NERP

Torres Strait / GBR environmental conditions report:

Recent status and predictions

11 February 2013

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

UQ-GPEM Biophysical Oceanography Group

Outline

- Overview
- Extreme weather event: TC Oswald
- Recent SST and in situ Temperature evolution
- GBR SST forecast (POAMA)
- Coral Bleaching Outlook (NOAA:CRW)
- Surface conditions in the tropical Pacific
- ENSO evolution and predictions

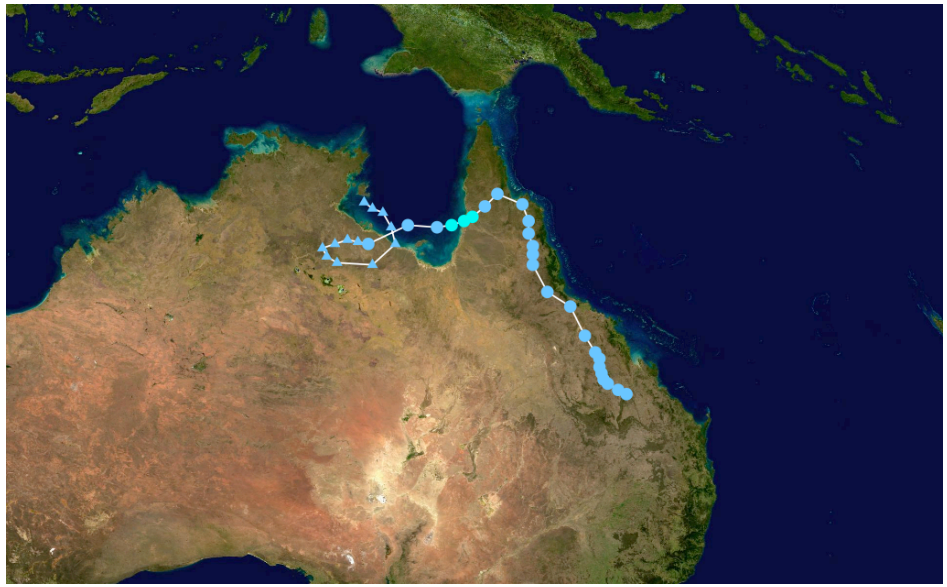
Overview

- Former tropical cyclone Oswald tracked southwards along the Queensland coast (20-29 January)
- Mostly neutral temperature conditions prevalent over the Torres Strait and the entire GBR
- Forecast of close to average SST along the GBR and Torres Strait for the upcoming months.
- The NOAA Coral Reef Watch no longer suggests 'Warning' for the Torres Strait and/or N-GBR regions.
- ENSO-neutral conditions continued in the Pacific during January, and expected to persist in the upcoming months.

Extreme weather event for Queensland: Tropical Cyclone Oswald
(21 to 29 of January 2013)

"Most of the east coast of Queensland, and the coast of New South Wales from the Illawarra northwards, experienced very heavy rainfall during the period from 22 to 29 January 2013, as a result of the former tropical cyclone Oswald tracking southwards along a track just inland from the Queensland coast.
[…]
Oswald formed in the Gulf of Carpentaria on 21 January, and made landfall that night near Kowanyama, on the west coast of Cape York Peninsula, as a category 1 system. It rapidly weakened after landfall and was downgraded to a tropical low on the morning of 22 January. The low then moved near the east coast, being centred off Cooktown on 23 January and then tracked slowly to the south-southeast just inland from the coast. It was centred near Townsville on the 24th, became slow-moving in the St. Lawrence- Rockhampton area on the 25th and 26th, and then resumed a southwards track to be centred near Dalby on the 28th. It then accelerated southwards and moved offshore near Sydney on the 29th before moving out to sea."

Extracted from BOM: Special Climate Statement 44 – extreme rainfall and flooding in coastal Queensland and New South Wales. *(http://www.bom.gov.au/climate/current/statements/scs44.pdf)*
Issued 5th of February 2013

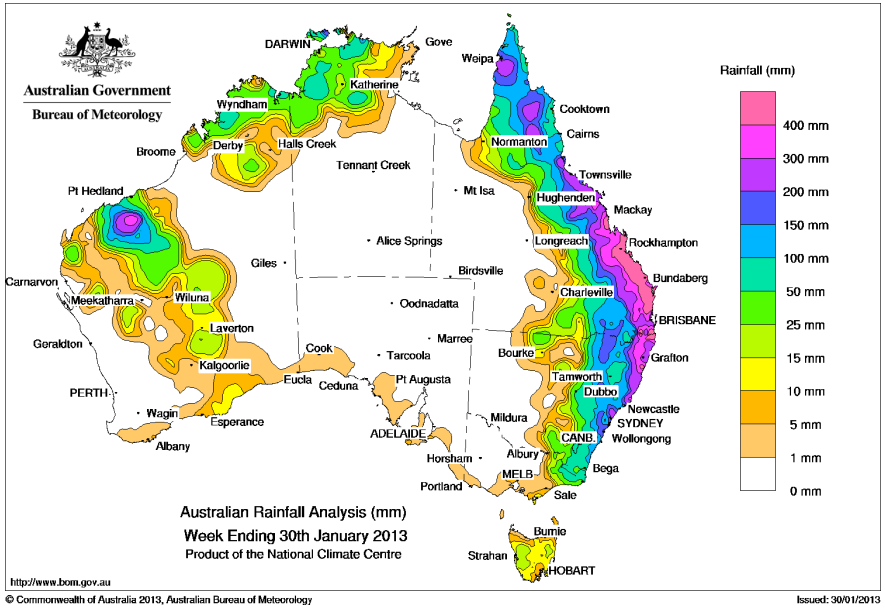


Track map of the Tropical Cyclone Oswald. The points show the location of the storm at 6-hour intervals.
Source: http://en.wikipedia.org/wiki/File:Oswald_2013_track.png

Extreme weather event for Queensland: Tropical Cyclone Oswald
(21 to 29 of January 2013)

"Throughout its lifespan, the system brought heavy rainfall, especially in moist easterly to northeasterly flow on its southern flank. The system was also associated with strong winds, with numerous sites experiencing gusts in excess of 100 km/h, and coastal storm surges and high waves, as well as a number of tornadoes, particularly in the Bundaberg area."

