NERP

Torres Strait / GBR environmental conditions report:

Recent status and predictions

14 Jun 2013

By Ana Redondo-Rodriguez
work supervised by Dr. Scarla Weeks
Contact: a.rodriguez@uq.edu.au

UQ-GPEM Biophysical Oceanography Group

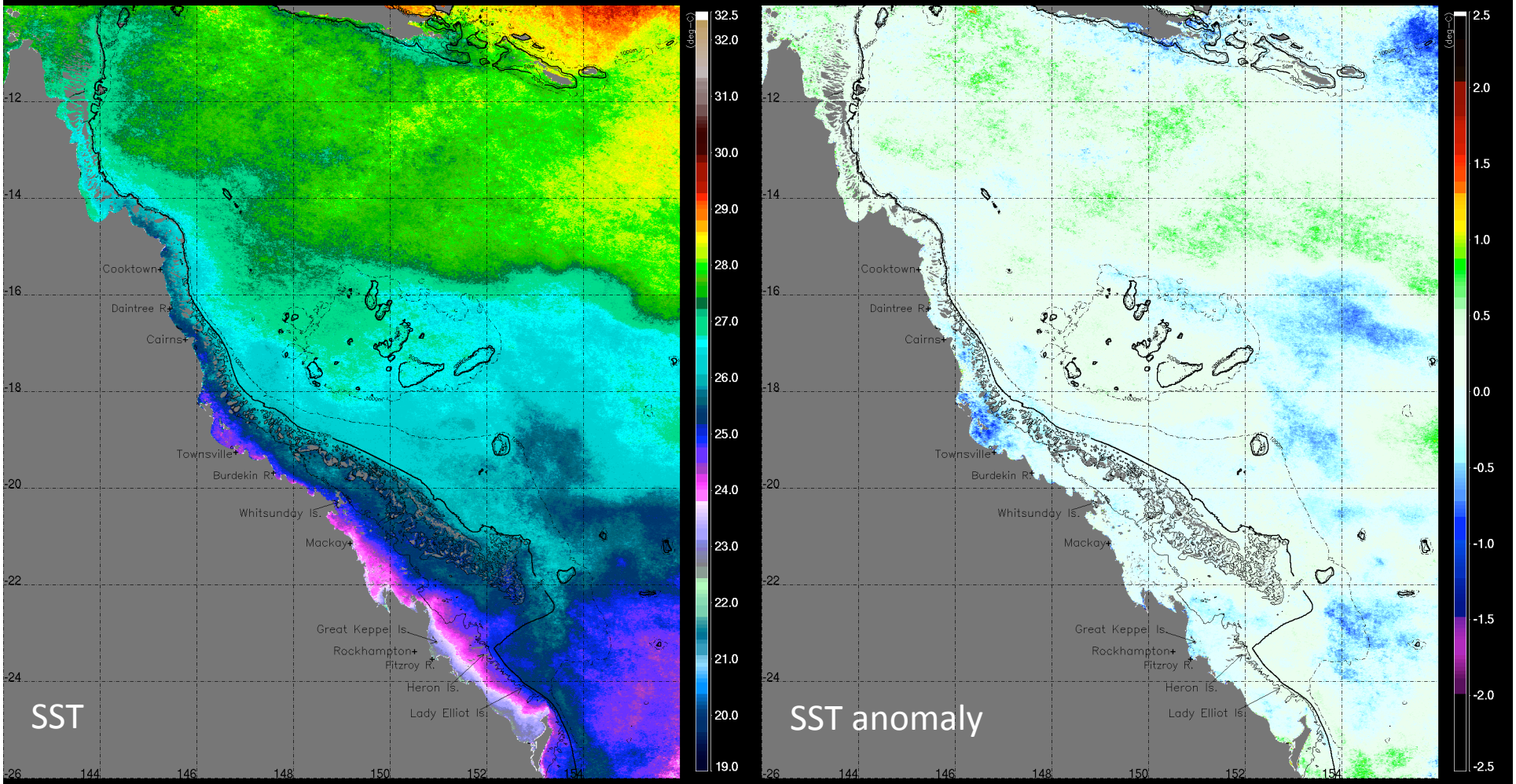
Outline

- Overview
- Recent SST and in situ Temperature evolution
- Monthly means and anomalies of MODIS Chlorophyll-a concentrations and 10% Photic Depth
- GBR SST forecast (POAMA)
- Coral Bleaching Outlook (NOAA:CRW)
- Surface conditions in the tropical Pacific
- ENSO evolution and predictions

Overview

- Mostly average SST prevalent over the entire GBR and Torres Strait areas during May
- High Chlorophyll-a signal on the inner reefs along almost the entire GBR
- Reduced water clarity along the coast.
- Forecast of close to average SST along the GBR and Torres Strait for the upcoming months.
- The NOAA Coral Reef Watch shows no bleaching alerts for the GBR and Torres Strait for the winter months.
- ENSO-neutral conditions continued in the Pacific during April, and are expected to persist in the upcoming months.

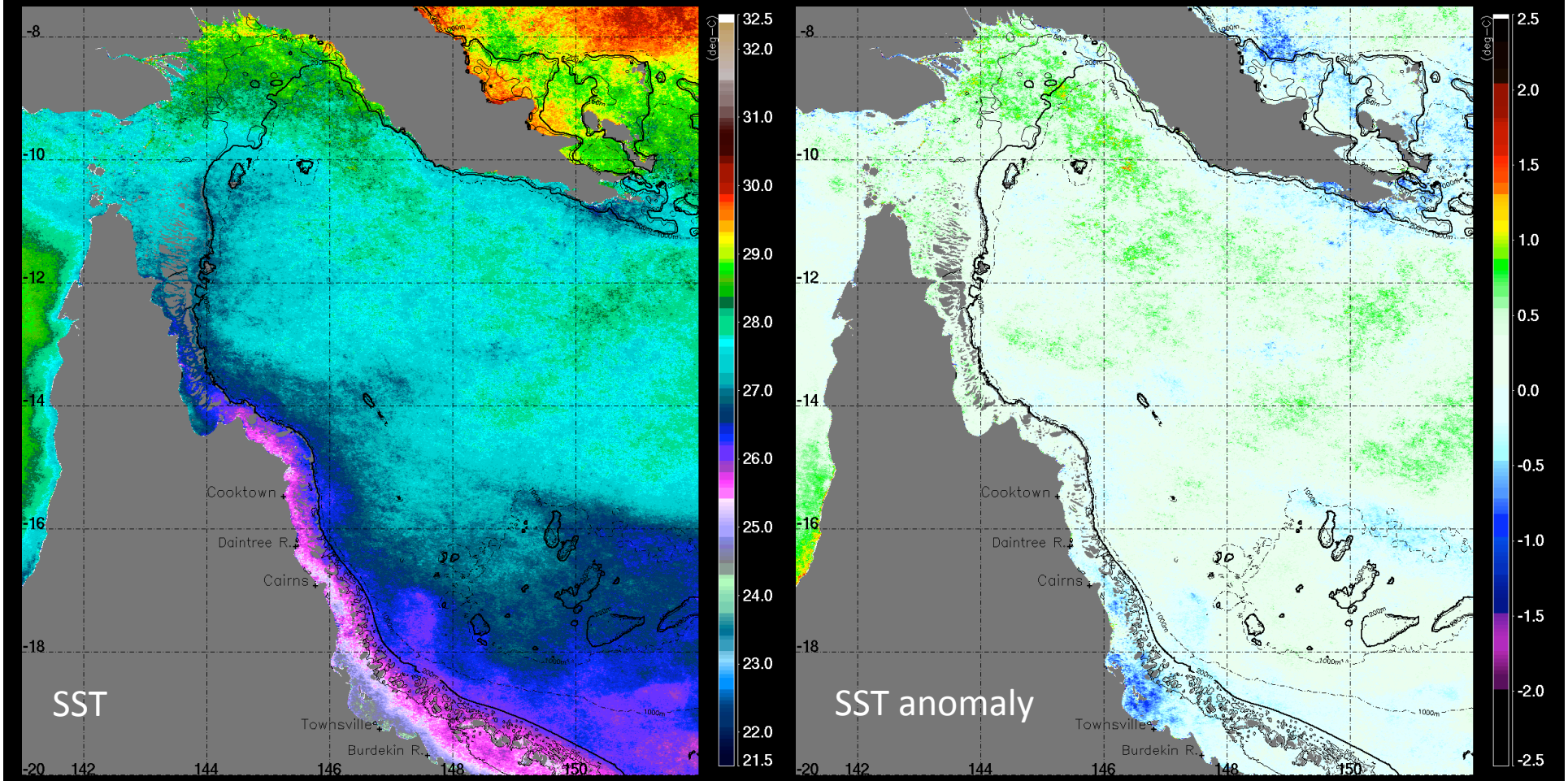
Modis SST (day+night): May 2013



Note:

- Neutral SST conditions continued along the length of the GBR during May, including the far N-GBR (the only area that presented positive anomalies during April)
- In the Coral Sea a pattern of weak positive vs negative SST anomalies seen north and south of ~16°S respectively

