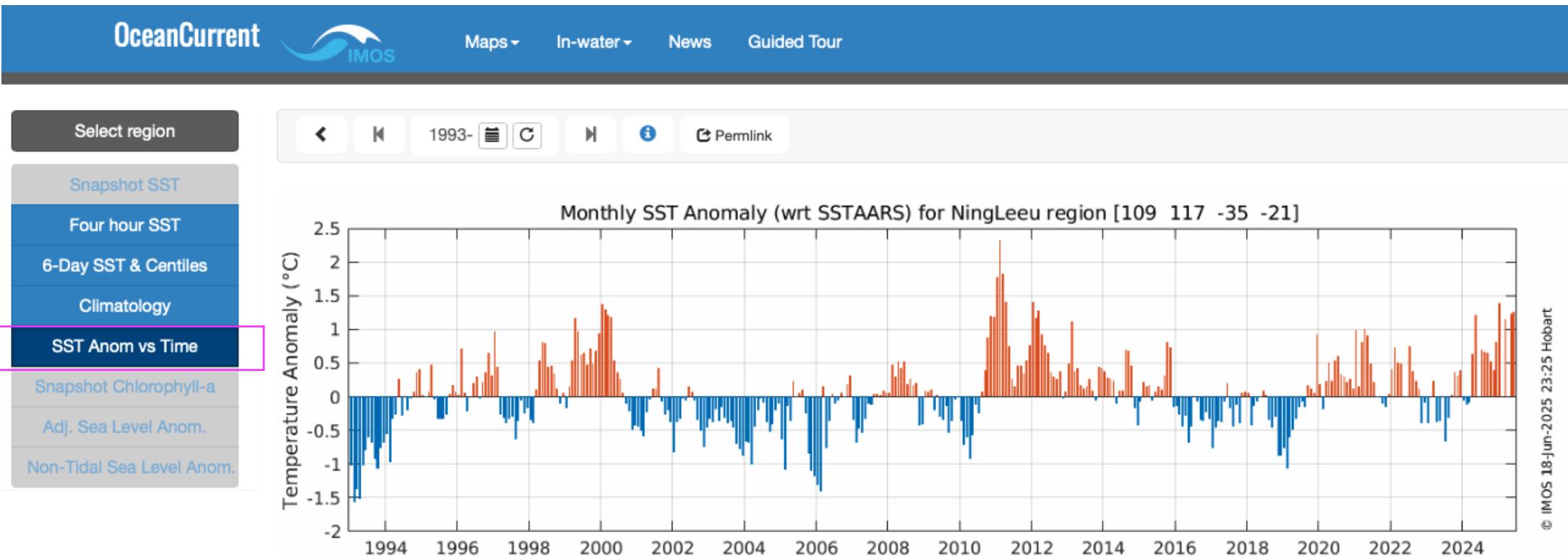
Surface Geostrophic velocity from  
map of adjusted sea level

SST filaments



# Q: Is the ocean off the west coast getting hotter?

Case Study #1: A quick look into the ocean conditions off WA during the 24/25 summer



# Q: Is the ocean off the west coast getting hotter?

OceanCurrent



Maps

In-water

News

Guided Tour

Select region

Snapshot SST

Four hour SST

6-Day SST & Centiles

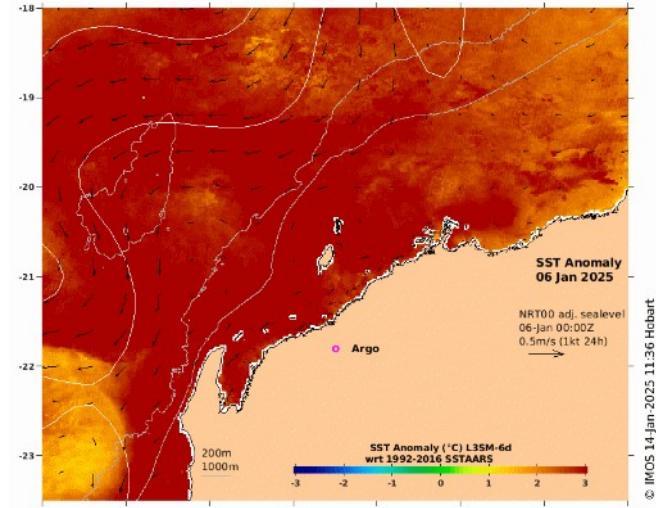
Climatology

SST Anom vs Time

Snapshot Chlorophyll-a

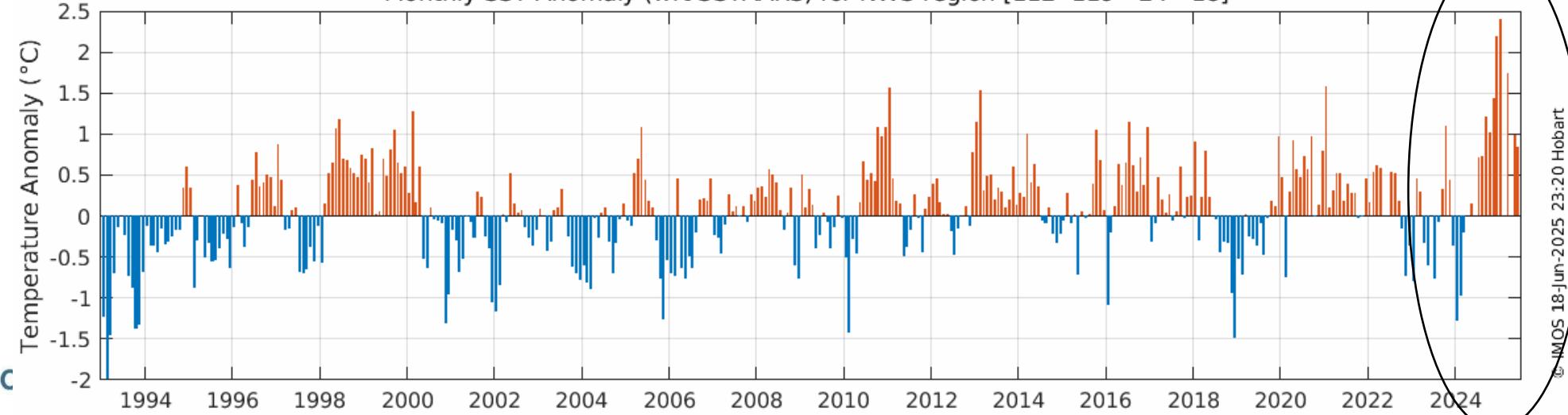
Adj. Sea Level Anom.

Non-Tidal Sea Level Anom.

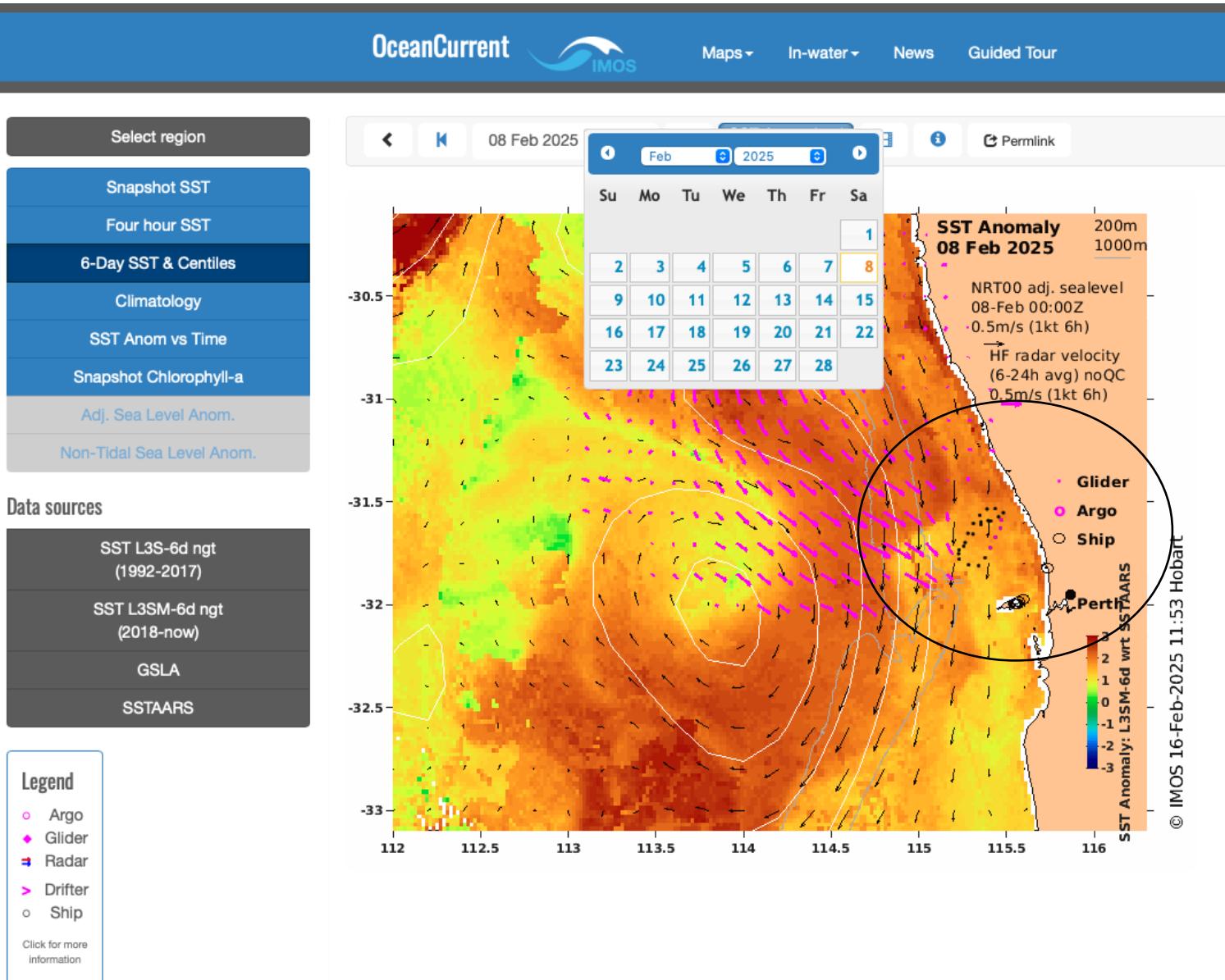


Q: What about Marine Heatwave metrics and Degree Heating Days? Both available at the AODN Portal!  
\*Tutorial this afternoon!\*

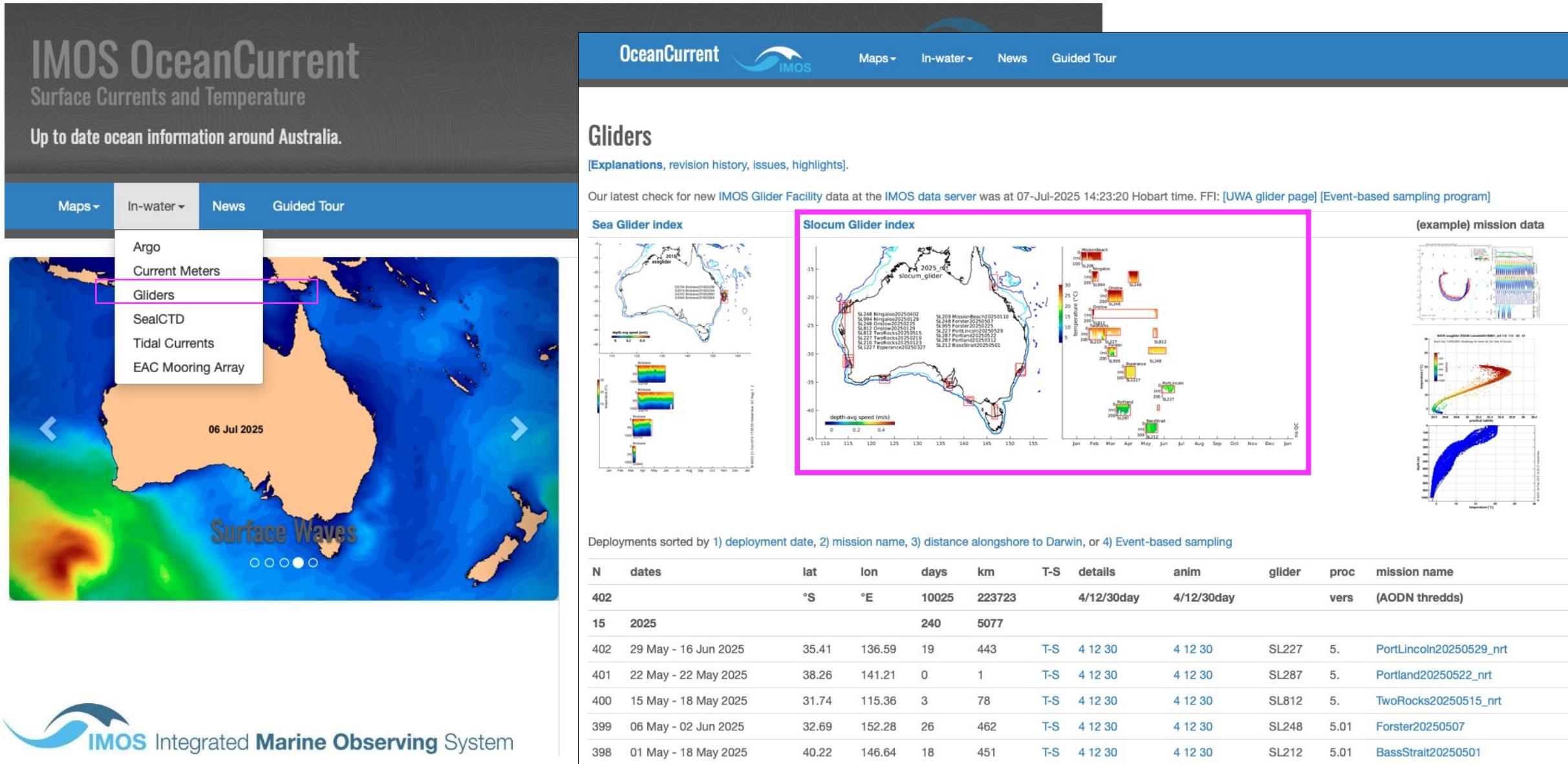
Monthly SST Anomaly (wrt SSTAARS) for NWS region [112 119 -24 -18]



## Q: Did we have any gliders in the water?



Q: Did we have any gliders in the water?