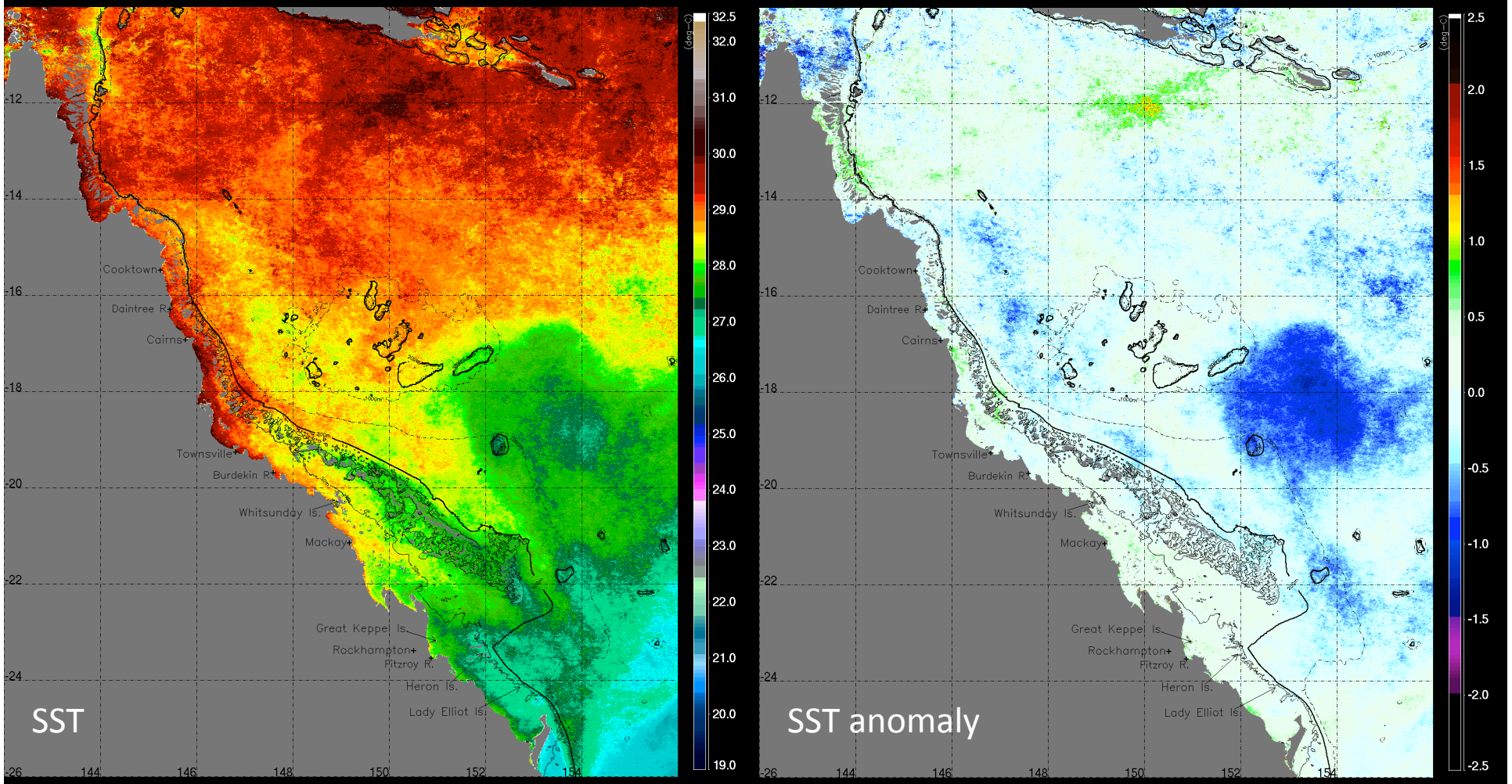
Extracted from BOM: Special Climate Statement 44 – extreme rainfall and flooding in coastal Queensland and New South Wales. *(http://www.bom.gov.au/climate/current/statements/scs44.pdf)*
Issued 5th of February 2013



Rainfall coverage across Australia over the last week of January.
Source: BOM: (http://www.bom.gov.au/jsp/awap/rain/index.jsp)

MODIS Image of Tropical Storm Oswald over the Cape York Peninsula, Queensland. on the 21st of January Source: NASA (Image captured by MODIS – Aqua satellite)