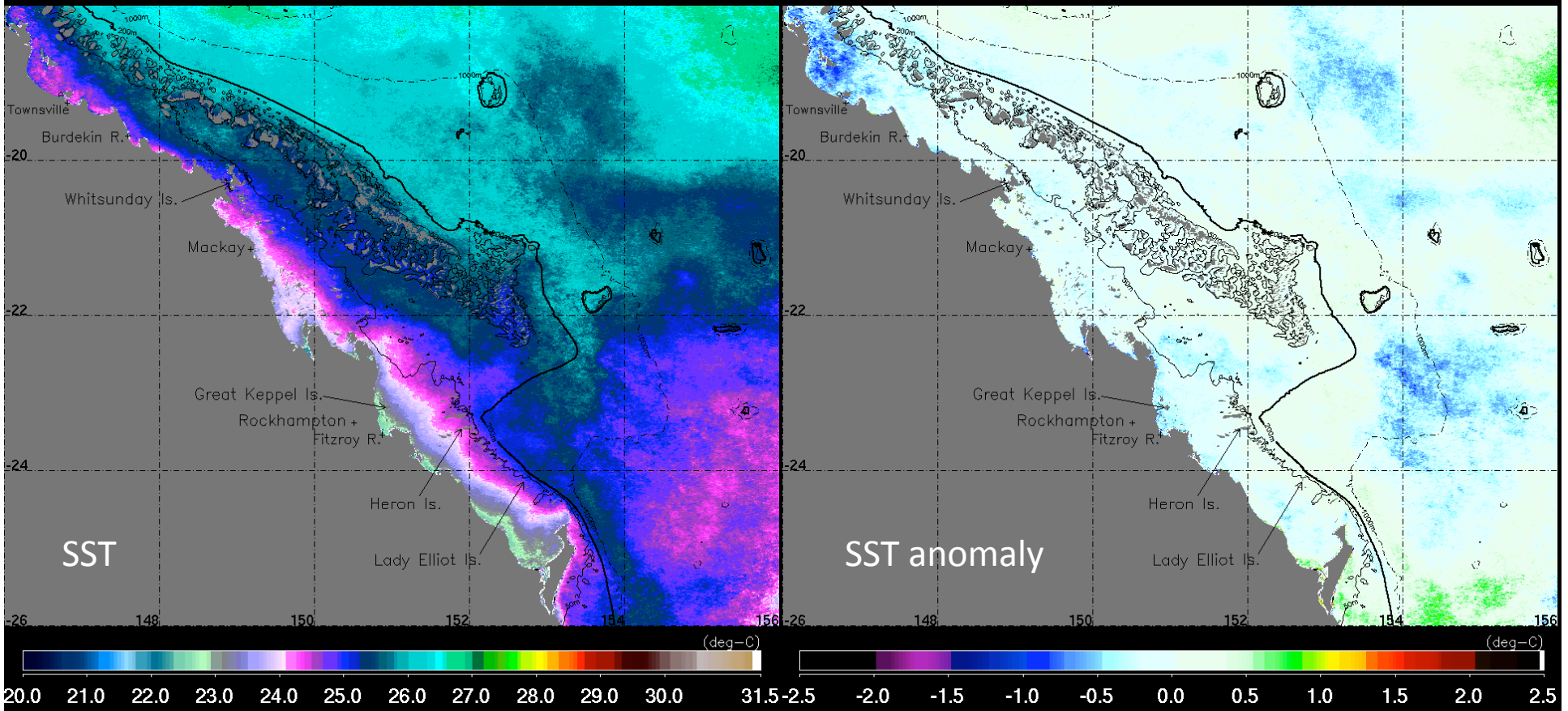
Torres Strait / far northern GBR MODIS SST: May 2013



Note:

- Neutral conditions apparent in the N-GBR and Torres Strait areas during May
- A localised area of negative anomalies developed inshore, north of Townsville

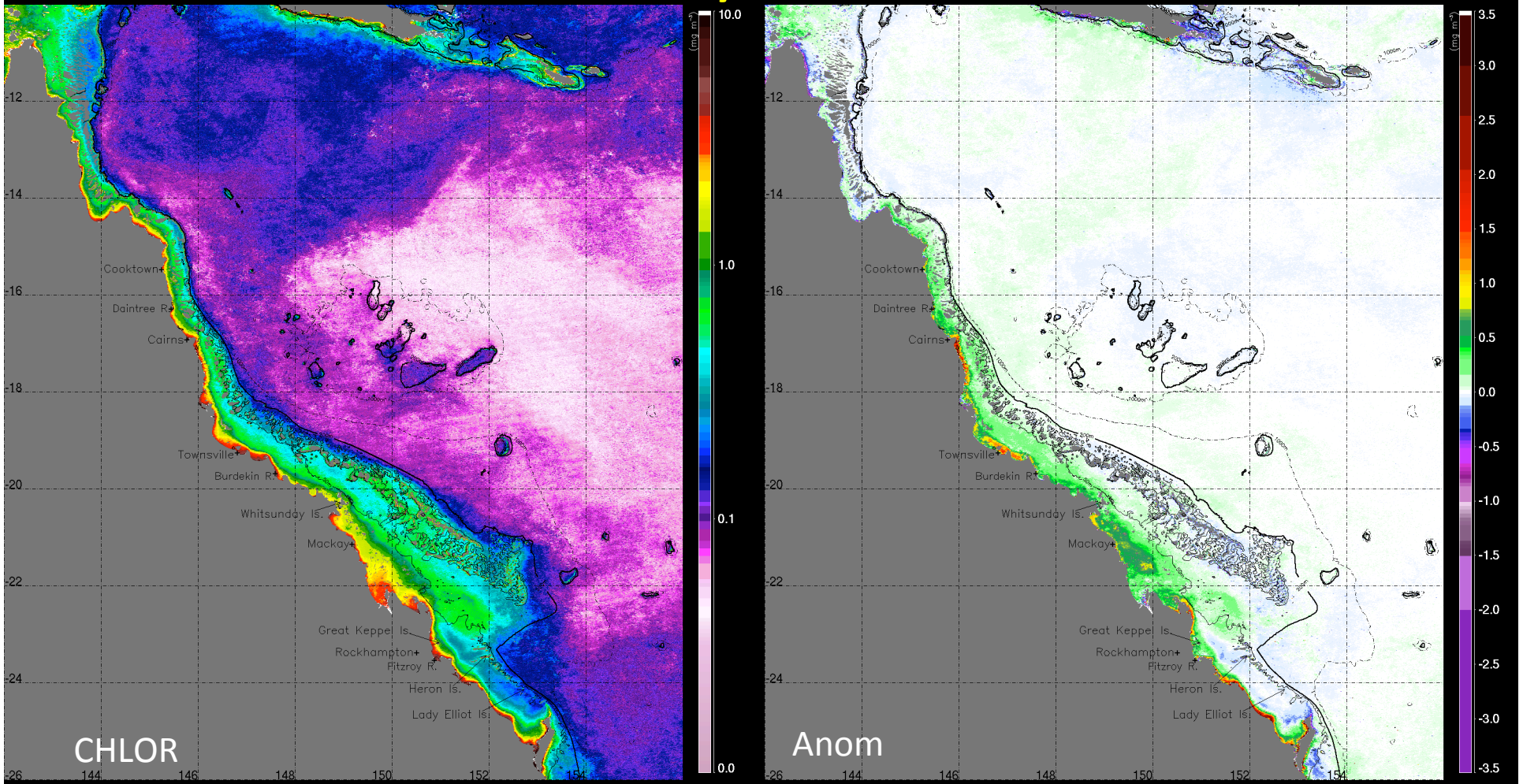
Southern GBR MODIS SST: May 2013



Note:

- Neutral SST conditions also apparent on the S-GBR during May

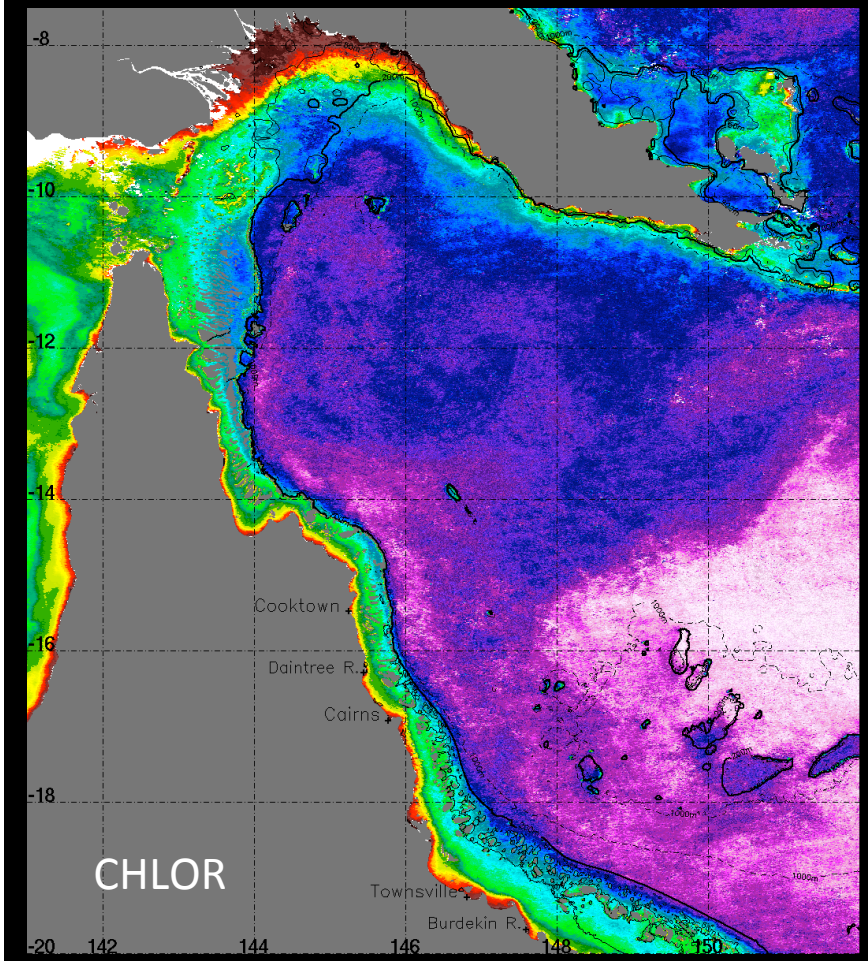
MODIS Chlorophyll-*a* concentration: May 2013