## Q: Did we have any gliders in the water?

OceanCurrent



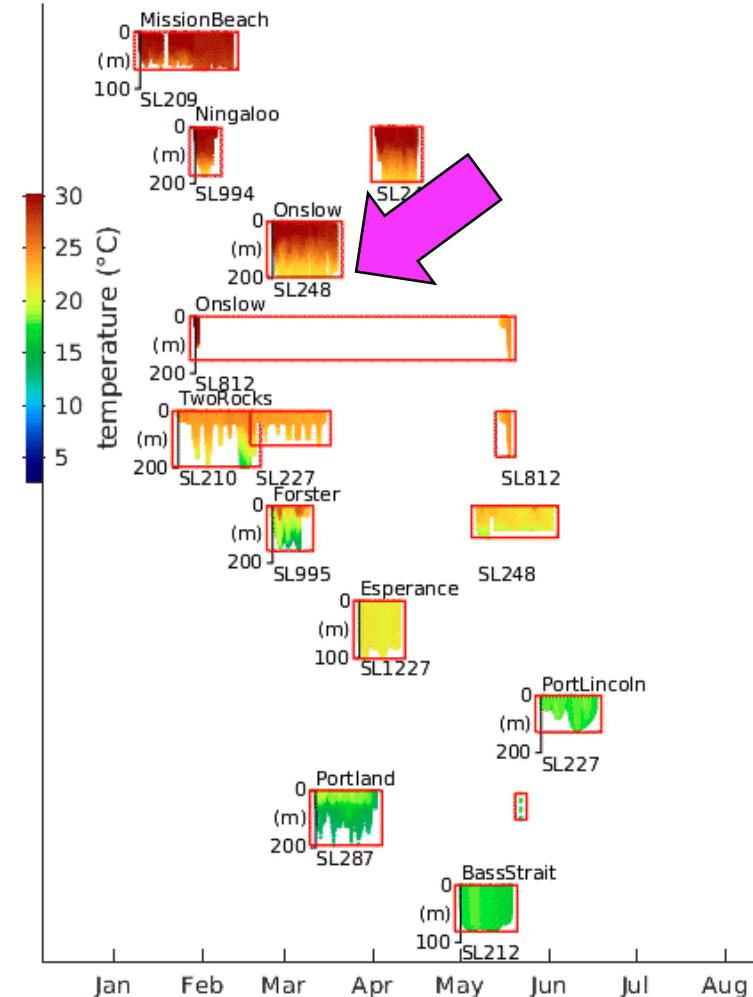
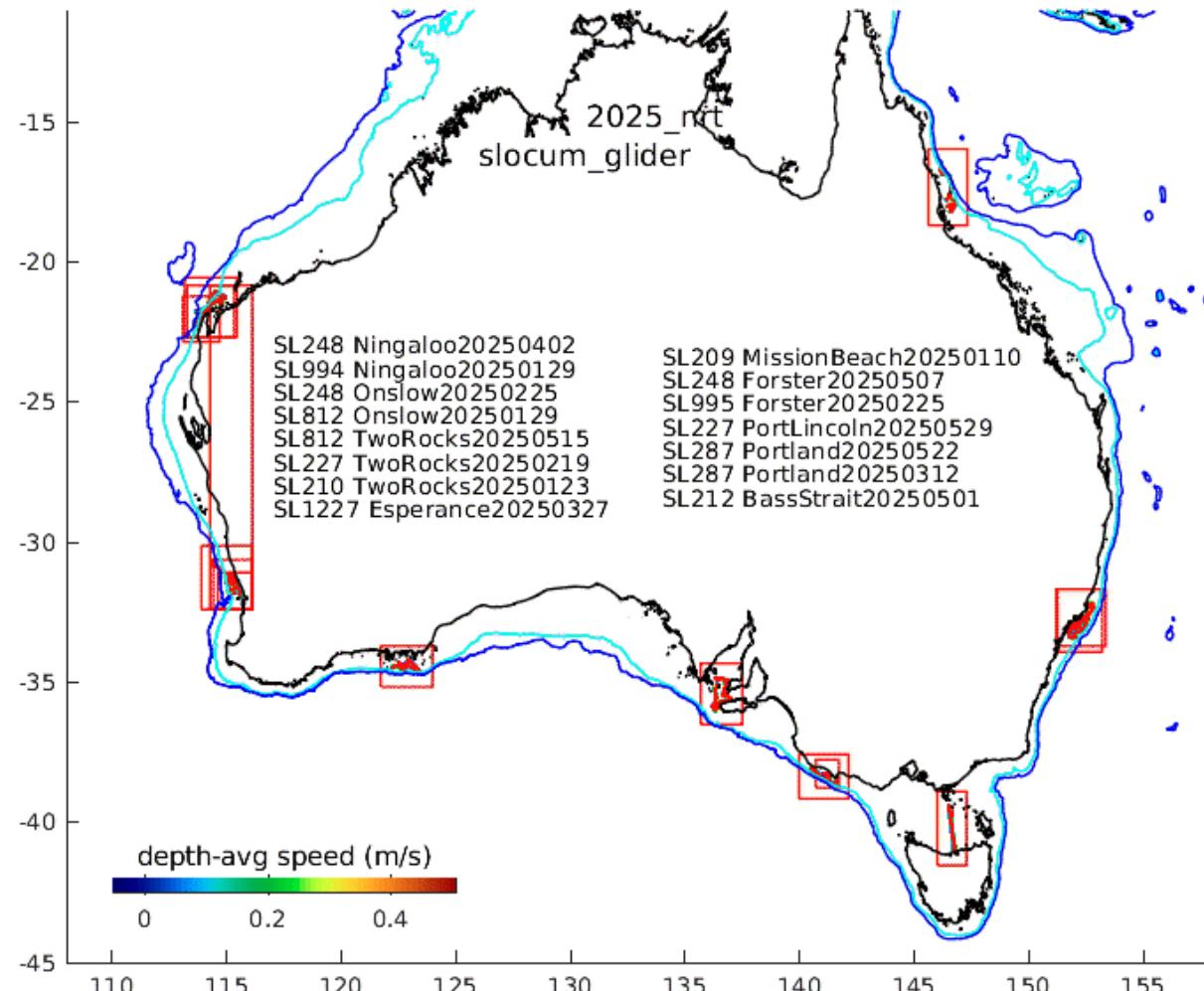
Maps ▾

In-water ▾

News

Guided Tour

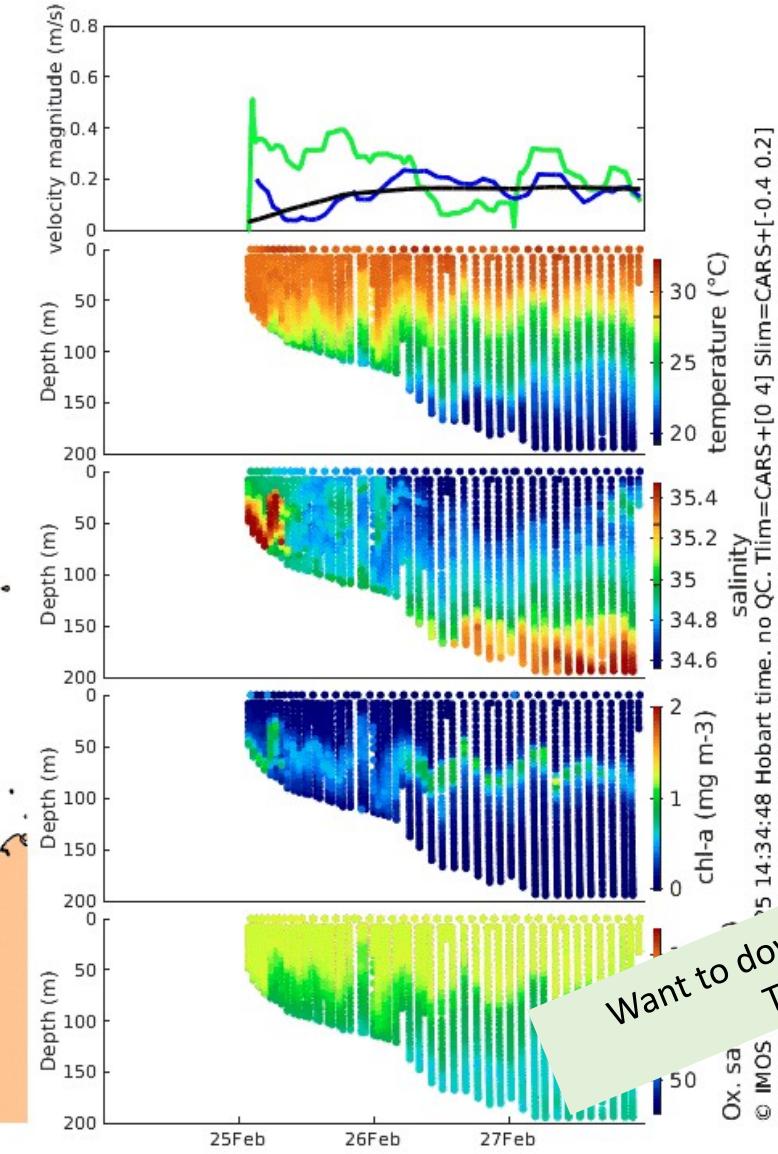
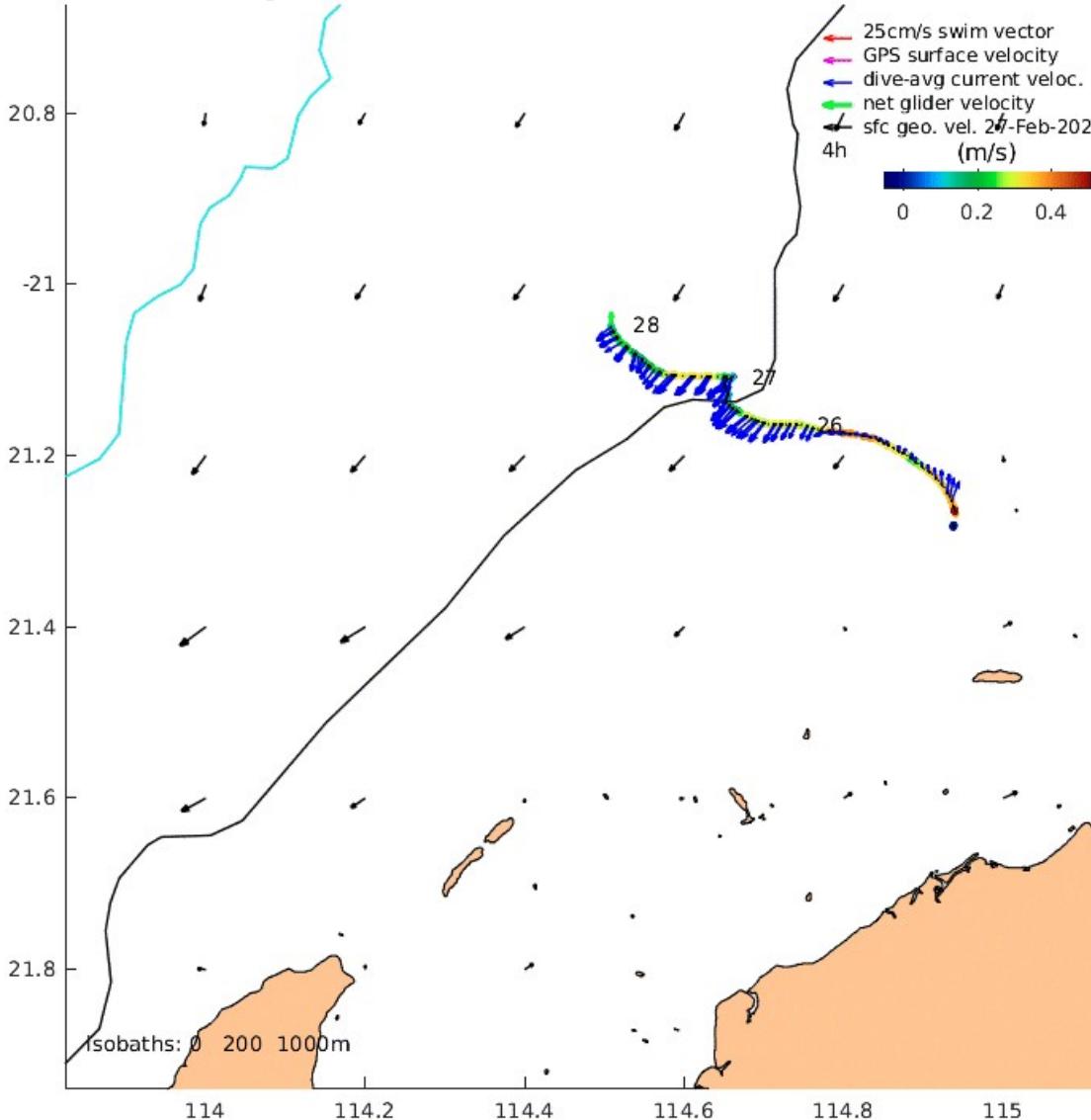
[Gliders] [sg] [sl] [temp] [tempa] [psal] [psala] [flu2] [doxy] [30d] [12d] [04d] [PREV]



# Q: Did we have any gliders in the water?

[PREV][NEXT][DATE INDEX]

**SL248 Onslow20250225 25-Feb 01Z to 27-Feb 23Z.**  
**Dist. over ground: 58km. Dist. swum: 63km. Mission DOG: 58km. Swum: 63km**



Want to download and analyse this data?  
Tutorial this afternoon!