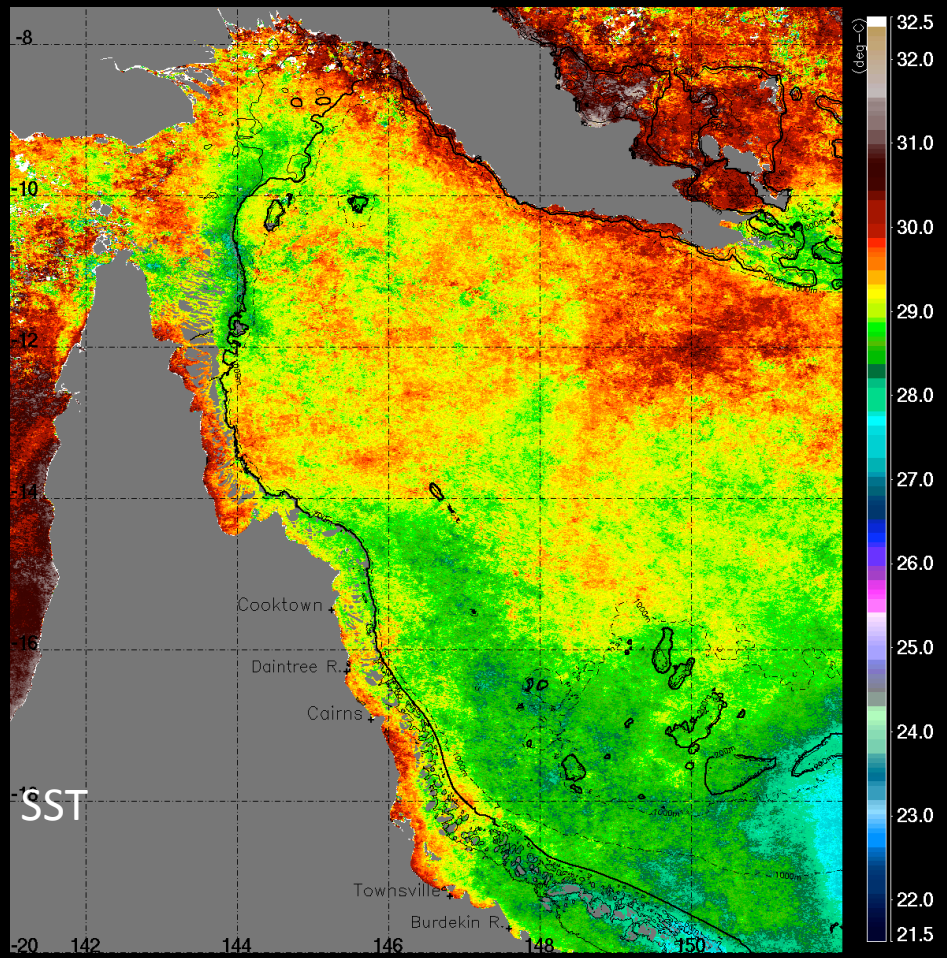
Modis SST (day+night): January 2013



Note: Extreme cloud contamination in the latter half of January due to cyclonic conditions –data primarily representative of 1 -20 January

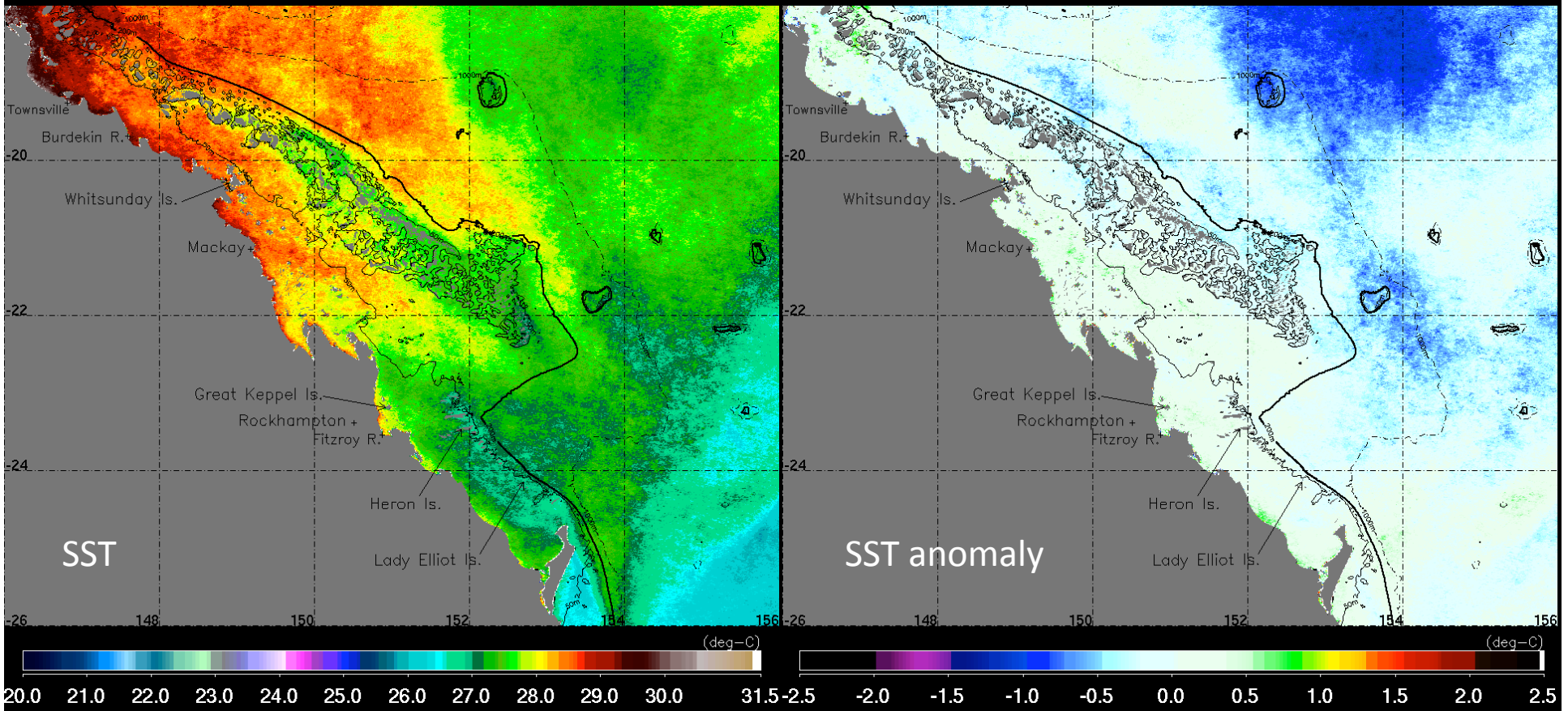
- SST anomalies present over the GBR during previous months dissipated during January, leaving mostly average temperatures along the length of the GBR.
- Only an area of strong negative anomalies persisted over the Coral Sea.