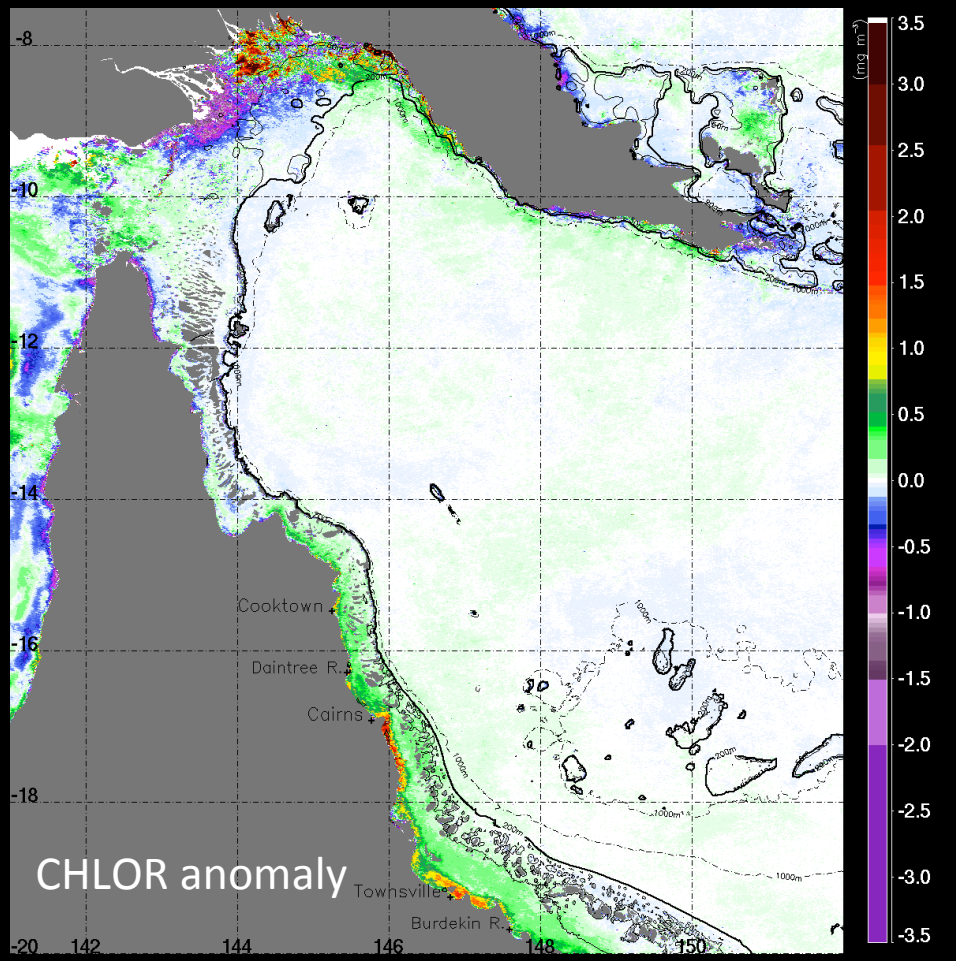


Note:

- High Chlorophyll-a signal on the inner reefs along almost the entire GBR during May (from 14°S to 25°S):
  - a strengthening and extension of the positive anomalies seen previously in the southern GBR.
  - positive anomalies were also noticeable north of Townsville, in an area which has consistently been experiencing negative anomalies in previous months

Torres Strait / far northern GBR
Chlorophyll-*a* concentration
May 2013

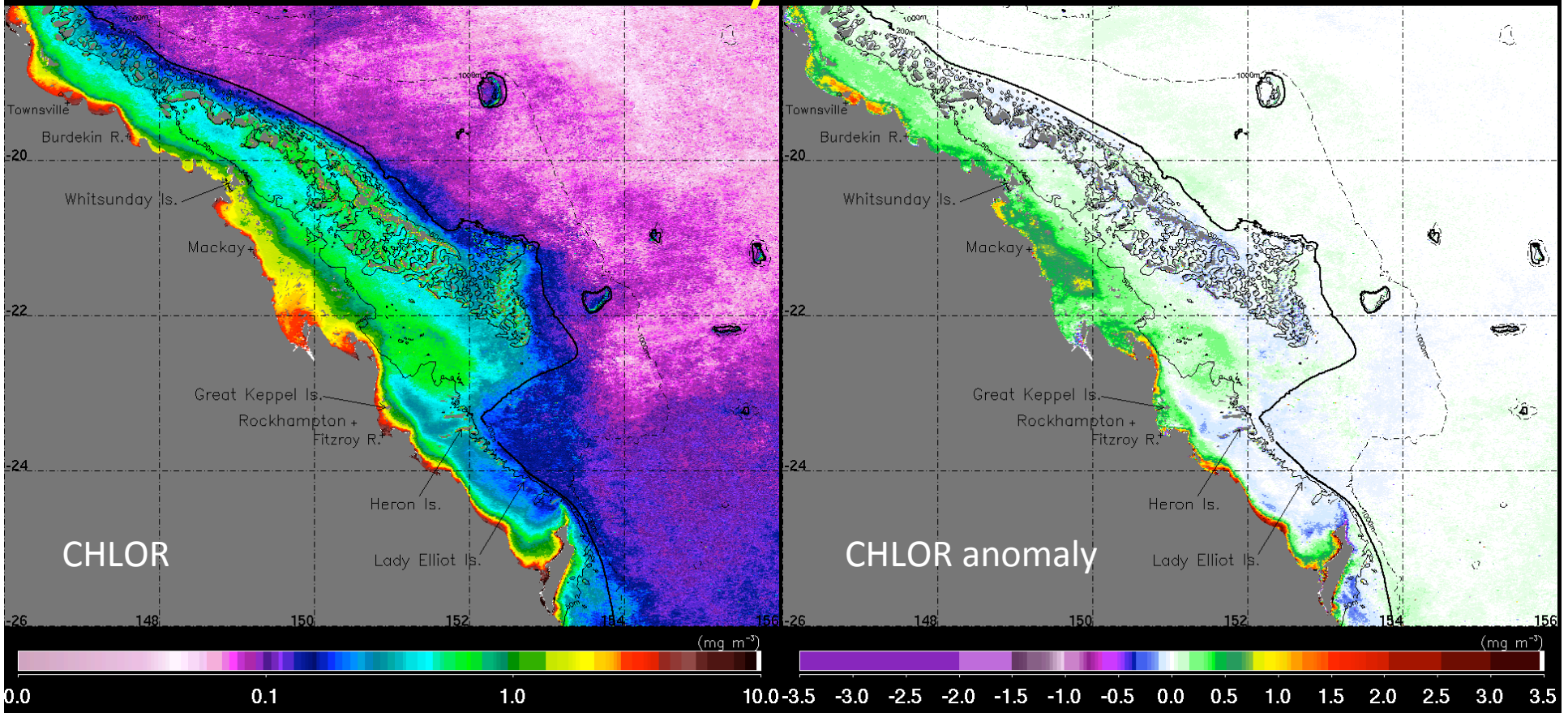




Note:

- The negative anomalies observed during previous months in the N-GBR and Torres Strait areas have dissipated almost entirely during May.
- Positive anomalies south of ~14°S, likely due to a combination of high river outflow and consistent south-easterlies during May