# IMOS OceanCurrent

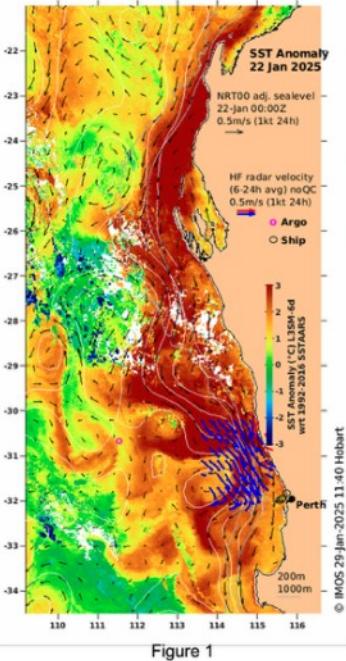
## Surface Currents and Temperature

Up to date ocean information around Australia.

Maps • In-water • News **Guided Tour**

### Marine Heatwave off WA

Gabriela S Pilo & David Griffin



30 January, 2025

The ocean off Western Australia is extremely hot right now (Figure 1). The monthly sea surface temperature (SST) off Australia's northwest was up to 2.5°C above the long-term mean over the past few months (Figure 2). That is 1°C above the previous summers maxima (Figure 2c). The event has been characterised as a Marine Heatwave (MHW), evolving from [category 1 \(moderate\)](#) to [3 \(severe\)](#) since September.

The high temperatures started in September, off Australia's NW. By November (Figure 3a), the SST exceeded 2°C above the seasonal mean (i.e., the average temperature for that time of the year, at that location). In that region, by December, the temperature was 3°C over the seasonal mean at the sea surface (Figure 3b), and 26°C waters were observed down to 100 metres by a glider off Onslow. An intense Leeuwin Current, accompanied by strong winds from tropical cyclone Sean, carried that hot water southward along the WA shelf break (Figure 3b, c).

Ocean temperatures within the Leeuwin current were up to 3°C above the seasonal mean (Figure 3c) near the surface. These anomalously high temperatures extended from the surface to 400 m off Shark Bay (25°S) and to 800 m off Jurien (30°S), as shown by Argo floats sampling the Leeuwin Current and its eddies. [Outside of the Leeuwin current](#), however, sub-surface temperatures are still within the climatological mean.

On the shelf, the IMOS' [Glider](#) and [Event-based](#) facilities have deployed three gliders to monitor this MHW. One glider is currently off Perth doing a routine on-off shelf transect, and two other were deployed off Onslow, [one](#) doing on-off shelf transects, and [the other](#) sampling southward along the Ningaloo Coast to be collected in Shark Bay.

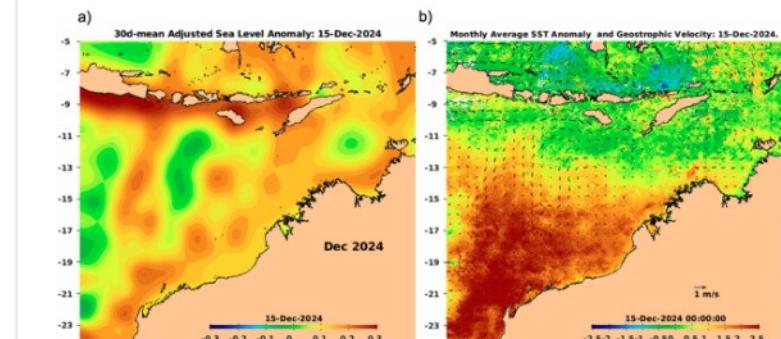
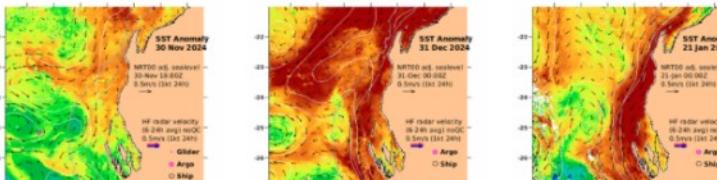
This year's MHW has a different onset and timing than the 2011 WA MHW, which had devastating effects in kelp, seagrass, and coral reef ecosystems. However, it has already impacted local marine life due to thermal stress, including 30,000 dead fish washing ashore [off the Pilbara Coast](#). The extent of coral bleaching and further impacts are still being assessed.

Possible causes for the current MHW off WA include a combination of local and remote air-sea interactions, anomalously weak winds in the NW shelf, and a strong Leeuwin Current bringing the anomalous heat southward.

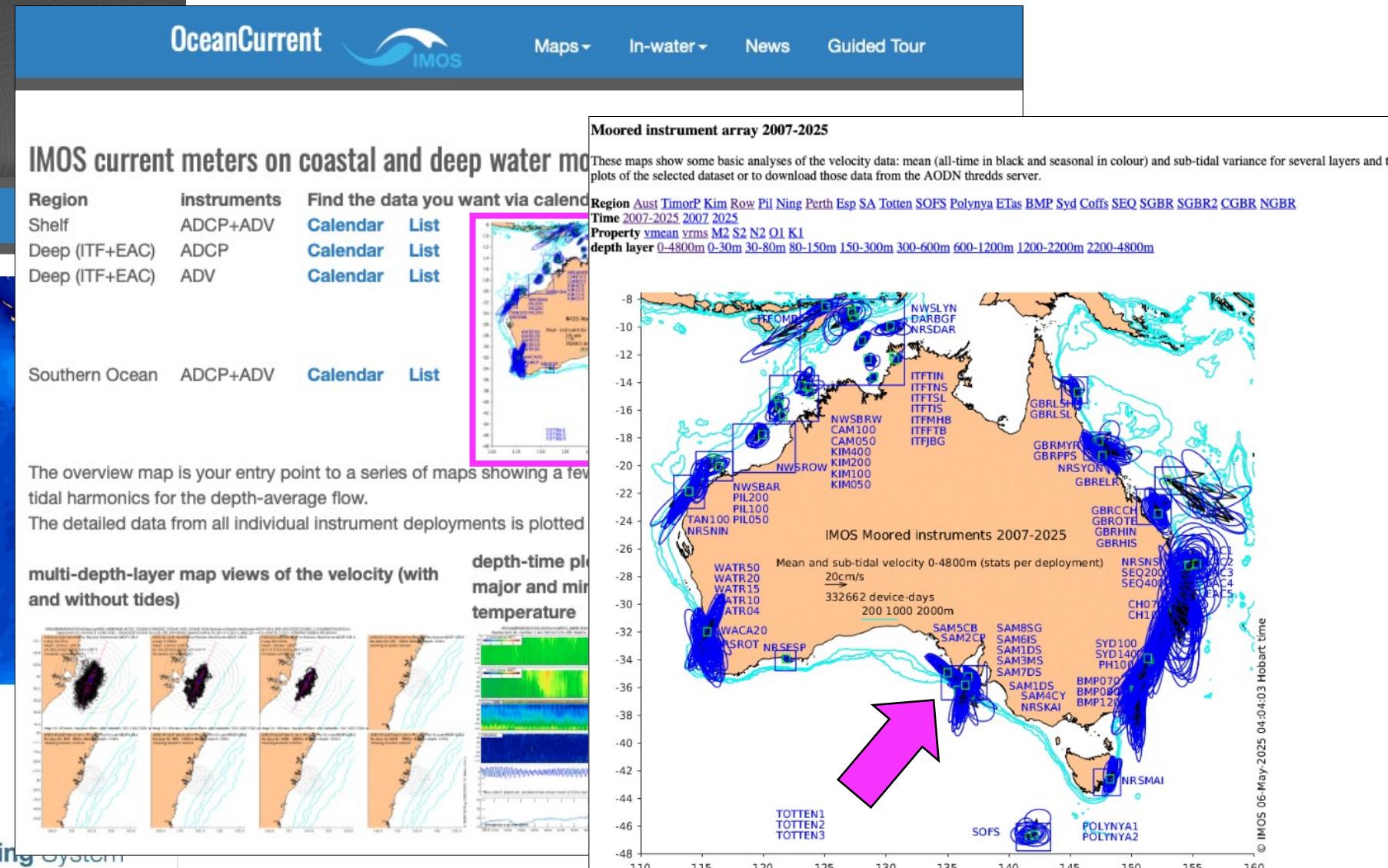
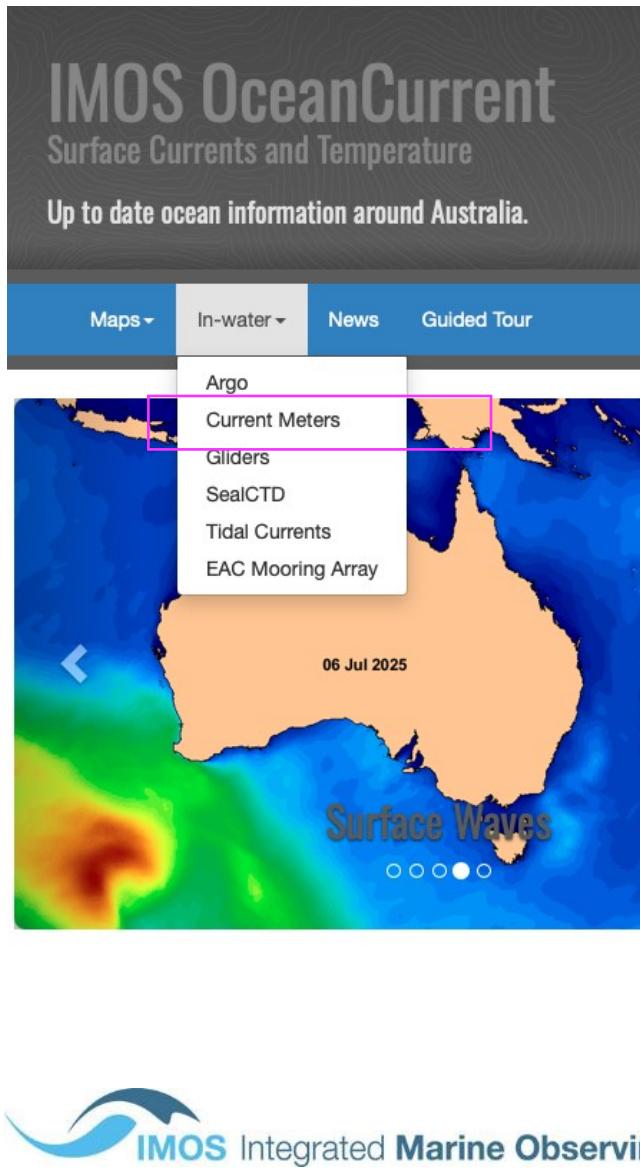
The SST in some regions off WA were exceeding the range we had set in our maps. We have now changed the range of the colourbar in [some](#) of our regions off WA for better visualization.

Integrated Marine Observing System

Case Study #1: A quick look into the ocean conditions off WA during the 24/25 summer  
Want to learn more?



## Case Study #2: How's the ocean circulation near Kangaroo Island?



# Moored instrument array 2007-2025

These maps show some basic analyses of the velocity (mean in black and seasonal in colour) and sub-tidal variance for several locations in the AODN thredds server.