Torres Strait / far northern GBR MODIS SST: January 2013



SST data in Torres Strait / N-GBR severely impacted by cloud contamination masking values of accurate anomalies – hence, SST Anomaly image not included as not truly representative of the month

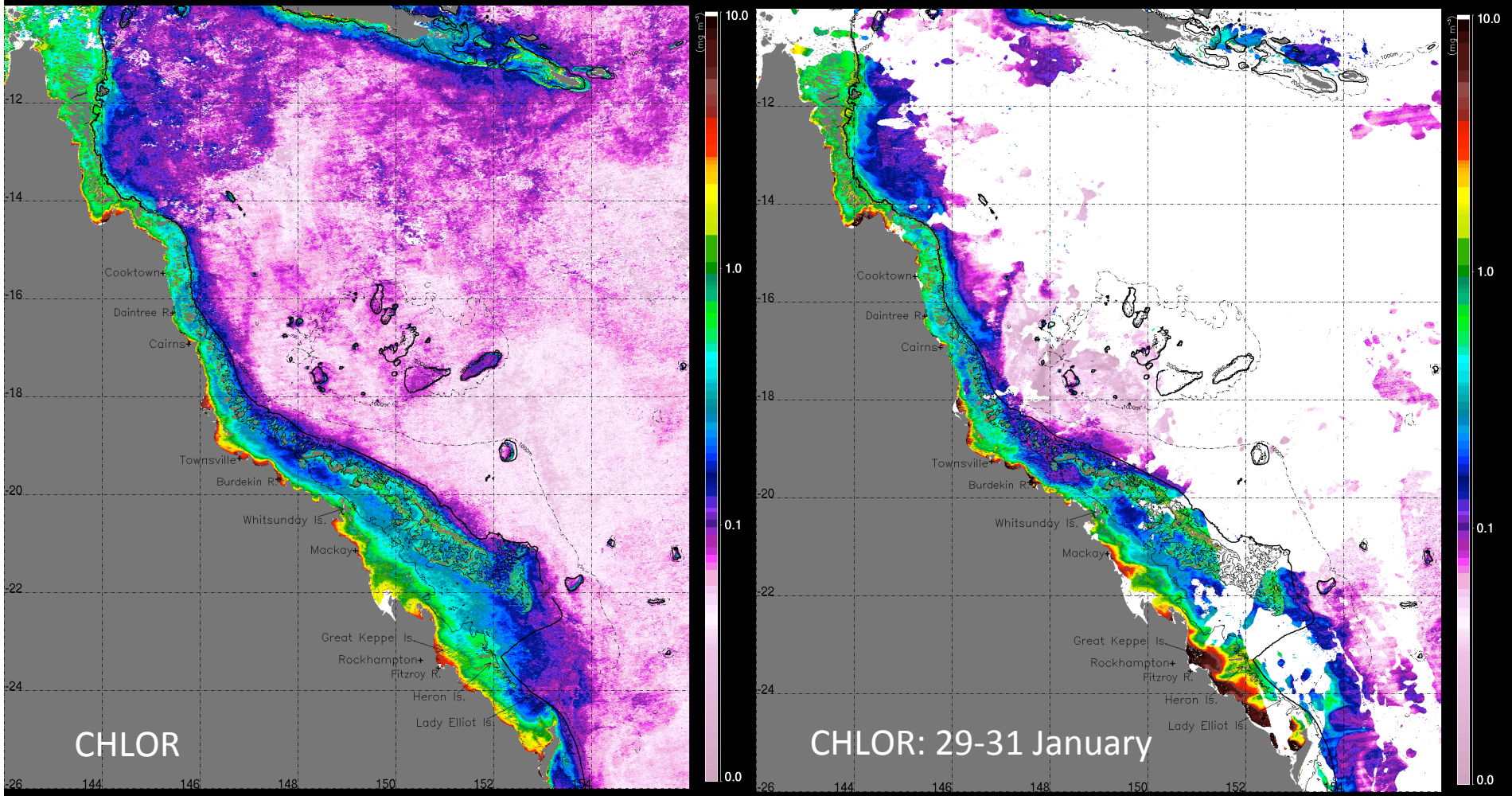
Southern GBR MODIS SST: January 2013



Note:

- Similar to previous months, mostly neutral conditions persisted for the entire S-GBR during January, while negative anomalies persisted offshore.

MODIS Chlorophyll-*a* concentration: January 2013

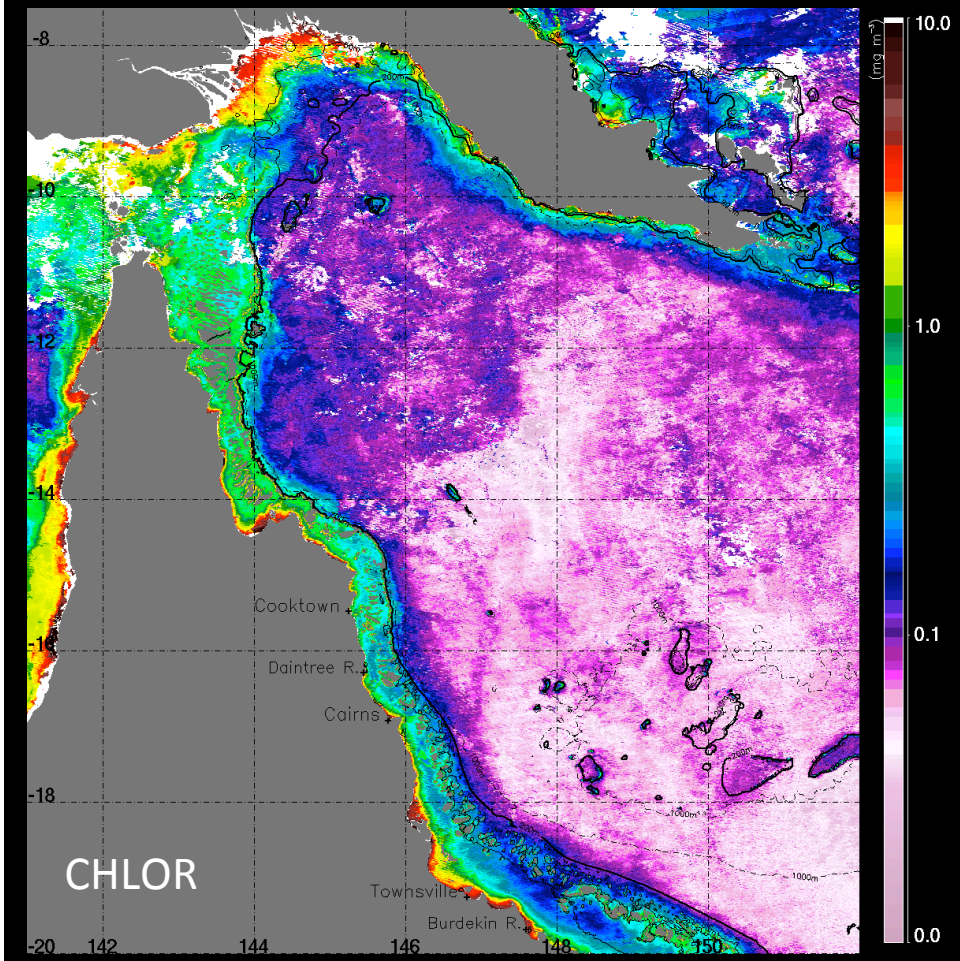


Note:

- Extreme cloud contamination and heavy rainfall during January due to Tropical Cyclone Oswald (hence anomaly not included)
- Image for 29-31 January (right panel) shows very high chlorophyll concentrations inshore due to riverine outflow (Burdekin and especially Fitzroy River) and sediment resuspension.

UQ Biophysical Oceanography Group

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

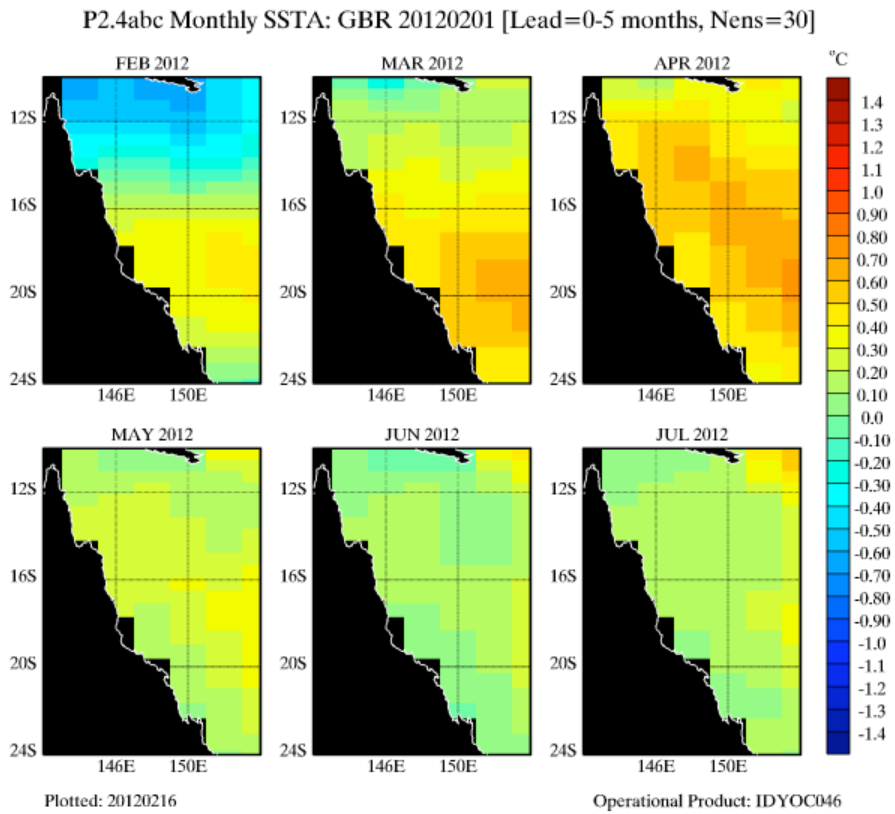


Note:

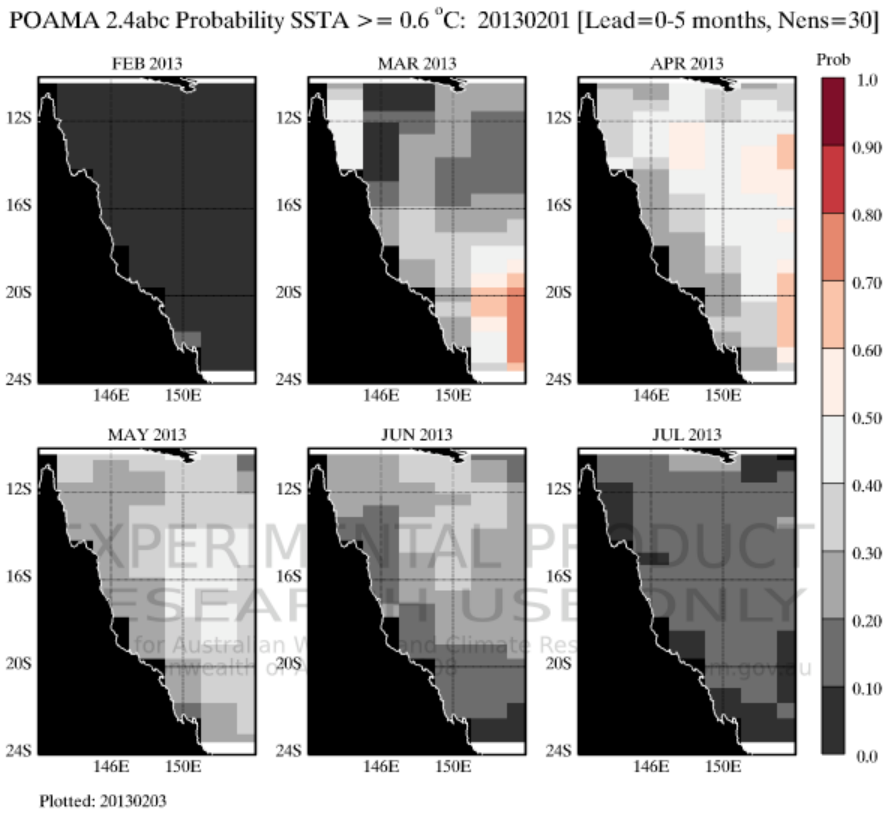
- Chlorophyll image represents only a limited number of days in January due to the extreme cloud contamination, especially in the Torres Strait / far-northern GBR. Hence, this is not a true representation of conditions for the full month and caution should be applied in the interpretation. For the same reason, the anomaly image is not included in this report.