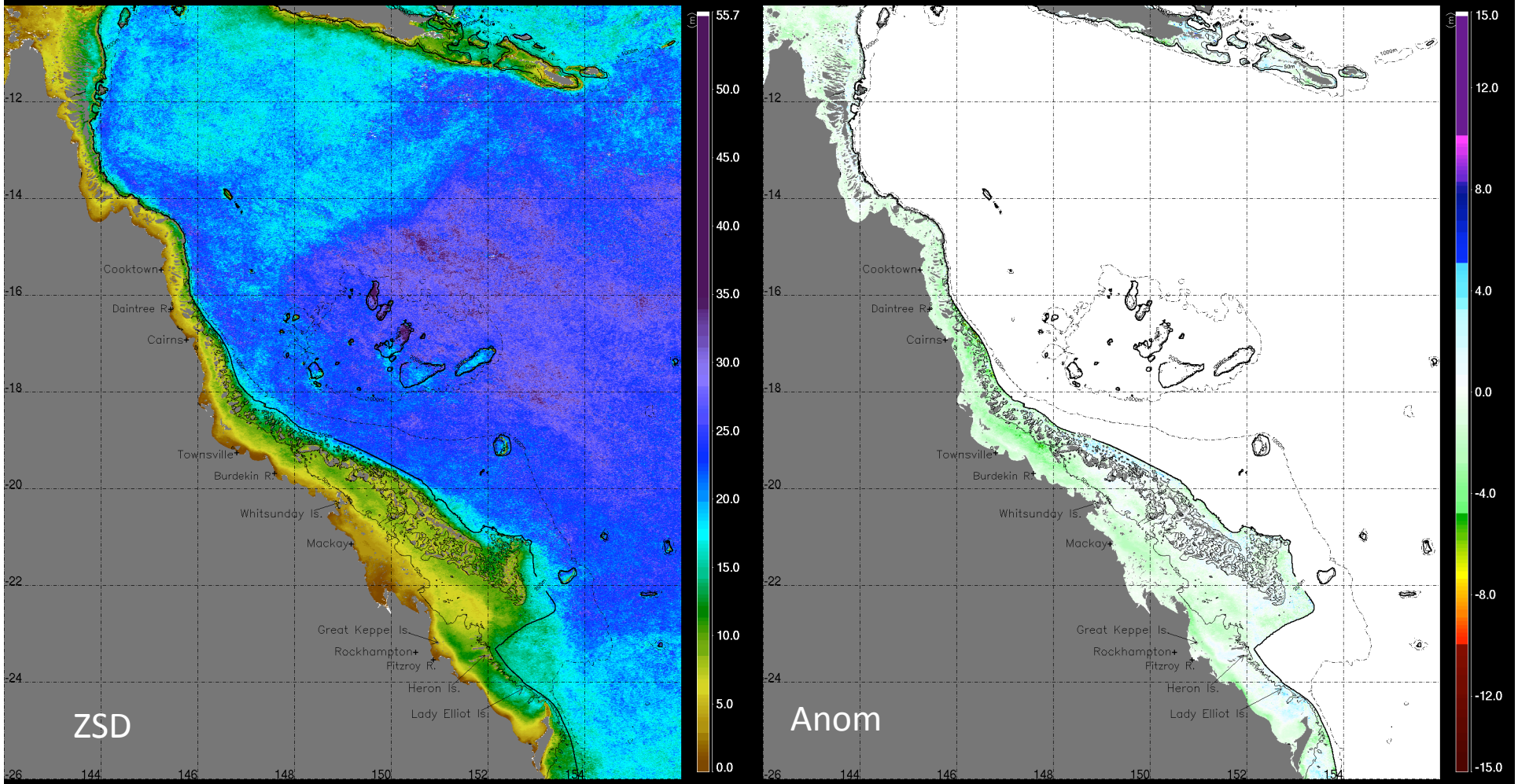
Southern GBR Chlorophyll-*a* concentration: May 2013



Note:

- During May, the entire S-GBR area presented a positive chlorophyll-a anomaly signal in the inshore and mid-shelf region
- This is likely due to a combination of high river outflow and consistent south-easterlies (along the entire GBR) during May

MODIS 10% Photic Depth: May 2013

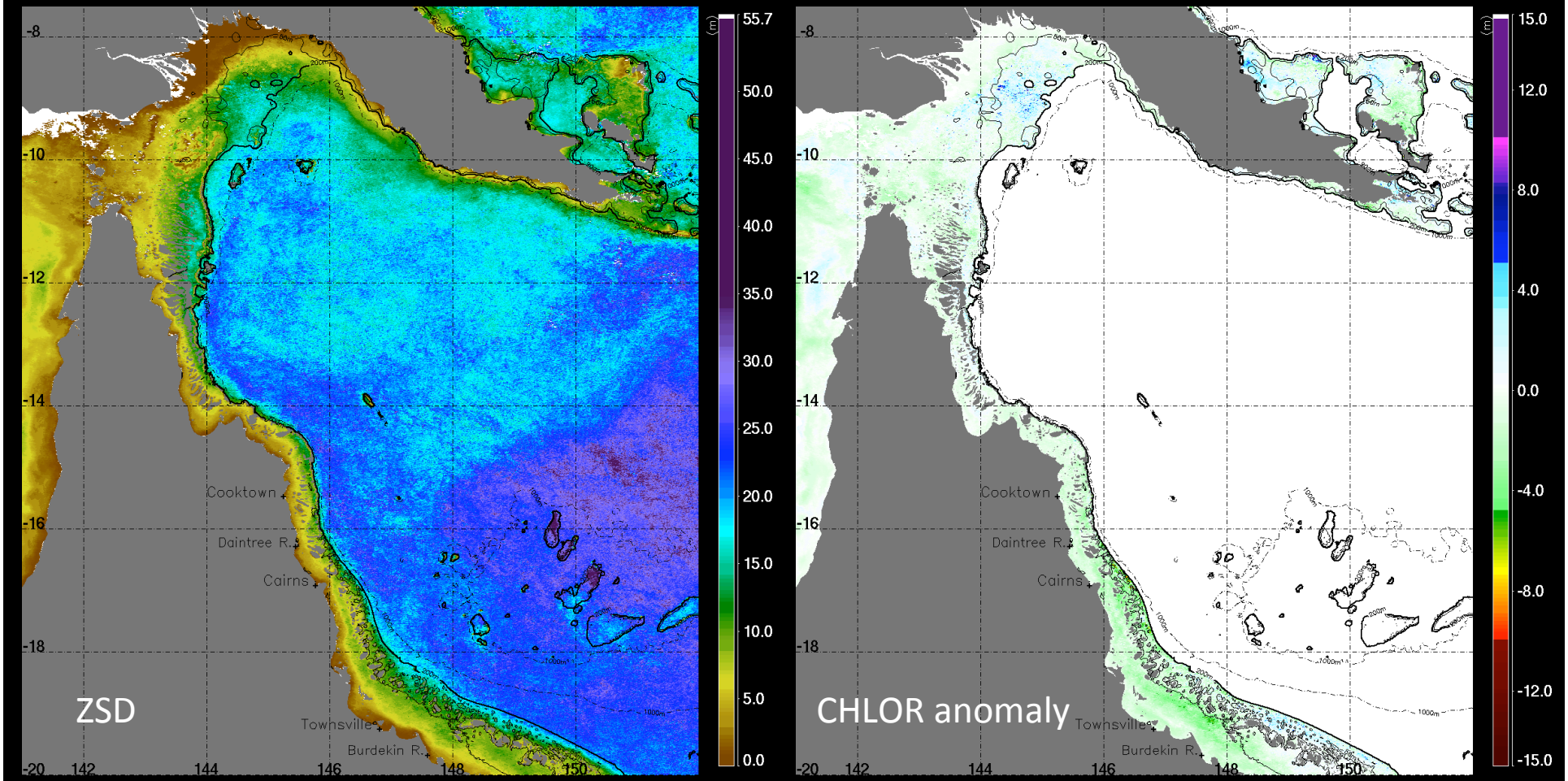


Note:

- Satellite-derived 10% photic depth mean for May indicative of reduced water clarity along the coast, particularly the inshore reefs.
- Along much of the GBR region, shallow photic depths likely due to river influence and strong vertical mixing
  - Associated mean negative anomalies for May of ~ -4m photic depth.

UQ Biophysical Oceanography Group

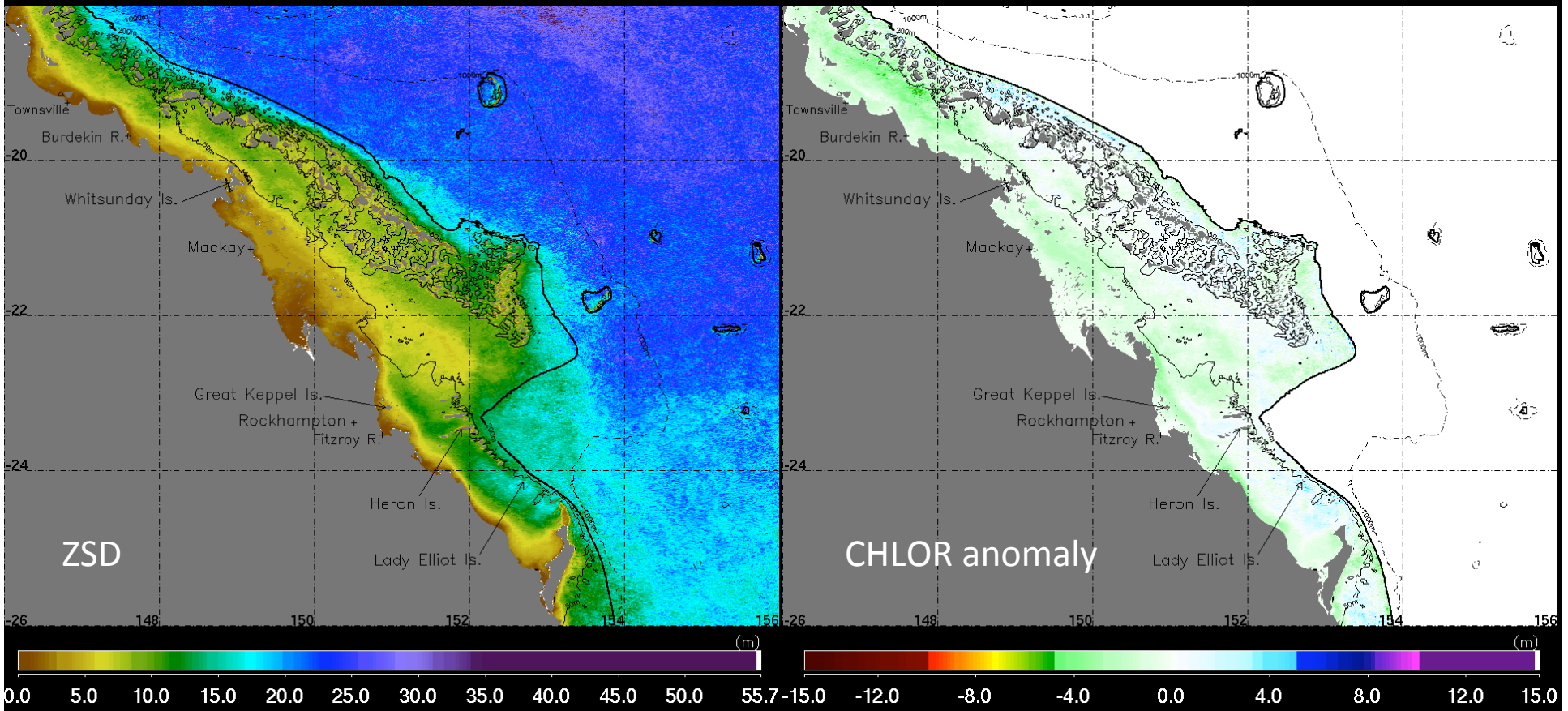
Torres Strait / far northern GBR
MODIS 10% Photic Depth
May 2013