Region [Aust](#) [Timor](#) [P](#) [Kim](#) [P](#)  
Time [2007-2025](#) [2007](#)  
Property [vme](#)  
depth [80-150m](#) [150-300m](#) [300-600m](#) [600-1200m](#) [1200-2200m](#) [2200-4800m](#)

Want to download and analyse this data?  
Tutorial this afternoon!

[Voten](#) [SOFS](#) [Polynya](#) [ETas](#) [BMP](#) [Syd](#) [Seq](#) [SGBR](#) [SGBR2](#) [CGBR](#) [NGBR](#)

[80-150m](#) [150-300m](#) [300-600m](#) [600-1200m](#) [1200-2200m](#) [2200-4800m](#)

IMOS Moored instruments 2007-2025 Mean and sub-tidal velocity 0-4800m (stats per depth)

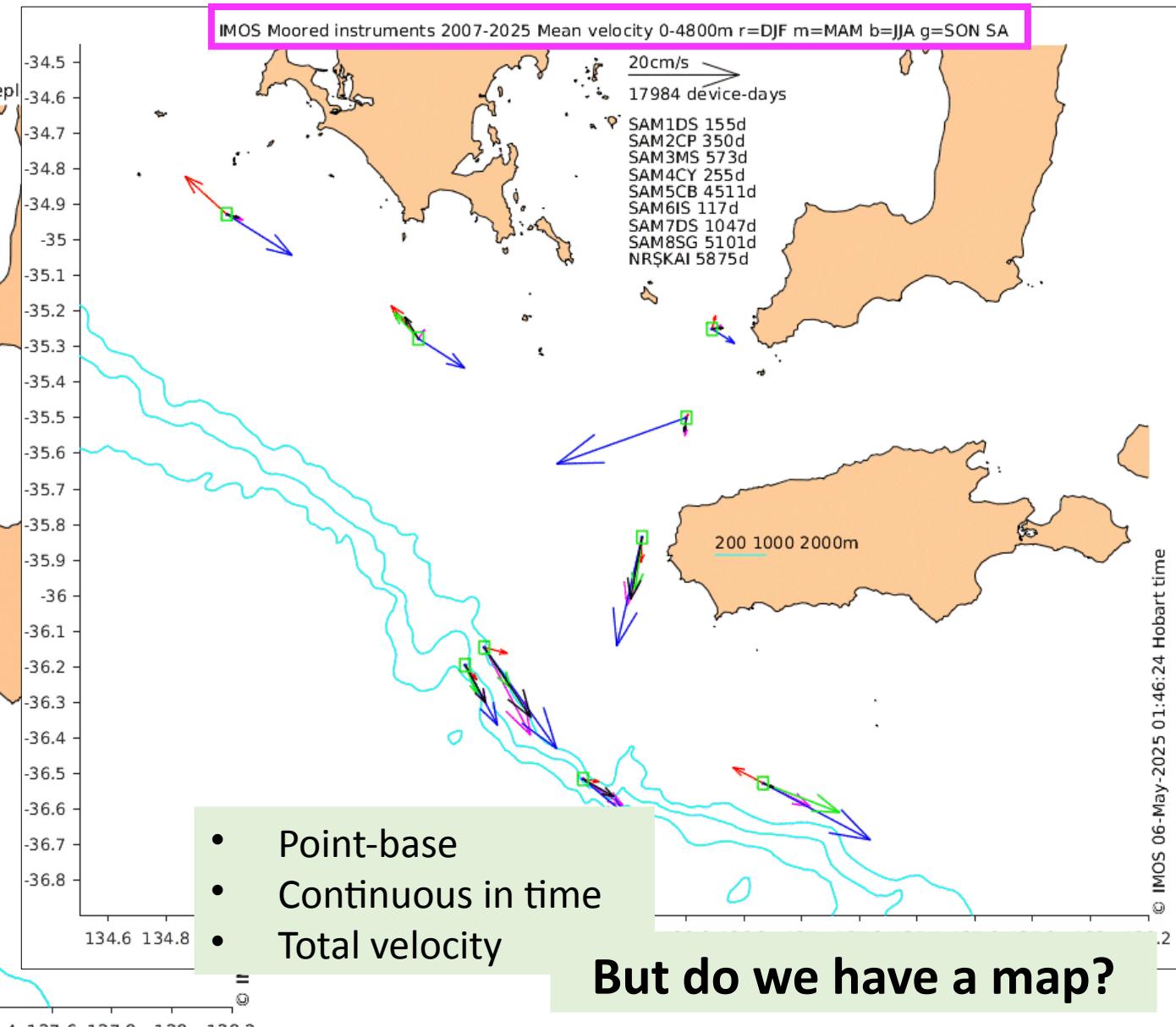
20cm/s →  
17984 device-days

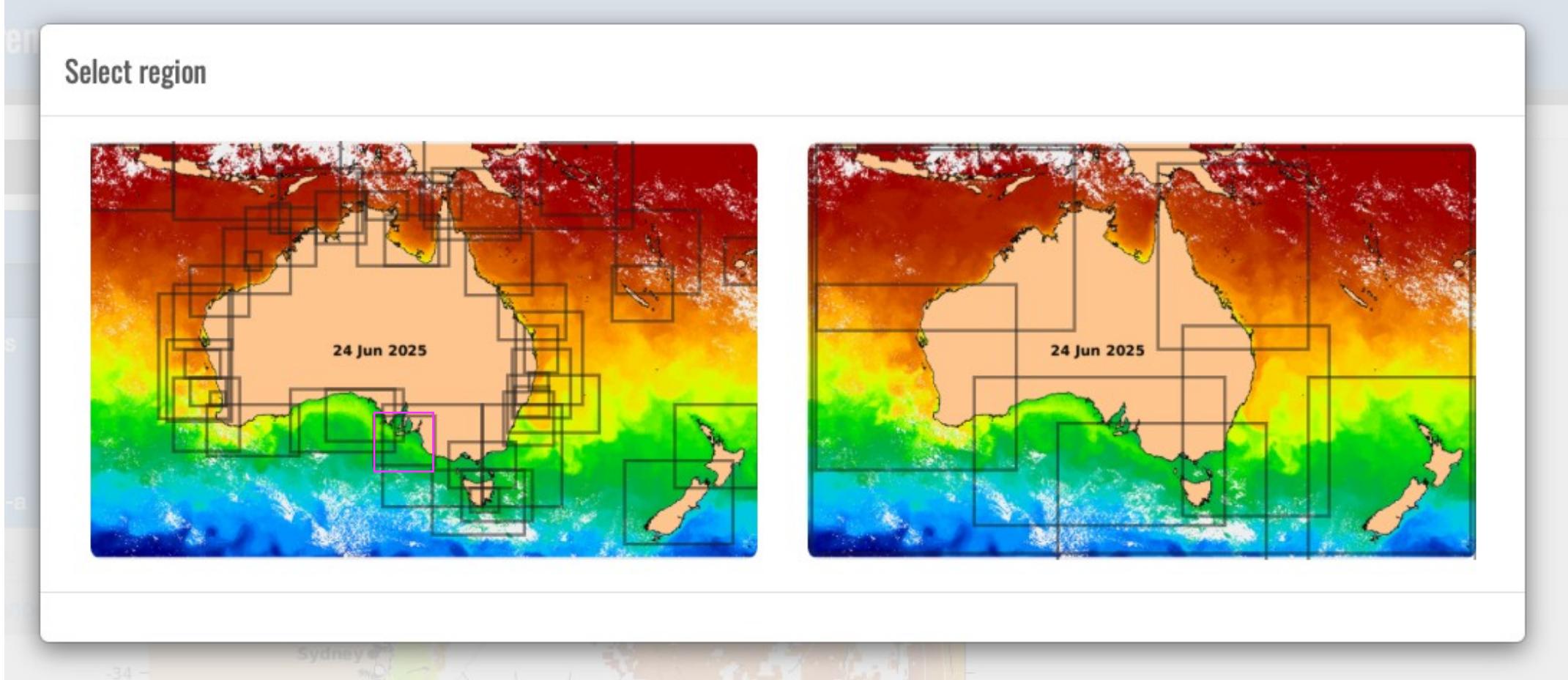
SAM1DS 155d  
SAM2CP 350d  
SAM3MS 573d  
SAM4CY 255d  
SAM5CB 4511d  
SAM6IS 117d  
SAM7DS 1047d  
SAM8SG 5101d  
NRSKAI 5875d

200 1000 2000m

-34.6 -34.7 -34.8 -34.9 -35.0 -35.1 -35.2 -35.3 -35.4 -35.5 -35.6 -35.7 -35.8 -35.9 -36.0 -36.1 -36.2 -36.3 -36.4 -36.5 -36.6 -36.7 -36.8

134.6 134.8 135 135.2 135.4 135.6 135.8 136 136.2 136.4 136.6 136.8 137 137.2 137.4 137.6 137.8 138 138.2





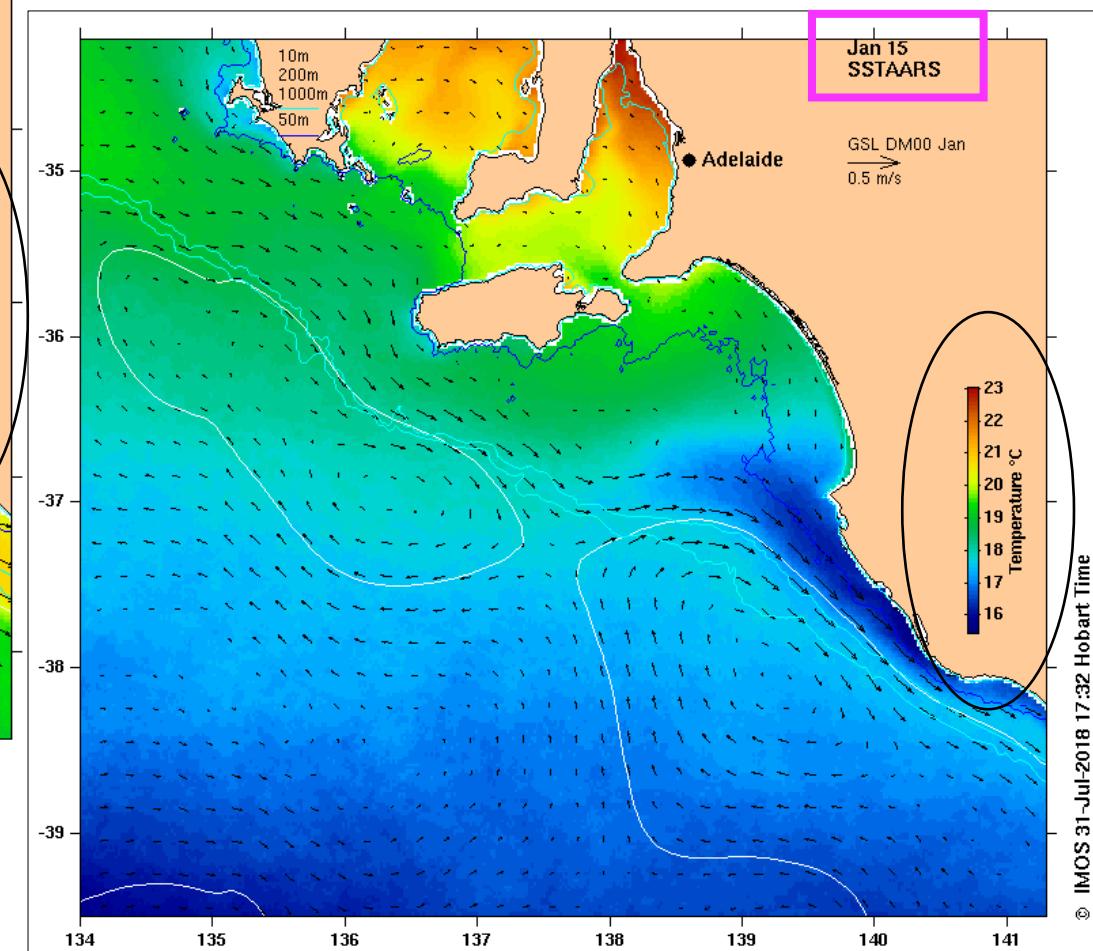
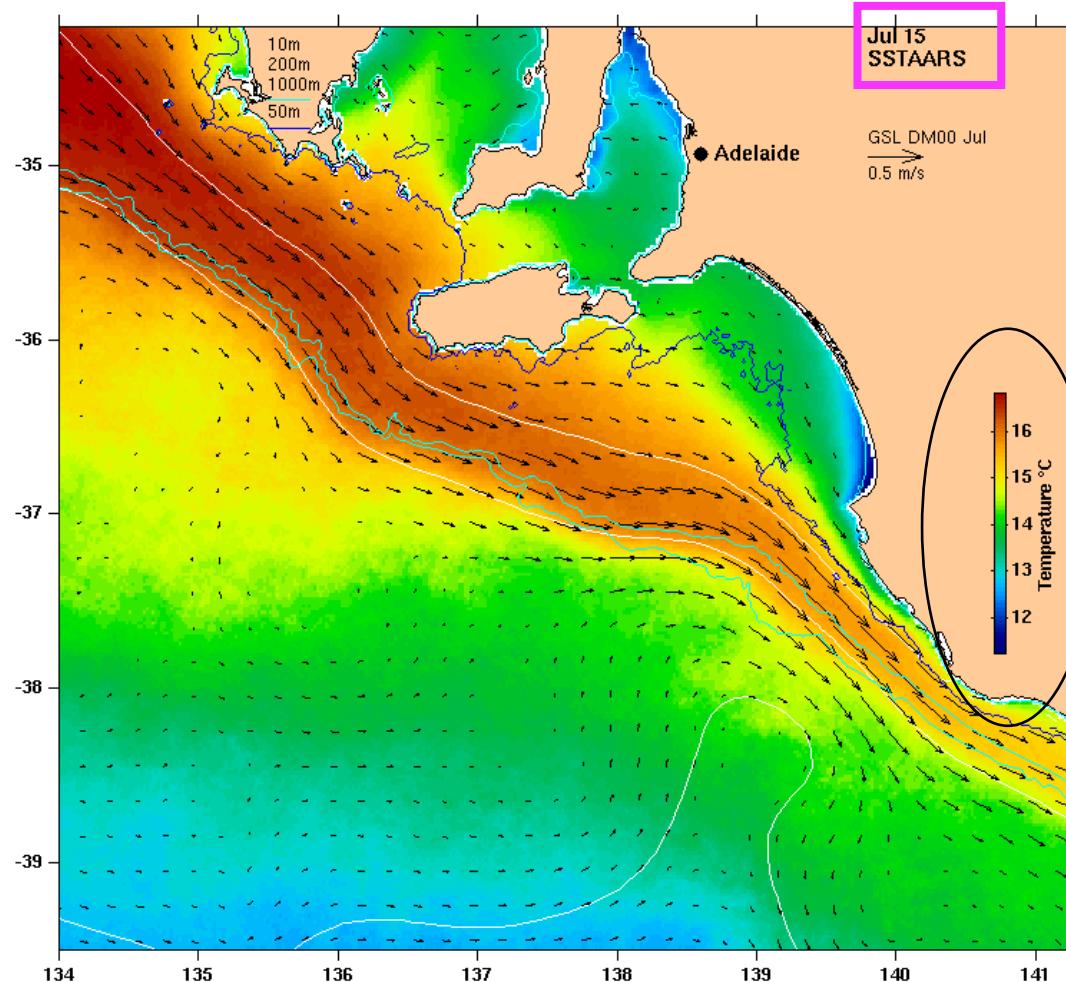
Select region