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:

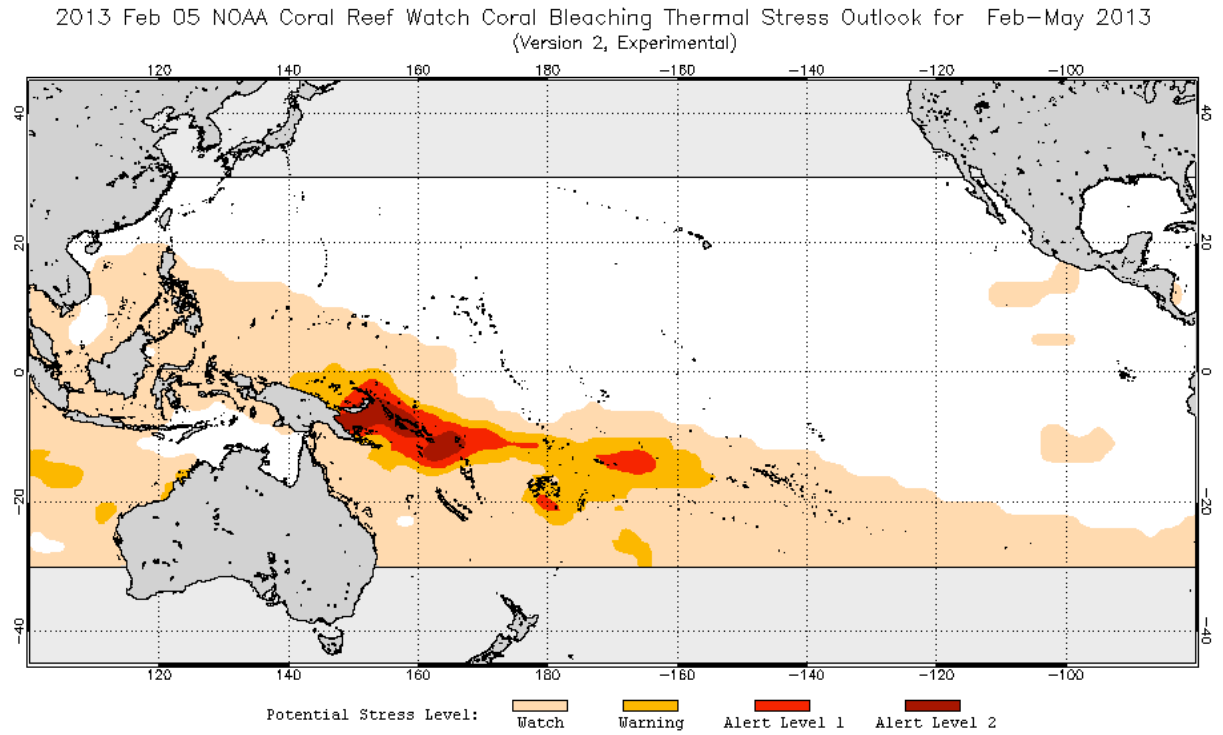
- POAMA is currently forecasting higher temperatures for February to April than previous forecasts, with maximum anomalies centered at around 20°S. However the probability of the SST anomalies exceeding 0.6°C remains very low.

NOAA Coral Reef Watch

Coral Bleaching Thermal Stress Outlook

(Version 2, experimental)

Outlook for February to May 2013



Note:

- The NOAA Coral Reef Watch forecast has been reduced from ‘Alert level 1’ to ‘Watch’ for the whole Torres Strait and GBR region.

NEW!

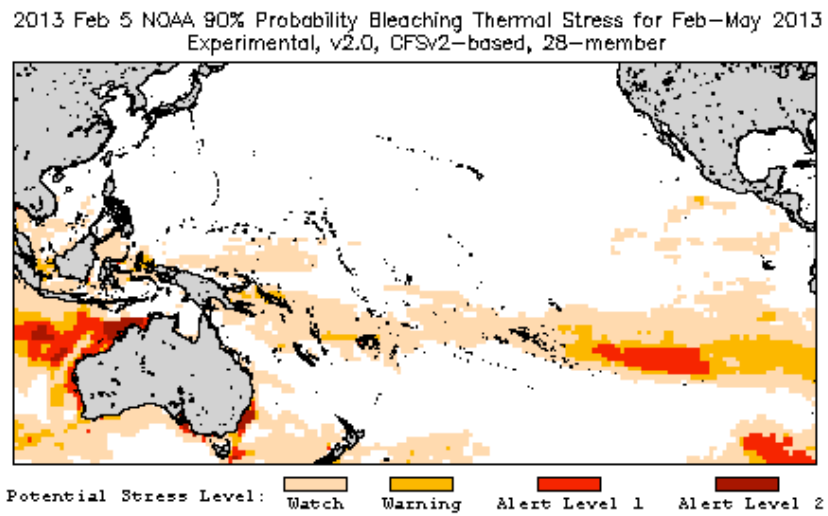
NOAA Coral Reef Watch

Seasonal Coral Bleaching Thermal Stress Outlook (CFS-based)

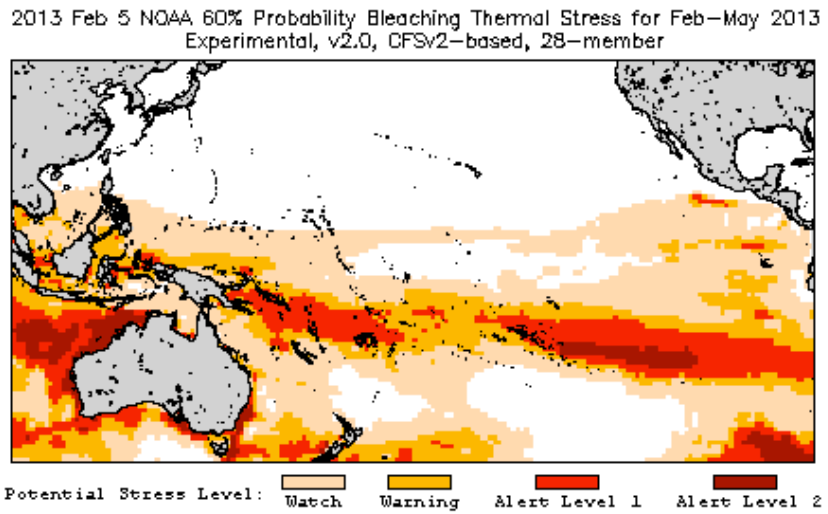
(Version 1.0, experimental, weekly, 1x1 degree spatial resolution)