Note:

- Clear signal for the satellite-derived photic depth along the N-GBR and Torres Strait areas,.
- Moderate (- 3-4m) negative anomalies are apparent on the Torres Strait and south of ~14°S indicative of reduced water clarity along the coast.

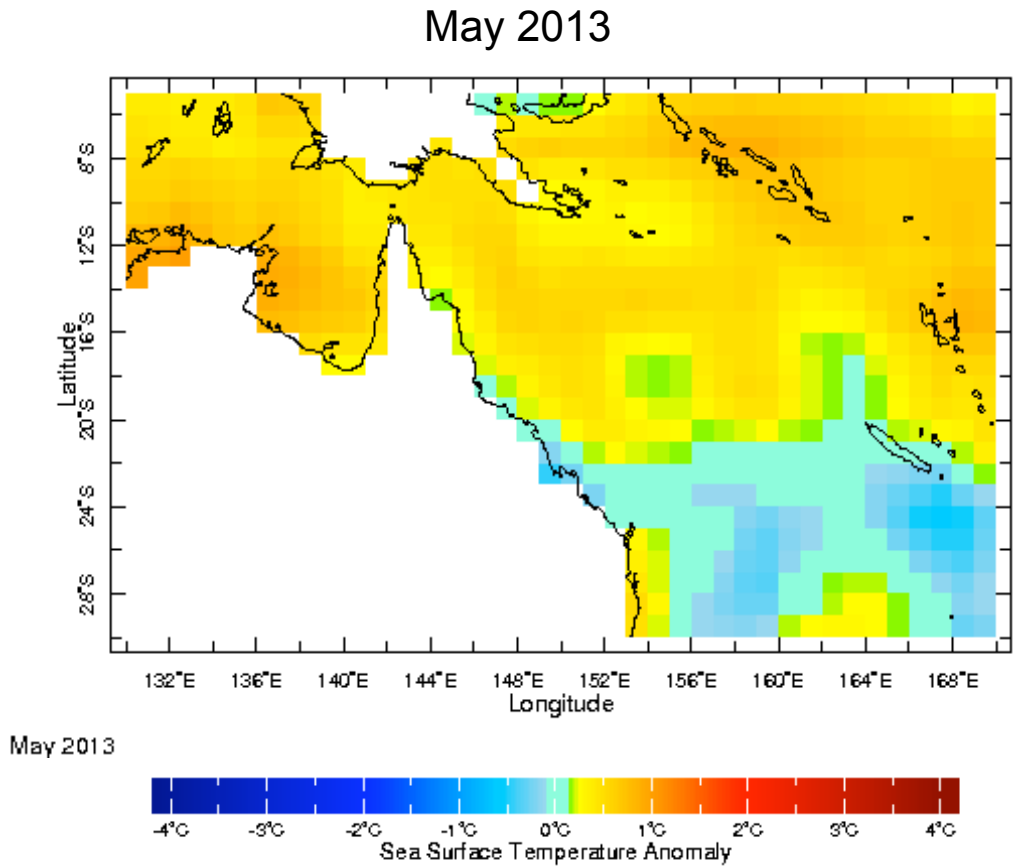
Southern GBR
MODIS 10% Photic Depth:
May 2013



Note:

- Coincident with the anomalies seen in the chlorophyll image, the S-GBR present moderate (- 3-4m) negative photic depth anomalies (low water clarity) derived from a combination of high river outflow and consistent south-easterlies during May

NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2 monthly SSTA: Sea Surface Temperature Anomaly data



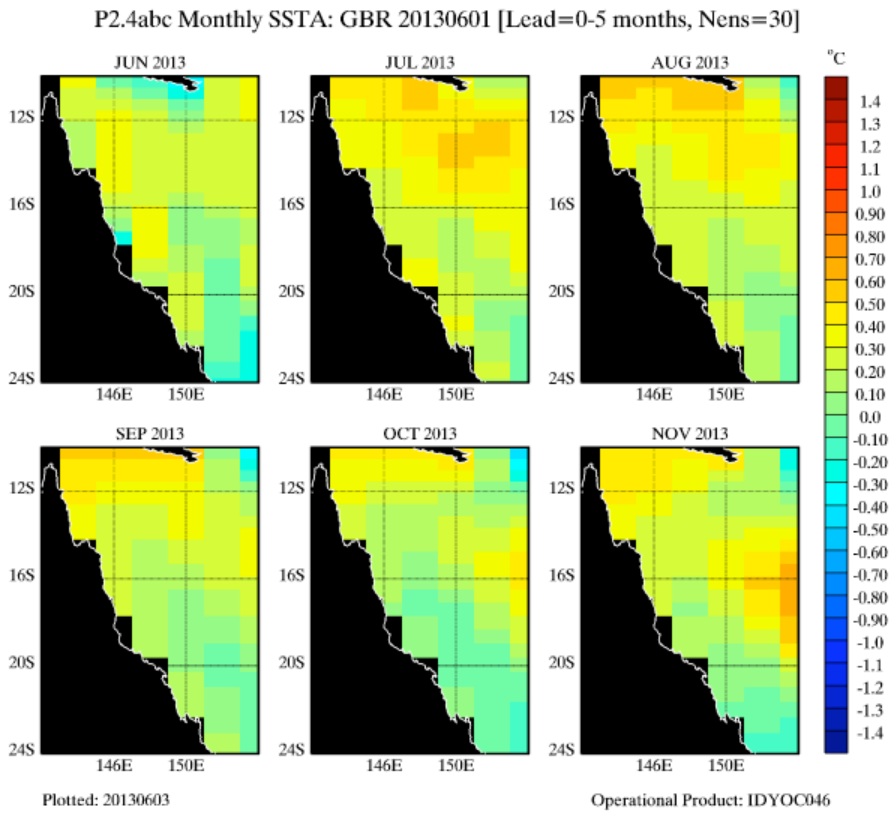
Note:

• Reynolds data show SST anomalies that are positive for the Torres Strait and northern GBR, and negative in the southern GBR during May. However, the anomalies are very weak.

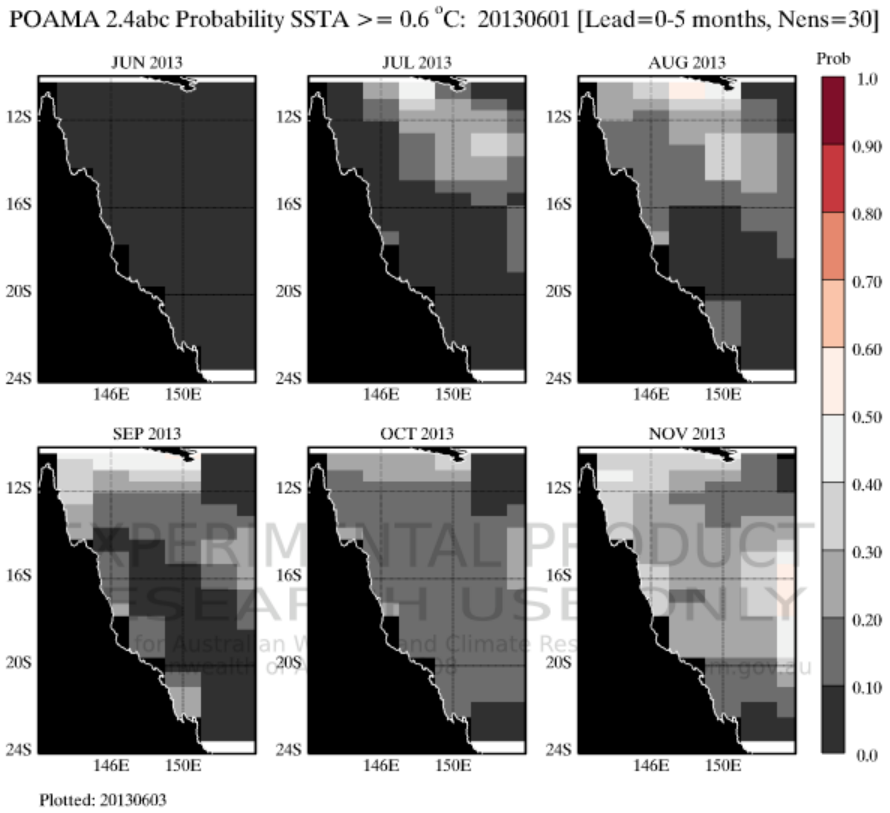
http://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.EMC/.CMB/.GLOBAL/.Reyn_SmithOIv2/

Great Barrier Reef SST Anomaly Forecast (POAMA-2)

POAMA SST anomaly forecast for the next 6 months (Operational)



Probabilities of SST anomalies greater than 0.6°C for the next 6 months (Experimental)



Note:

- POAMA forecast temperatures close to or slightly above average for the upcoming months. However, the probabilities of temperature anomalies exceeding 0.6°C remain low.