- Snapshot SST
- Four hour SST
- 6-Day SST & Centiles
- Climatology**
- SST Anom vs Time
- Snapshot Chlorophyll-a
- Adj. Sea Level Anom.
- Non-Tidal Sea Level Anom.

Data sources

SSTAARS

◀ ⏪ Jul ⏩ C SST ⓘ Permalink



Do we have in-situ biological observations?  
Yes!

Go to the Biological Ocean Observer (BOO) website

Select region

C

2024/01/22 05:00 Z

C

Chl-A

A

B

I

P

Permalink

Climatology

SST Anom vs Time

Snapshot Chlorophyll-a

Adj. Sea Level Anom.

Non-Tidal Sea Level Anom.

## Legend

Argo

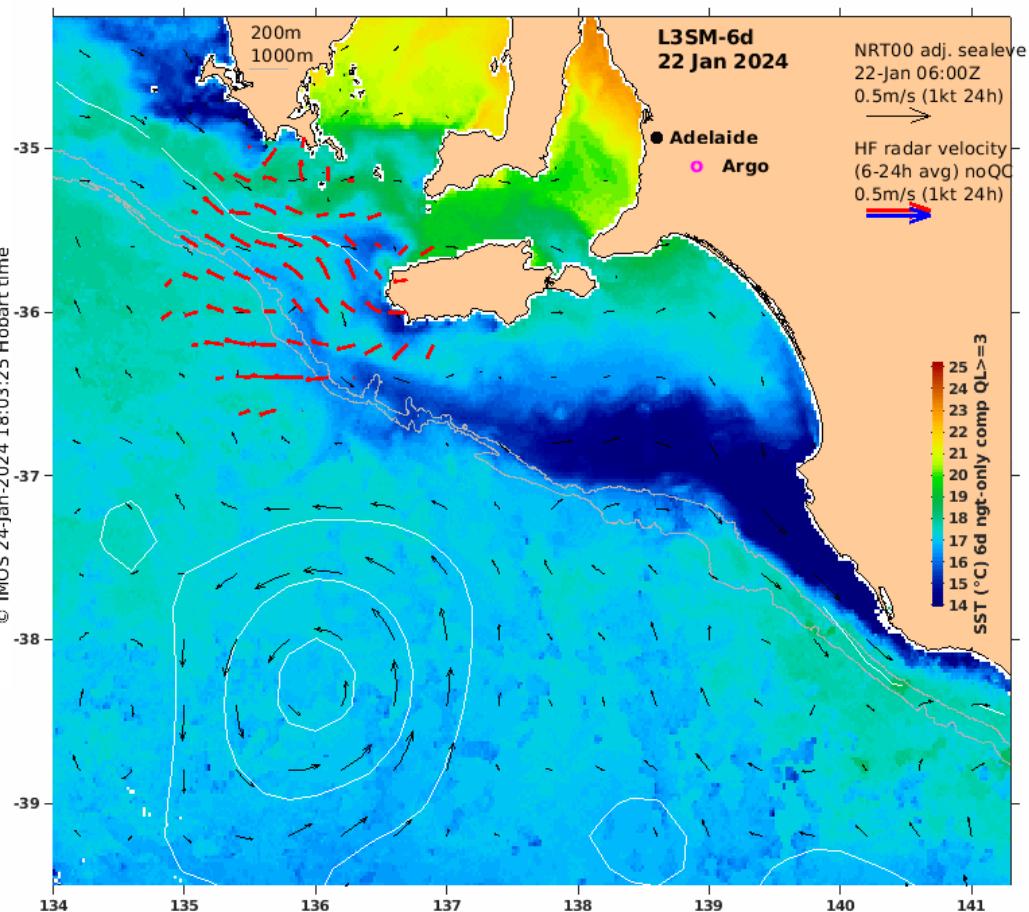
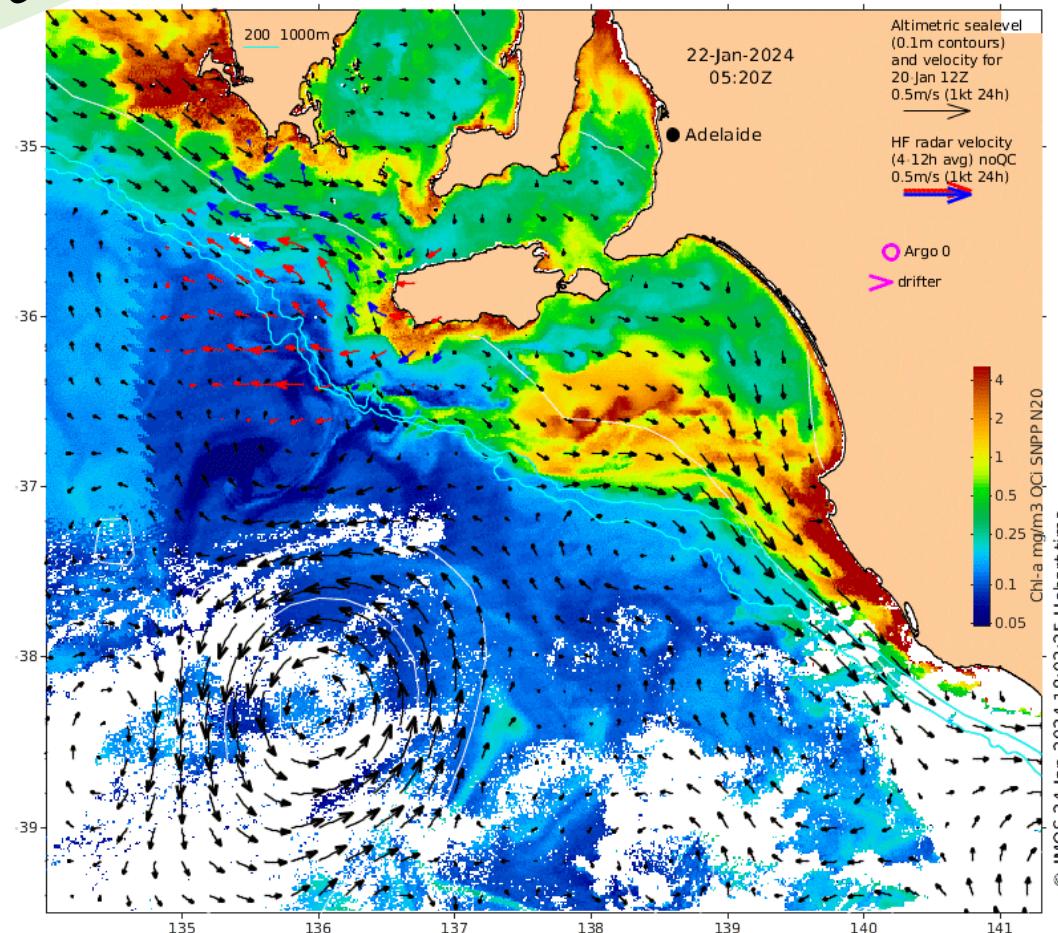
Glider

Radar

Drifter

Ship

Click for more information



# IMOS OceanCurrent

Surface Currents and Temperature

Up to date ocean information around Australia.

Maps ▾ In-water ▾ News Guided Tour

## A Bonney Bloom

Gabriela S. Pilo, Larissa Patrício-Valerio, and Edward King  
2 February, 2024

Late last year we took note of the persistent upwelling along the Bonney Coast. Indeed, the ocean conditions led to a phytoplankton bloom (Figure 1). The high resolution of ocean colour imagery provided by the MODIS sensor onboard the Aqua satellite allows us to see a trio of beautiful sub-surface eddies in the rotating filaments in the ocean colour image, but also provide vertical exchanges of properties between the surface and the deep ocean. Each eddy in the trio is roughly 18 km in diameter, so we cannot see their signature in our surface geostrophic velocity maps (black arrows) as we cannot resolve these sub-mesoscale features.

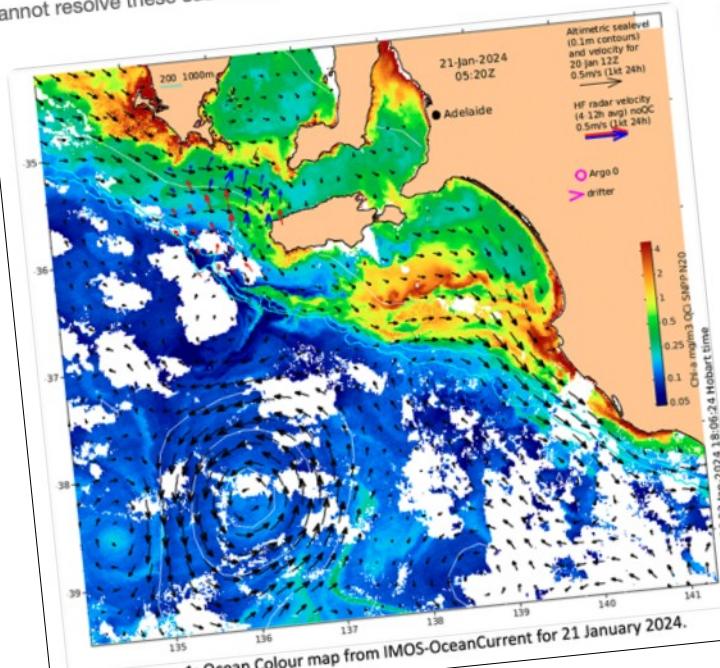


Figure 1: Ocean Colour map from IMOS-OceanCurrent for 21 January 2024.