Probability of bleaching thermal stress for Feb-May 2013:

90%



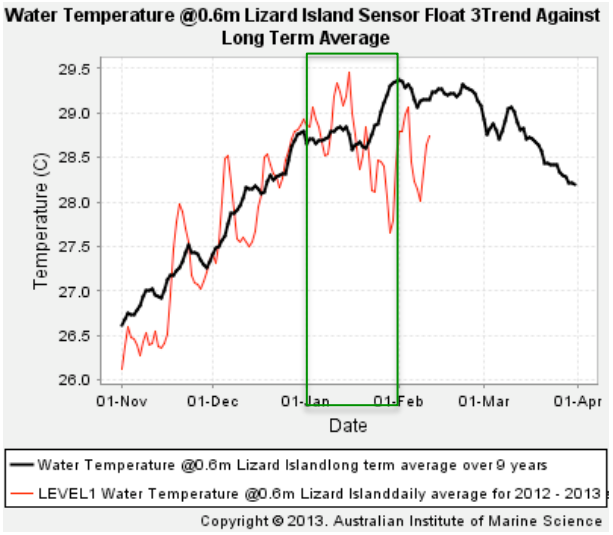
60%

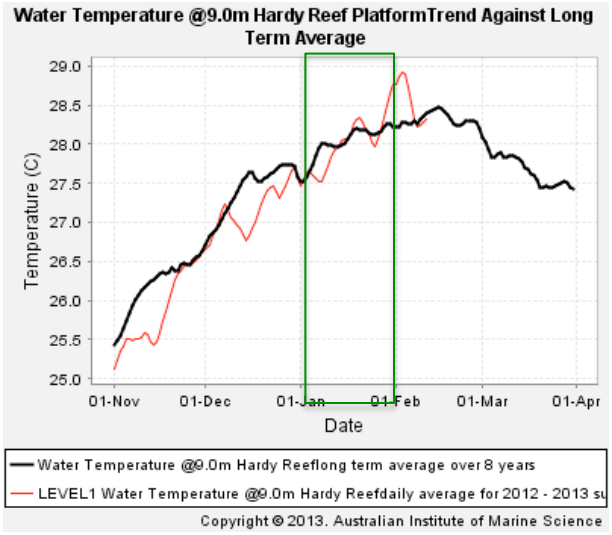


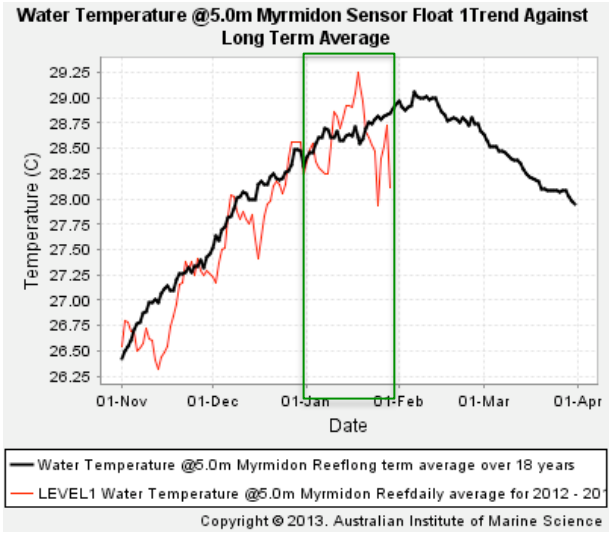
Note:

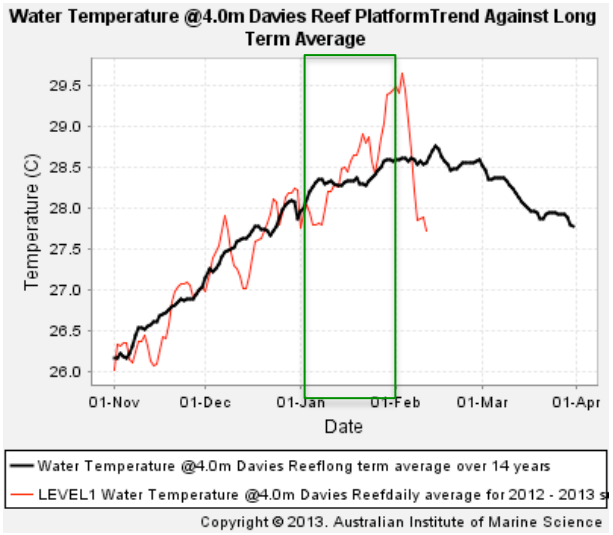
• NOAA Cora Reef Watch has developed a new seasonal outlook system based on NOAA's operational climate forecast system (CFS). These outlooks predict the probability of thermal stress events capable of causing large-scale, mass coral bleaching, using a weekly 28-member ensemble of SST forecast from the CFS. The second version of the CFS-based Thermal Stress Outlook was released in December 2012.