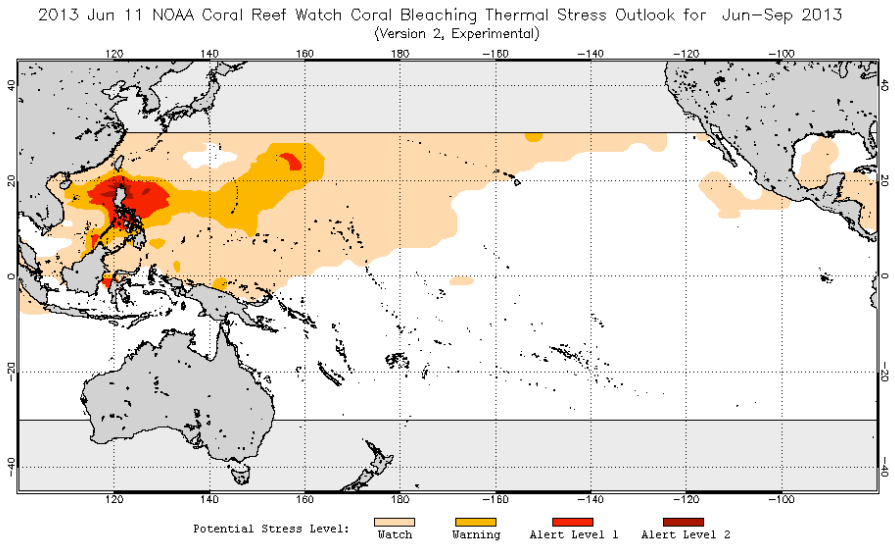
NOAA Coral Reef Watch

Seasonal Coral Bleaching Thermal Stress Outlook

June to September 2013

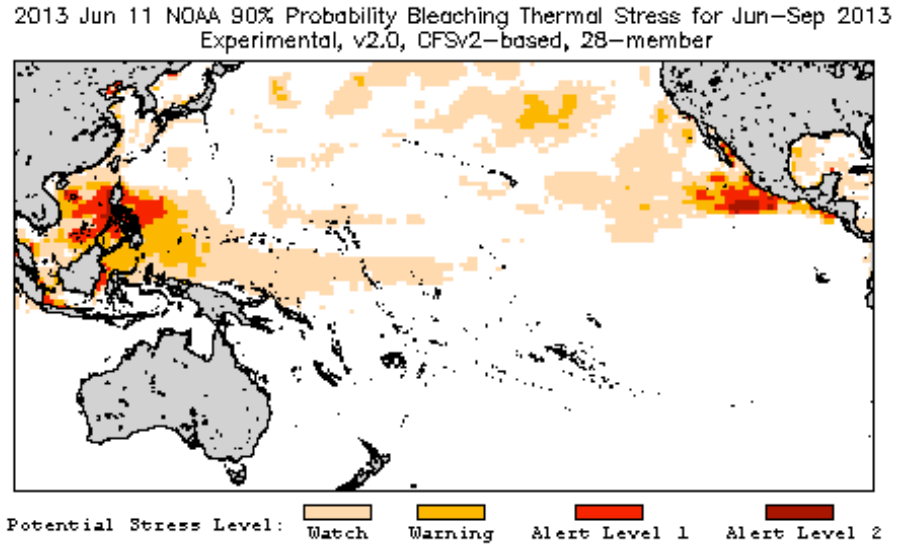
LIM-based

Version 2, experimental, weekly, 2x2 degree spatial resolution



CFS-based

Version 2.0, experimental, weekly, 1x1 degree spatial resolution
(90% probability)

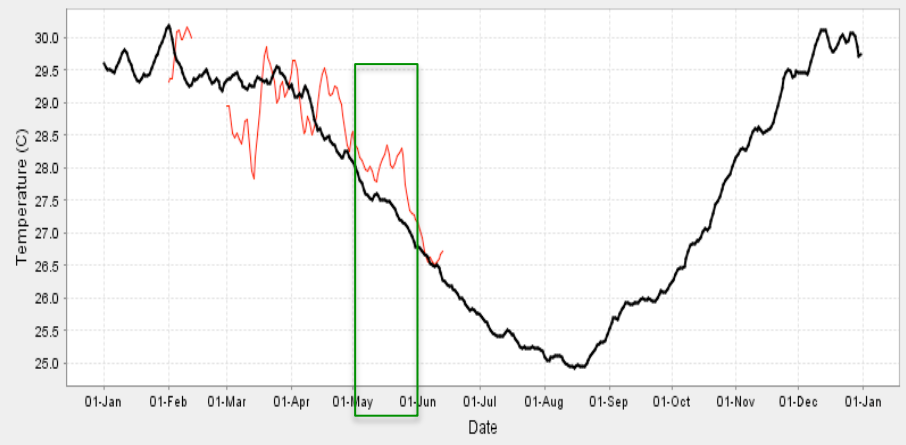


Note:

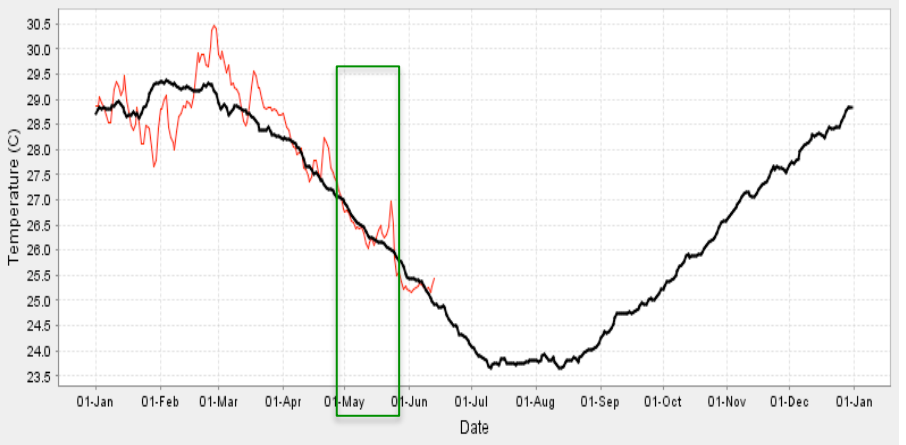
- Both NOAA CRW bleaching thermal stress outlooks show no bleaching alerts for the winter months (June to September), as expected.
- These outlooks are based on SST predictions from: 1) CRW's experimental statistical Linear Inverse Model (LIM-based) and 2) the NCEP climate forecast system (CFS-based) system.

Weather Observing System: AIMS Data Centre

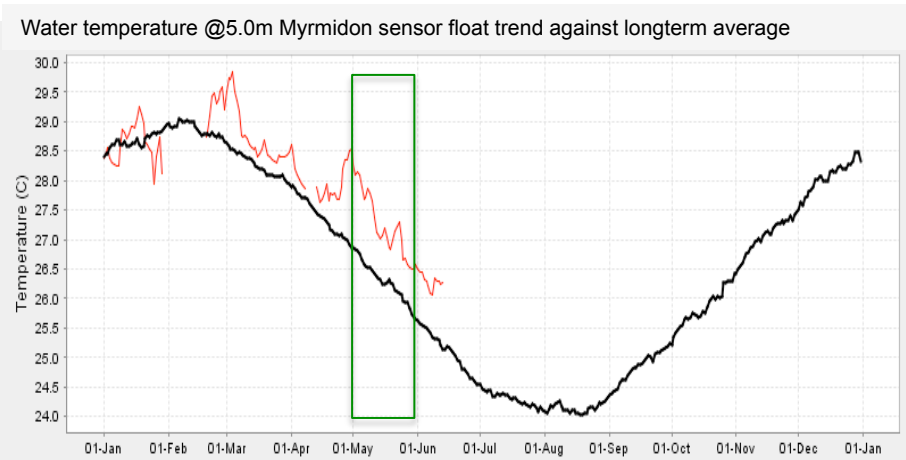
Water temperature @3.0m Thursday Island Weather Station trend against longterm average