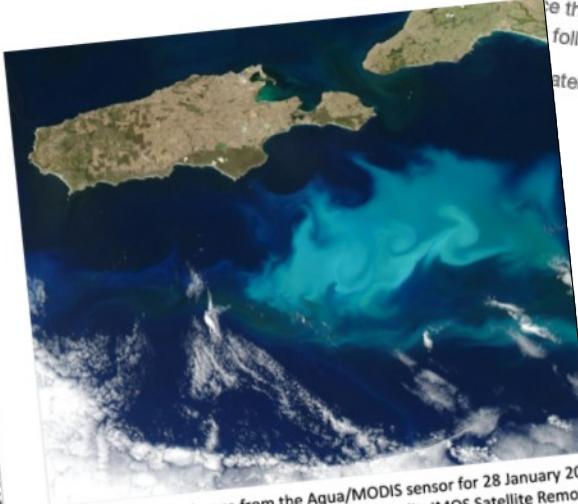


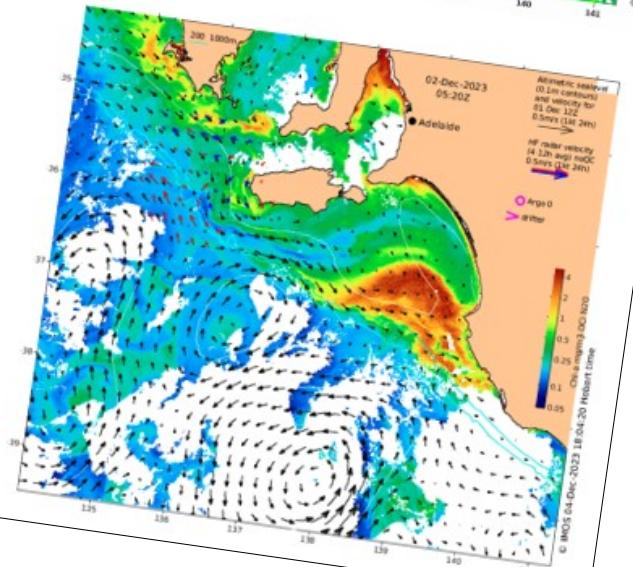
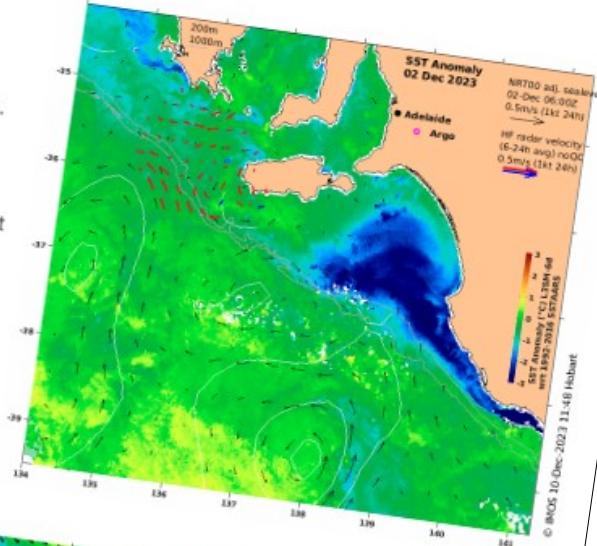
Figure 2: True color image from the Aqua/MODIS sensor for 28 January 2024. Kangaroo Island (South Australia); credit: IMOS Satellite Remote

An early Bonney upwelling  
Hugo Bastos de Oliveira and Jessica Benthuysen  
11 December, 2023  
Intense south-easterly storms have recently hit South Australia's coast, causing strong upwelling events along the Bonney coast.

The Bonney upwellings are...  
providing a favourable environment for phytoplankton to grow.

events, with cold, nutrient-rich bottom waters rising to the surface, allowing phytoplankton to grow. We've described the Bonney upwelling at IMOS-OceanCurrent since it started in 2020, and when it was observed by an ocean glider in 2016. That it is so strong so early in the season. Bonney upwelling events after is not yet stratified.

events, last between 5 and 10 days. This year, the first upwelling event upwelling we've seen over the past week are likely the lowest extreme is seen in our maps of SST centiles, where the SST of the record (1993-2016). The spatial extent of this event was also large till March next year. It's likely that the positive ENSO and the following events, leading to stronger temperature anomalies. satellite imagery we'll see as a result,



Case Study #2: How's the ocean circulation near Kangaroo Island?

## Want to learn more? Guided Tour News items

# IMOS OceanCurrent

## Surface Currents and Temperature

Up to date ocean information around Australia.

Maps ▾

In-water ▾

News

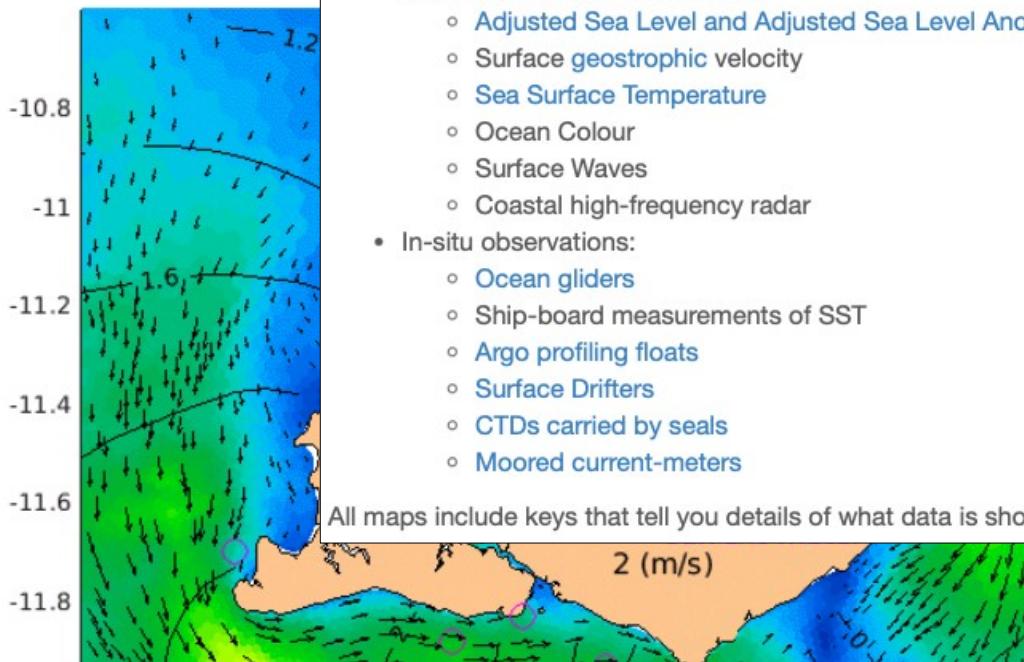
Guided Tour

### When is slack tide?

David Griffin

2 September, 2023

Slack tide is when the tidal current turns from flooding to ebbing, or vice versa. If you need to conduct an operation during the period of weakest tidal current, this is when to do it. But published predictions of slack tide timings are very few, and there is no universal rule of thumb relating the timing of slack tide to the timing of high or low tide. For the case of a narrow strait leading into a large bay, slack tide in the strait occurs close to the times of high and low tide within the bay. In many places, however, it is far less clear, and slack tide occurs at different times in nearby places. In Clarence Strait (between Darwin and Melville Island), for example, slack tide is half way between high and low tide at Darwin. Stepping through [our maps of tidal current speed](#) is one way to find the approximate time of slack tide at an arbitrary location. We are working on a way to estimate slack tide more precisely at any location, but in the mean time,



### IMOS-OceanCurrent maps: What's shown?

The IMOS OceanCurrent maps are divided into three categories, according to their spatial scale: [local regions](#), [state regions](#), and the [whole continent](#). These combinations of satellite-derived datasets and in-situ datasets, in ways appropriate to the scale of the map. The datasets included are:

- Remotely-sensed observations:
  - [Adjusted Sea Level and Adjusted Sea Level Anomaly](#)
  - [Surface geostrophic velocity](#)
  - [Sea Surface Temperature](#)
  - [Ocean Colour](#)
  - [Surface Waves](#)
  - [Coastal high-frequency radar](#)
- In-situ observations:
  - [Ocean gliders](#)
  - [Ship-board measurements of SST](#)
  - [Argo profiling floats](#)
  - [Surface Drifters](#)
  - [CTDs carried by seals](#)
  - [Moored current-meters](#)

All maps include keys that tell you details of what data is shown. Here we explain how to interpret those keys, using the three spatial scales.



[Gabriela.semolinipilo@csiro.au](mailto:Gabriela.semolinipilo@csiro.au)  
<http://oceancurrent.imos.org.au> 



Australia's Integrated Marine Observing System is enabled by the National Collaborative Research Infrastructure Strategy (NCRIS). It is operated by a consortium of institutions as an unincorporated joint venture, with the University of Tasmania as Lead Agent.

## PRINCIPAL PARTICIPANTS



(Lead Agent)