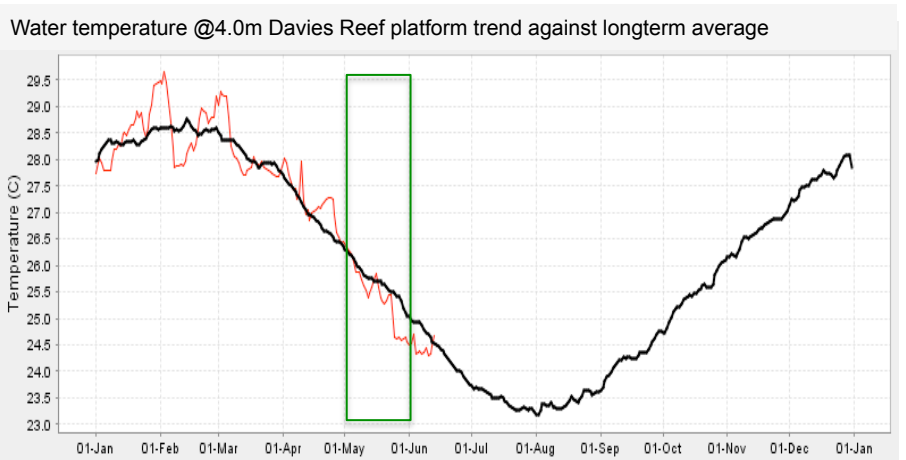
Water temperature @0.6m Lizard Island sensor float trend against longterm average



Water temperature @5.0m Myrmidon sensor float trend against longterm average

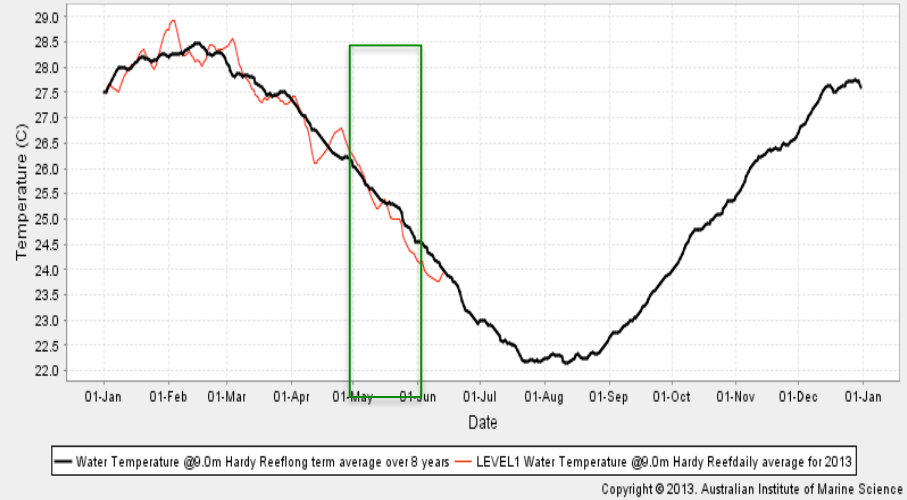


Water temperature @4.0m Davies Reef platform trend against longterm average

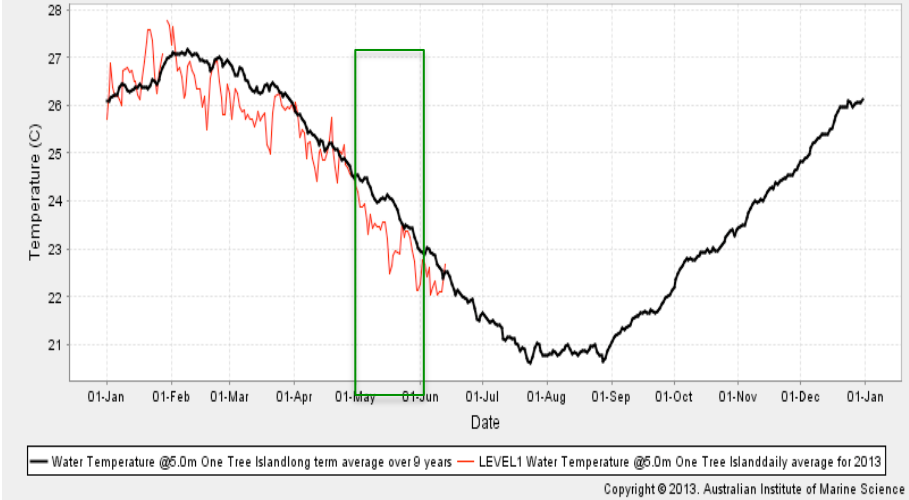


Weather Observing System: AIMS Data Centre

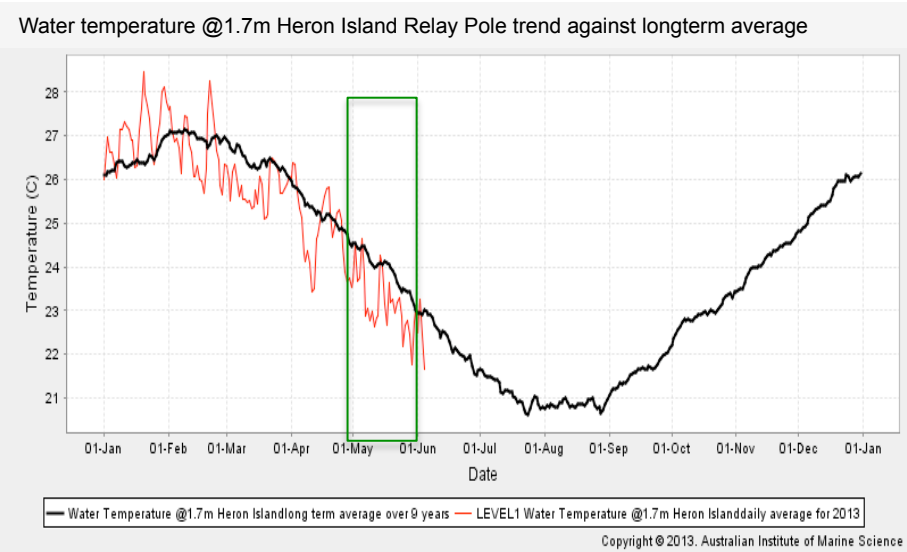
Water temperature @9.0m Hardy Reef platform trend against longterm average



Water temperature @5.0m One Tree Island Relay Pole trend against longterm average



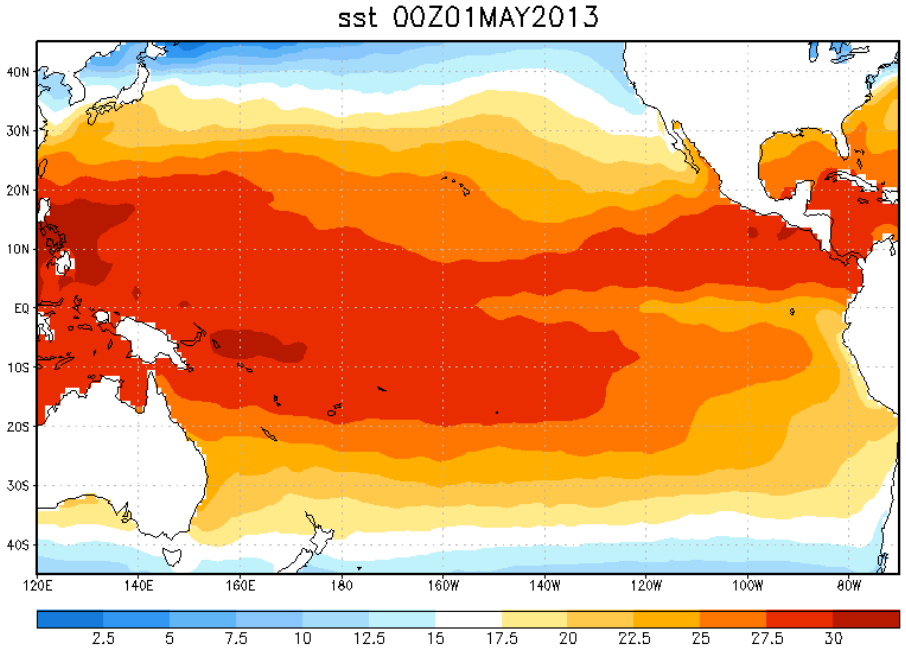
Water temperature @1.7m Heron Island Relay Pole trend against longterm average



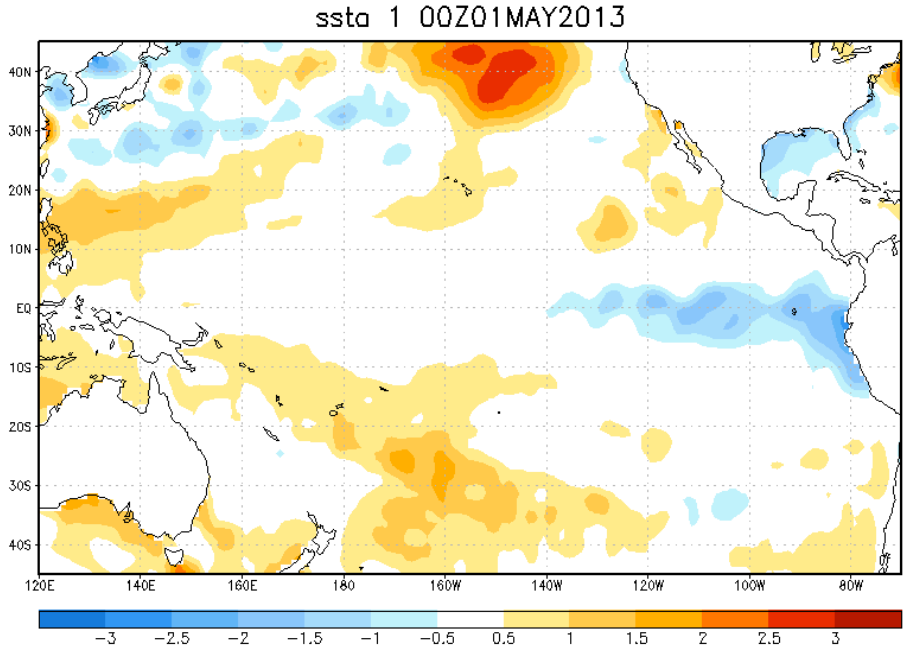
- Coincident with SST data:
  - Most AIMS weather stations showed water temperatures close to average for May.
  - Thursday Island (Torres Strait) showed temperatures slightly over the long term mean for May.
- Myrmidon sensor (located at ~18°S) showed water temperatures consistently above the long-term mean during May.

NOAA Optimum Interpolation Sea Surface Temperature Analysis:

OI SST: MAY 2013



OI SST ANOMALY: MAY 2013



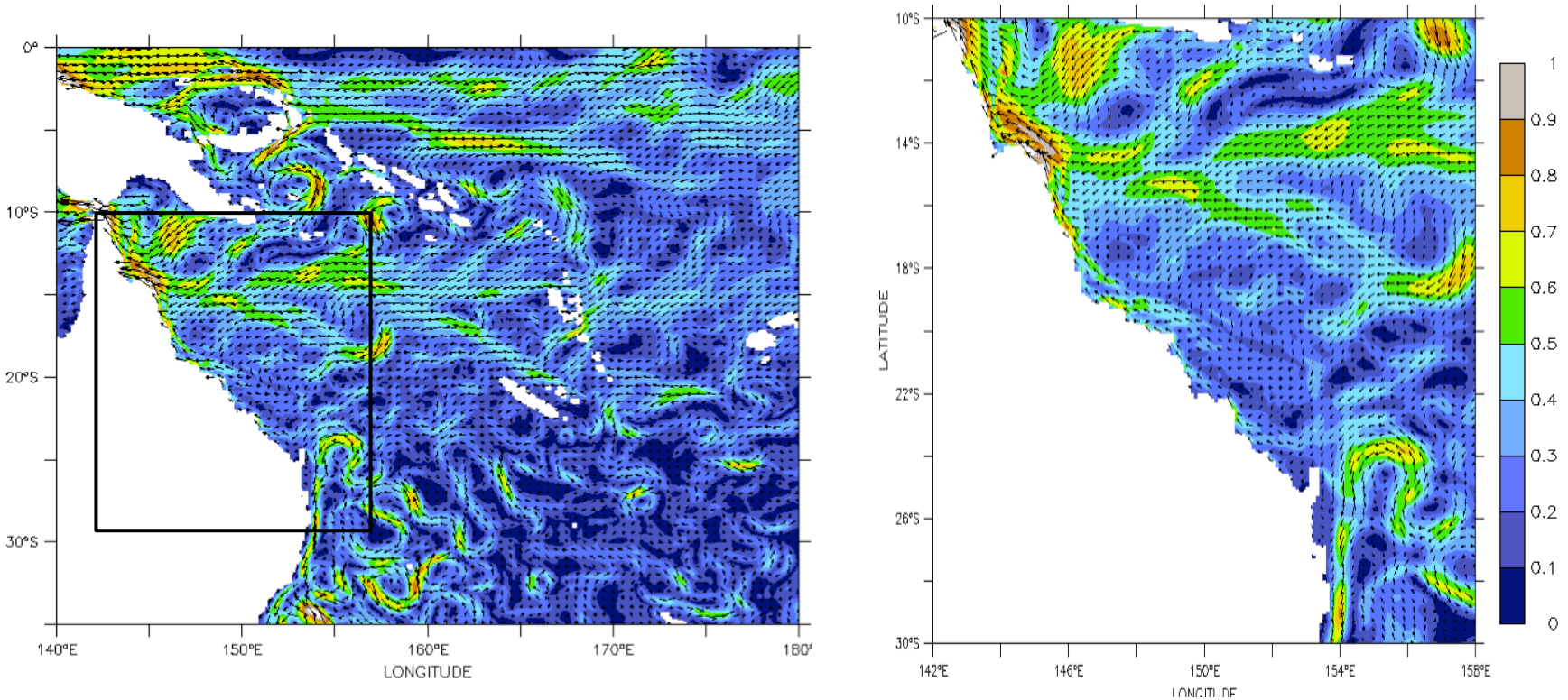
Note:

- SST remained near average in the western and central equatorial Pacific during May.
- In contrast, negative SST anomalies developed in the East.

OceanMAPS 15m Depth-Average Currents

May 2013

OceanMAPS Ocean Modeling, Analysis and Prediction System was developed at CSIRO Marine and Atmospheric Research and the Bureau of Meteorology and it is part of the **Bluelink** project.

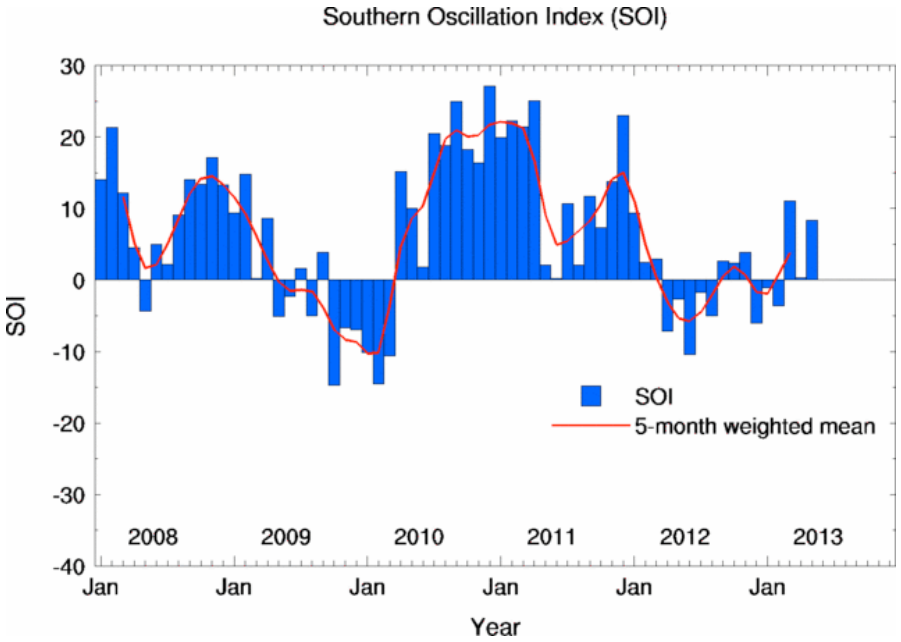


Behind Real Time analysis
15 m Depth-Averaged Currents (m/s).

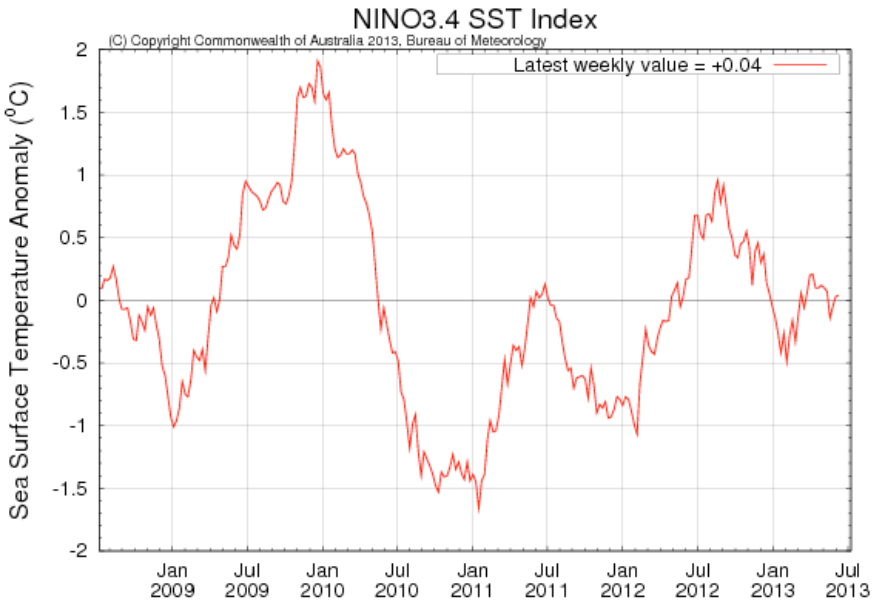
Note:

- Strong westward flow of the South Equatorial Current (SEC) towards the N-GBR (centered around 15°S). Most of the SEC inflow feeds the North Queensland Current (flowing northward to the Gulf of Papua)
- Very weak East Australian Current (EAC) along the GBR, due to the seasonality of the EAC and prevalence of strong Southeasterly winds during May.

ENSO index



Negative SOI = El Niño



Positive Nino 3.4 index= El Niño

Note:
• ENSO-neutral conditions continued during May and are expected to persist for the upcoming months, although there is a small chance that a weak La Niña may develop during the winter.