Government of South Australia



SARDI  
SOUTH AUSTRALIAN  
RESEARCH AND  
DEVELOPMENT  
INSTITUTE

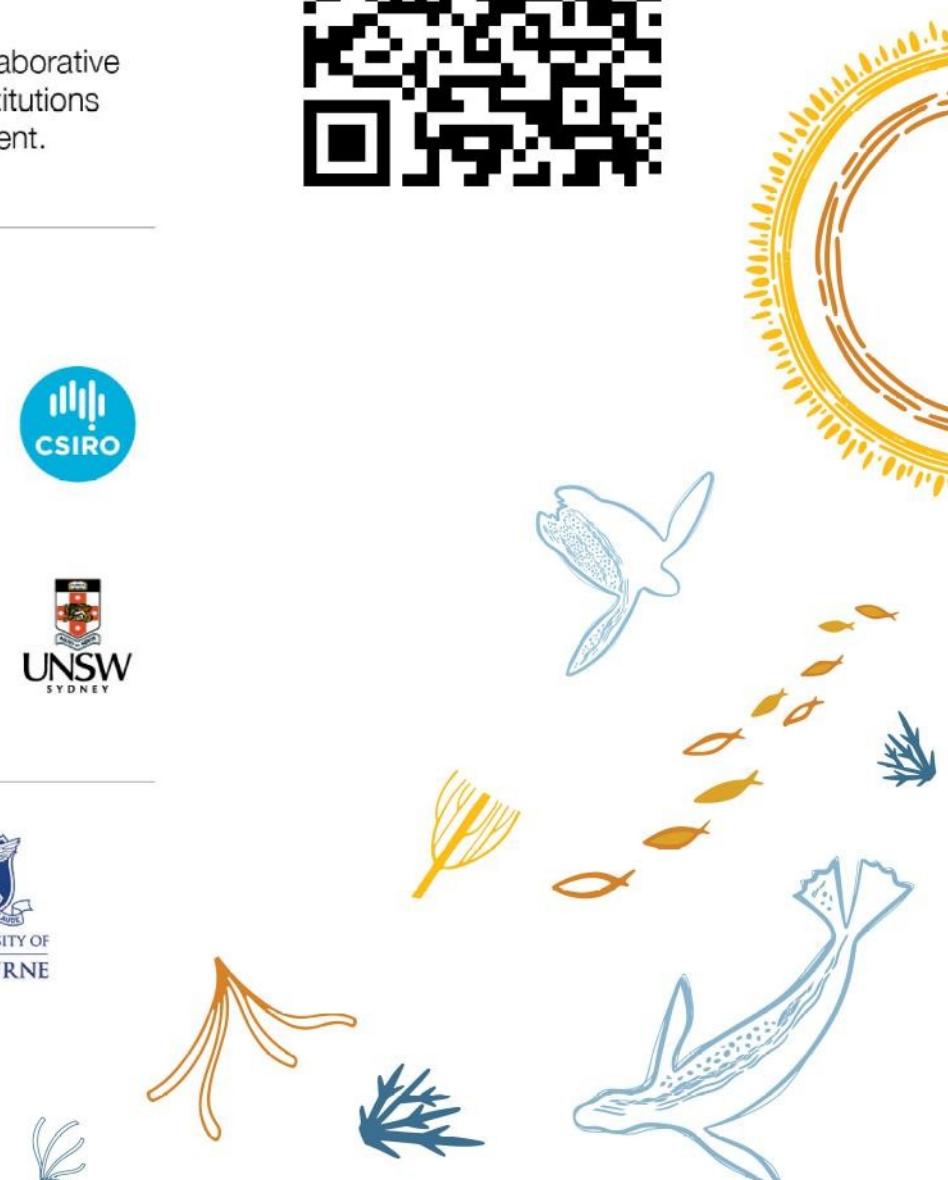


SIMS is a partnership involving four universities

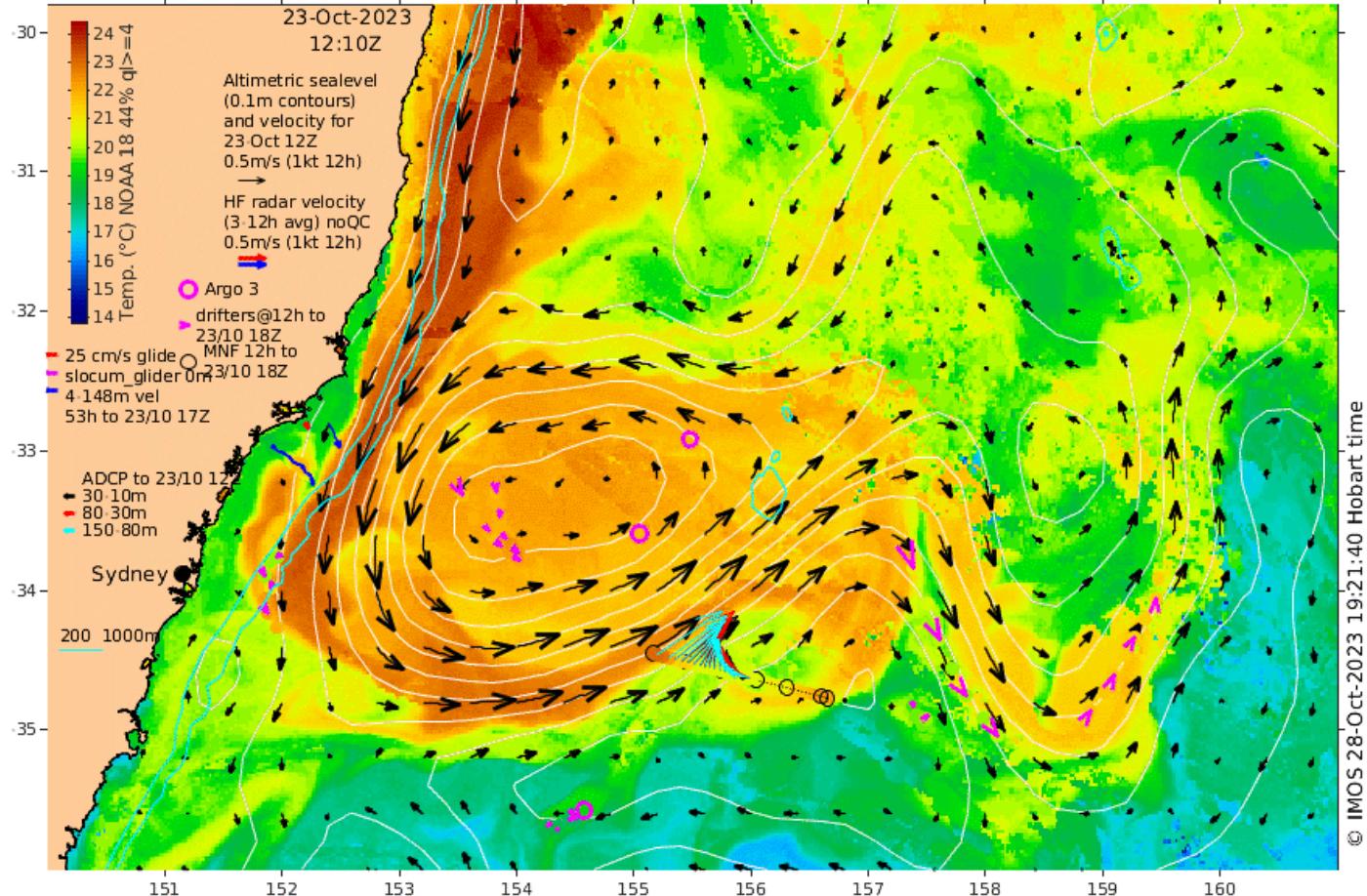
## ASSOCIATE PARTICIPANTS



IMOS thanks the many other organisations who partner with IMOS, providing co-investment, funding and operational support, including investment from the Tasmanian and Western Australian Governments.







Satellite Sea Surface Temperature (IMOS-Satellite Remote Sensing)

Surface geostrophic currents from gridded satellite altimetry (IMOS-OceanCurrent)

Surface Drifters (NOAA's Global Drifter Program)

RV Investigator location & in-situ temp (MNF)



Argo floats (IMOS-Argo, IMOS-BGC Argo, IMOS-Deep Argo)

Glider (IMOS-Ocean Gliders)

Shipboard ADCP data (MNF)

# How to find the data used to make the figure?

OceanCurrent



Catalog <https://thredds.aodn.org.au/thredds/catalog/IMOS/SRS/SST/ghrsst/L3S-6d/ngt/catalog.html>

## Dataset

## Size



ngt



1992/



1993/



1994/



1995/



1996/



1997/



1998/



1999/



2000/



2001/



2002/



2003/



2004/



2005/



-

## Select region

Snapshot SST

Four hour SST

6-Day SST & Centiles

Climatology

SST Anom vs Time

Snapshot Chlorophyll-a

Adj. Sea Level Anom.

Non-Tidal Sea Level Anom.

## Data sources

SST L3S-6d ngt  
(1992-2017)

SST L3SM-6d ngt  
(2018-now)

GSLA

STAARS

## Legend

- Argo
- ◆ Glider
- ▲ Radar
- > Drifter
- Ship



Catalog <https://thredds.aodn.org.au/thredds/catalog/IMOS/OceanCurrent/GSLA/catalog.html>

## Dataset

## Size



GSLA



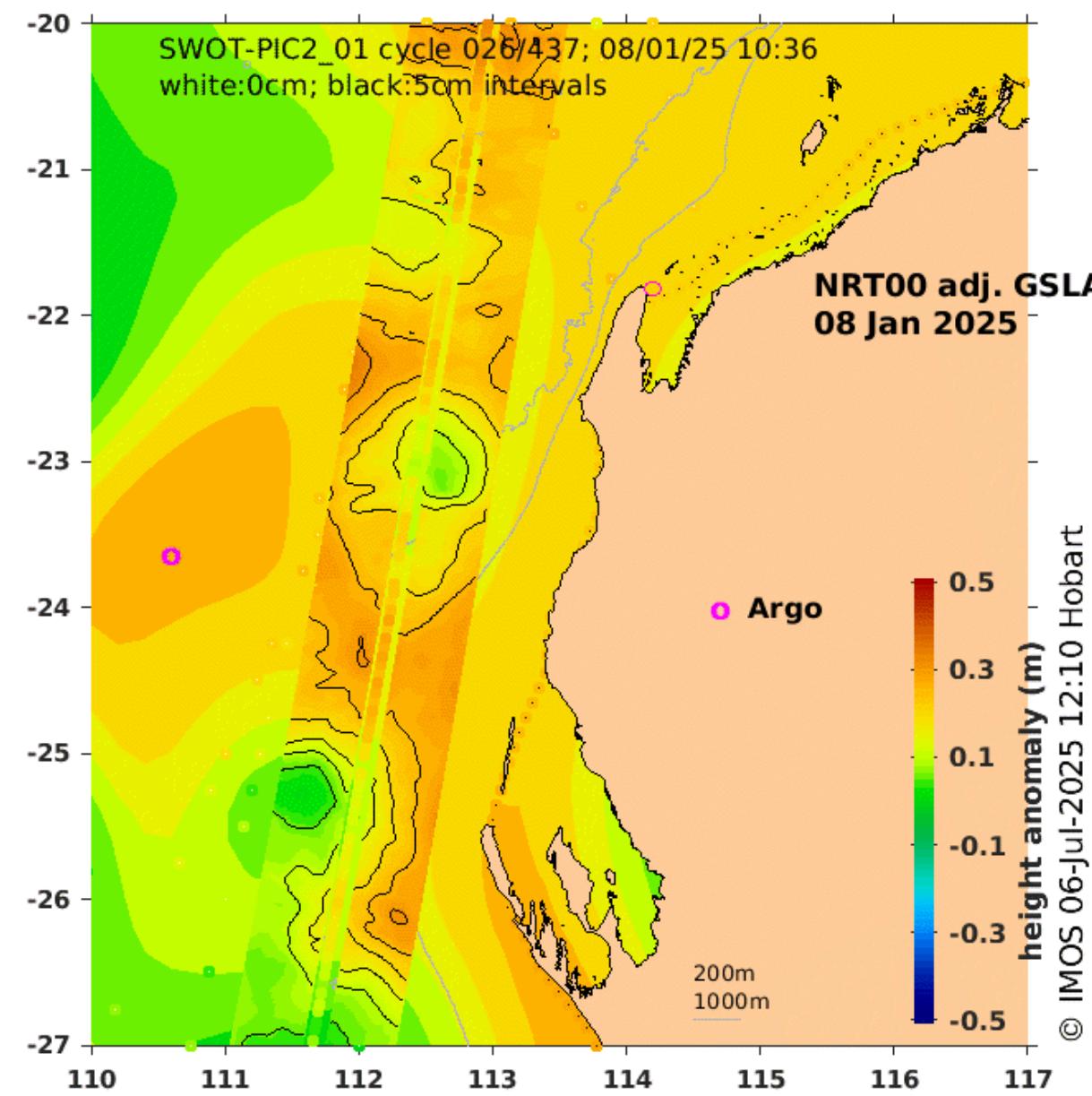
DM/



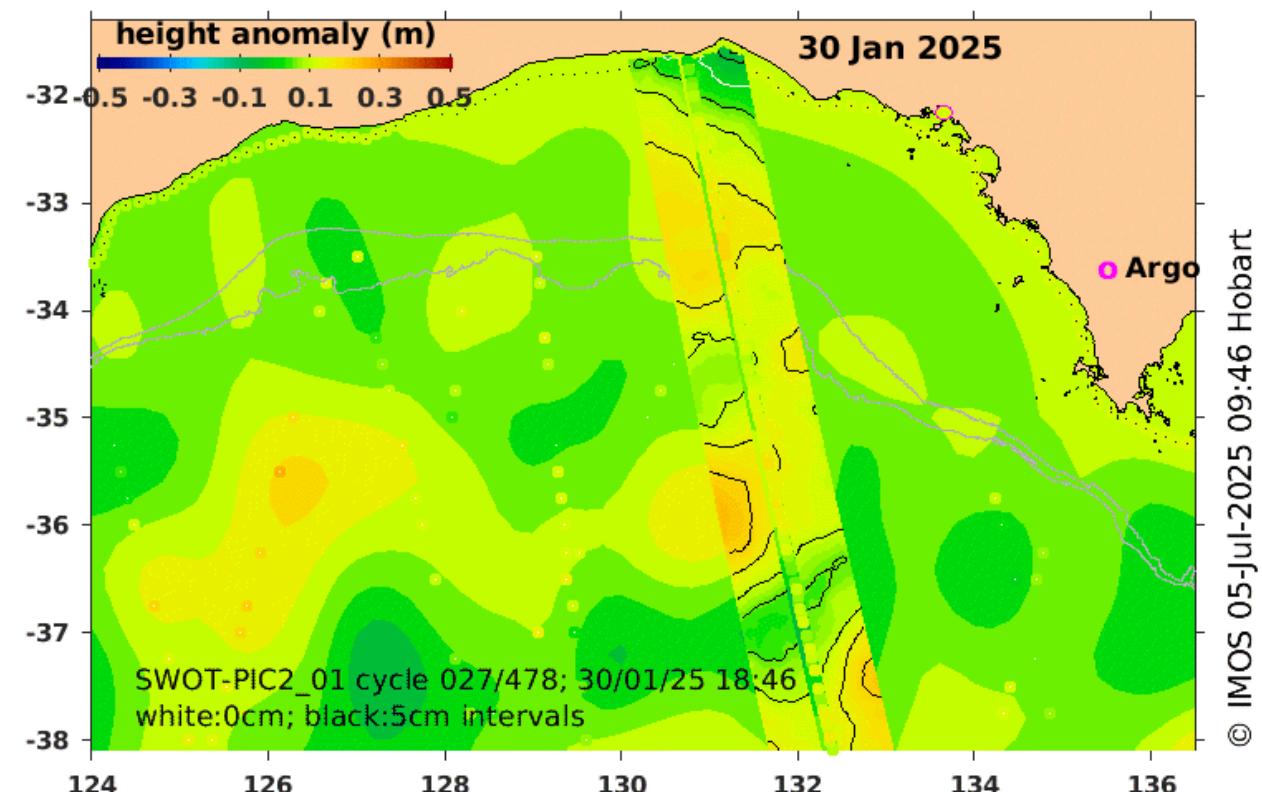
NRT/

IMOS Thredds Server at IMOS see [Info](#)

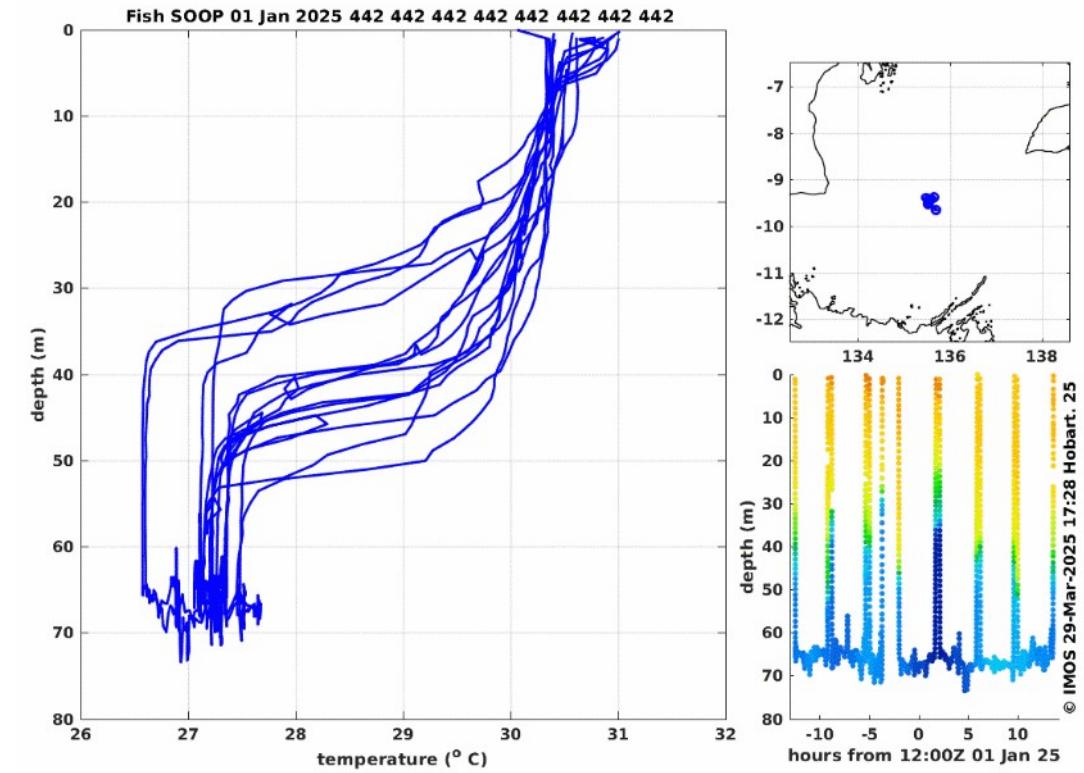
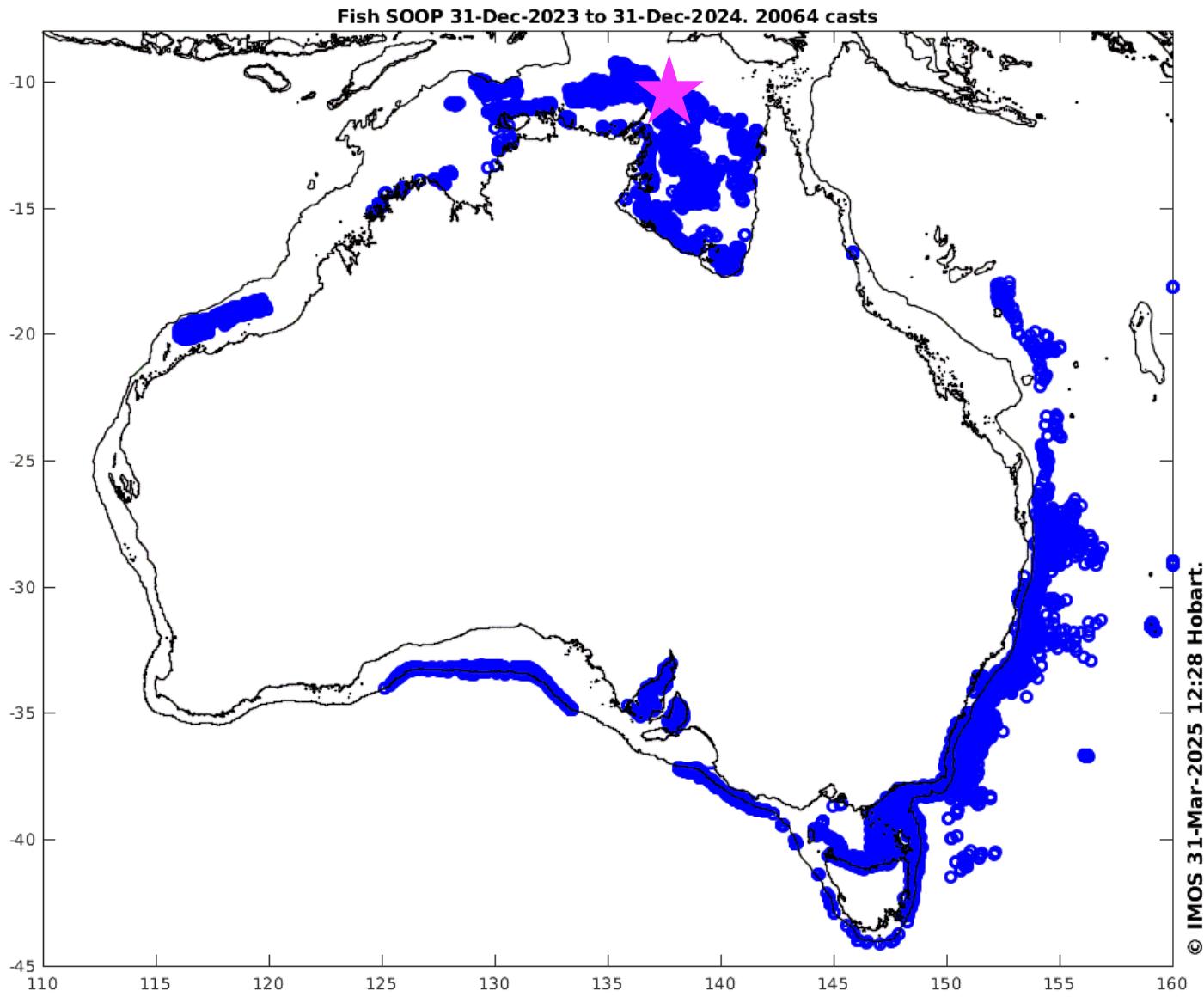
THREDDS Data Server [Version 4.42.28 - 2023-04-13T00:38:41+0000] [Documentation](#)



New product with SWOT data to  
go live this month!



## Sneak peek - FishSOOP data



# Bespoke SST maps - MyOceanCurrent

# IMOS OceanCurrent

Surface Currents and Temperature

Up to date ocean information around Australia

Maps In-water News Guided Tours

Snapshot SST

Ocean Colour

Four-hour SST

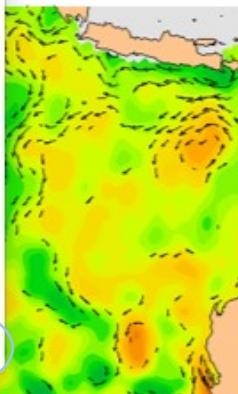
6-Day SST

Adj. SLA and SST maps

Monthly Means

Surface Waves

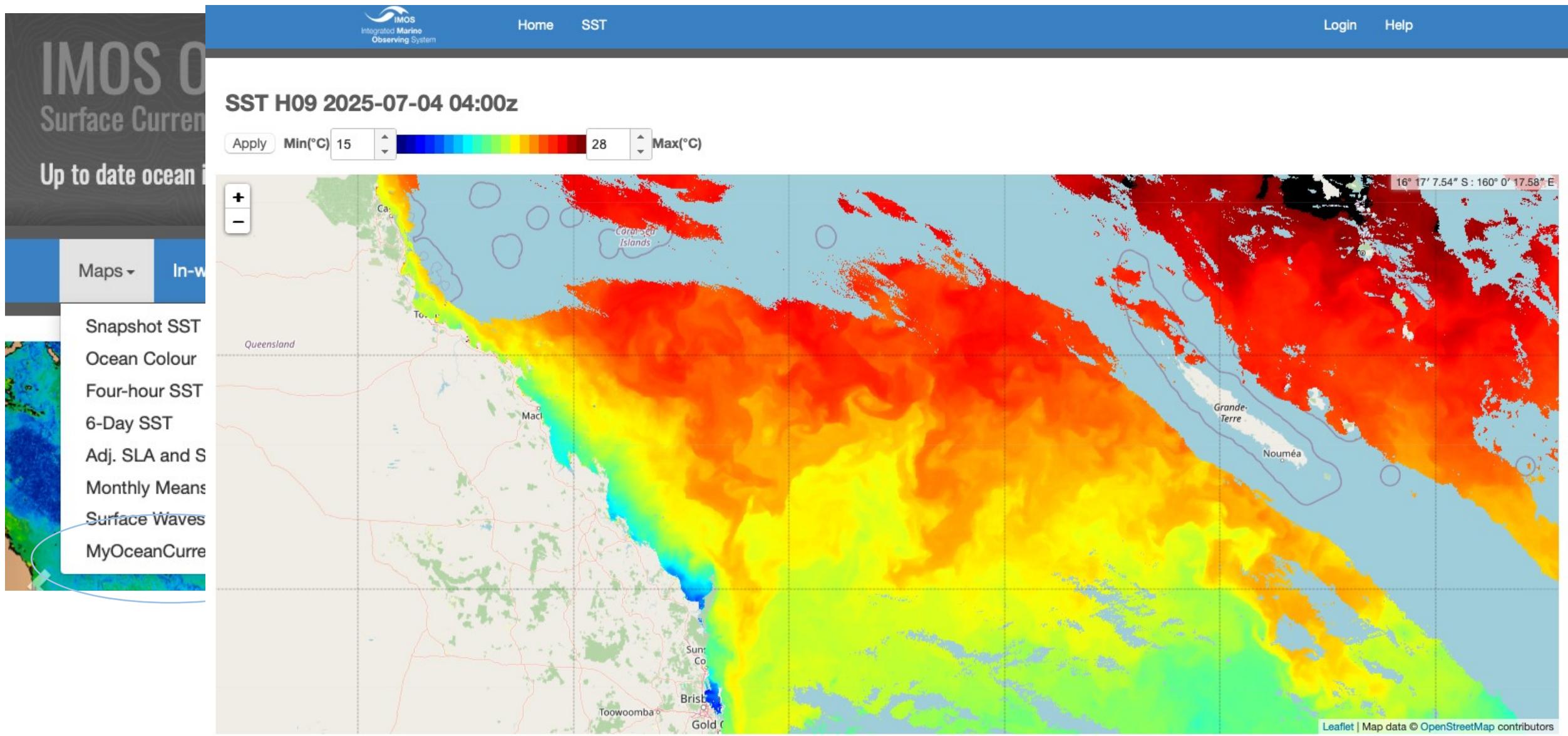
MyOceanCurrent



NRT SST Satellites: H09 modisA modisT viirsV

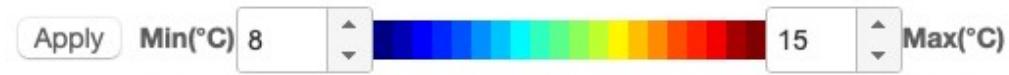
Date/Time	Satellite
2025-07-04 04:00z	H09
2025-07-04 00:00z	H09
2025-07-03 23:22z	MODIST
2025-07-03 21:50z	MODIST
2025-07-03 20:00z	H09
2025-07-03 20:00z	H09
2025-07-03 19:17z	MODISA
2025-07-03 18:09z	VIIRSV
2025-07-03 17:40z	MODISA
2025-07-03 16:27z	VIIRSV
2025-07-03 16:02z	MODISA
2025-07-03 16:00z	H09
2025-07-03 16:00z	H09
2025-07-03 16:00z	H09
2025-07-03 16:00z	MODIST
2025-07-03 16:00z	H09
2025-07-03 15:45z	MODIST
2025-07-03 14:45z	VIIRSV
2025-07-03 14:30z	MODISA
2025-07-03 14:07z	MODIST
2025-07-03 13:06z	VIIRSV
2025-07-03 12:27z	MODIST
2025-07-03 12:00z	VIIRSV
2025-07-03 11:52z	MODISA
2025-07-03 11:40z	H09
2025-07-03 11:40z	VIIRSV
2025-07-03 11:32z	MODISA
2025-07-03 11:30z	H09
2025-07-03 10:50z	MODIST
2025-07-03 08:22z	H09
2025-07-03 08:00z	MODISA
2025-07-03 08:00z	H09
2025-07-03 08:00z	VIIRSV
2025-07-03 08:00z	MODIST
2025-07-03 08:00z	VIIRSV
2025-07-03 07:54z	MODIST
2025-07-03 07:40z	H09
2025-07-03 05:12z	VIIRSV
2025-07-03 05:05z	MODISA
2025-07-03 04:00z	H09
2025-07-03 04:00z	H09
2025-07-03 04:00z	MODIST
2025-07-03 04:00z	H09
2025-07-03 03:32z	MODISA
2025-07-03 03:30z	VIIRSV
2025-07-03 02:02z	MODIST
2025-07-03 01:54z	VIIRSV
2025-07-03 00:22z	MODIST
2025-07-03 00:00z	H09
2025-07-03 00:00z	VIIRSV
2025-07-03 00:00z	MODISA
2025-07-03 00:00z	H09
2025-07-02 22:45z	MODIST
2025-07-02 20:17z	MODISA
2025-07-02 20:00z	H09
2025-07-02 20:00z	H09
2025-07-02 18:37z	MODISA
2025-07-02 18:27z	VIIRSV
2025-07-02 17:00z	MODISA
2025-07-02 16:48z	VIIRSV
2025-07-02 16:00z	H09
2025-07-02 16:00z	MODIST
2025-07-02 16:00z	H09
2025-07-02 15:22z	MODISA
2025-07-02 15:07z	MODIST
2025-07-02 15:06z	VIIRSV
2025-07-02 13:27z	MODIST
2025-07-02 13:27z	H09
2025-07-02 12:00z	MODISA
2025-07-02 12:00z	H09
2025-07-02 12:00z	VIIRSV

# Bespoke SST maps - MyOceanCurrent



# Bespoke SST maps - MyOceanCurrent

SST H09 2025-07-03 20:00z



6am, 4<sup>th</sup> July 2025  
~10degC at the top 50 cm