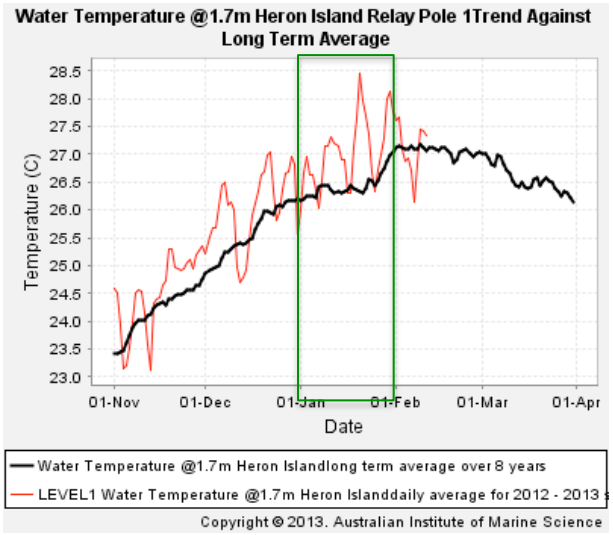
Weather Observing System: AIMS Data Centre

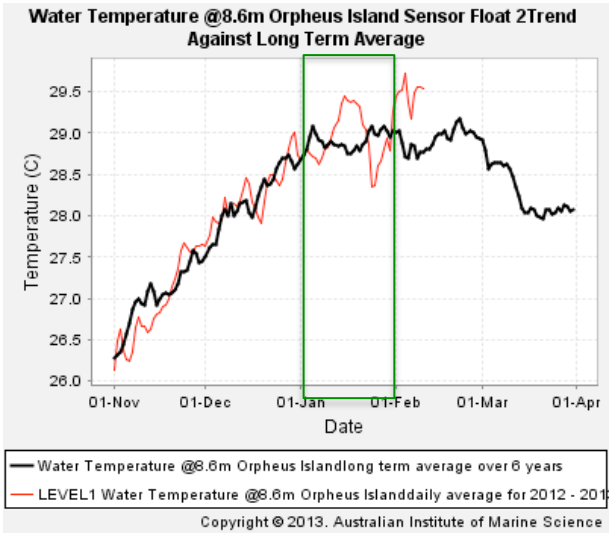








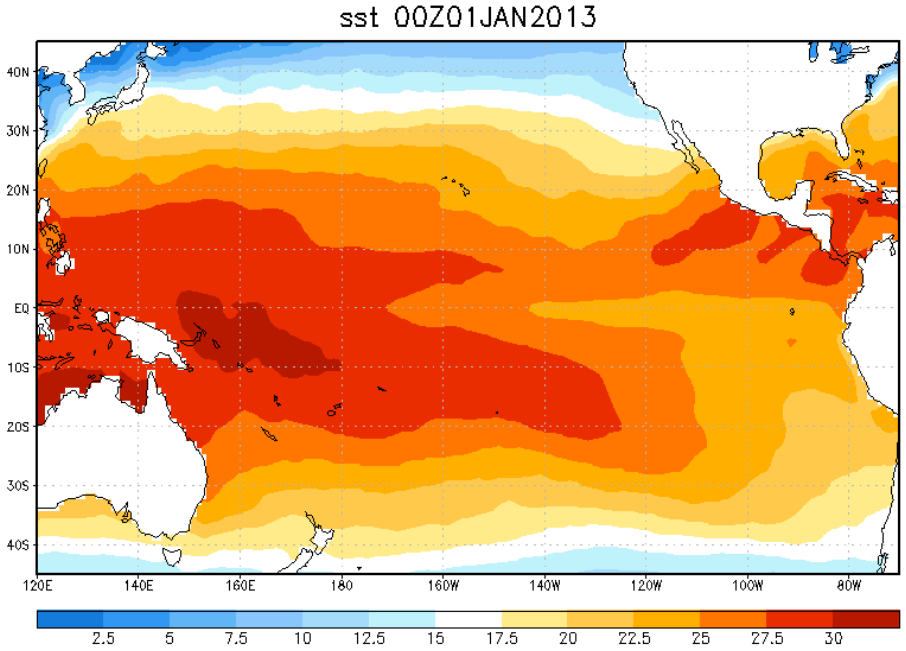




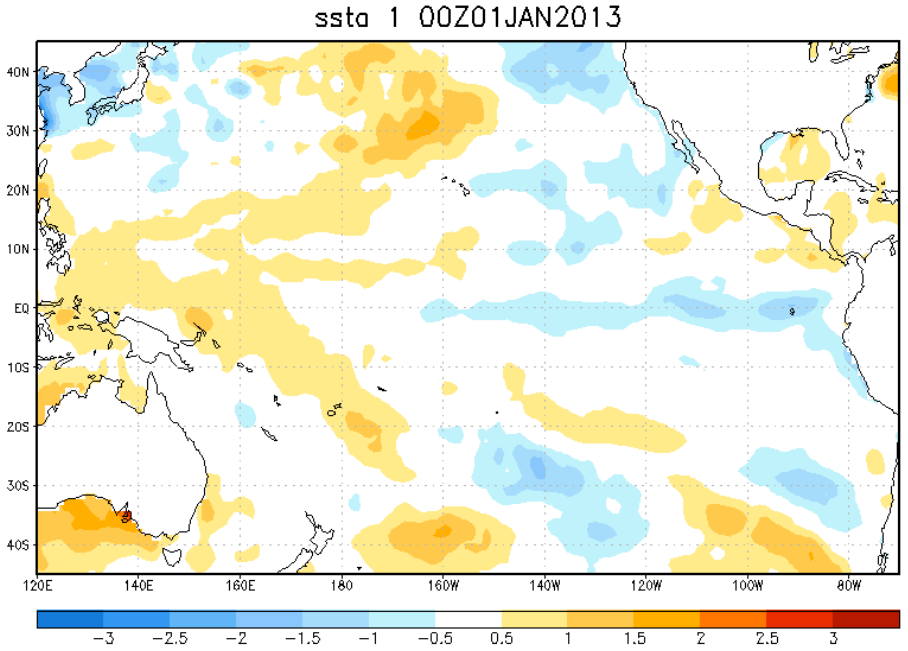
- Most of the AIMS weather stations show temperatures close to or above the long-term mean for January but drop at the end of the month, coincident with the “stormy weather” due to TC Oswald.
- Heron Island (S-GBR) and Davies Reef (18.5°S) however show strongly-fluctuating temperatures throughout January

NOAA Optimum Interpolation Sea Surface Temperature Analysis:

OI SST: JANUARY 2013



OI SST ANOMALY: JANUARY 2013



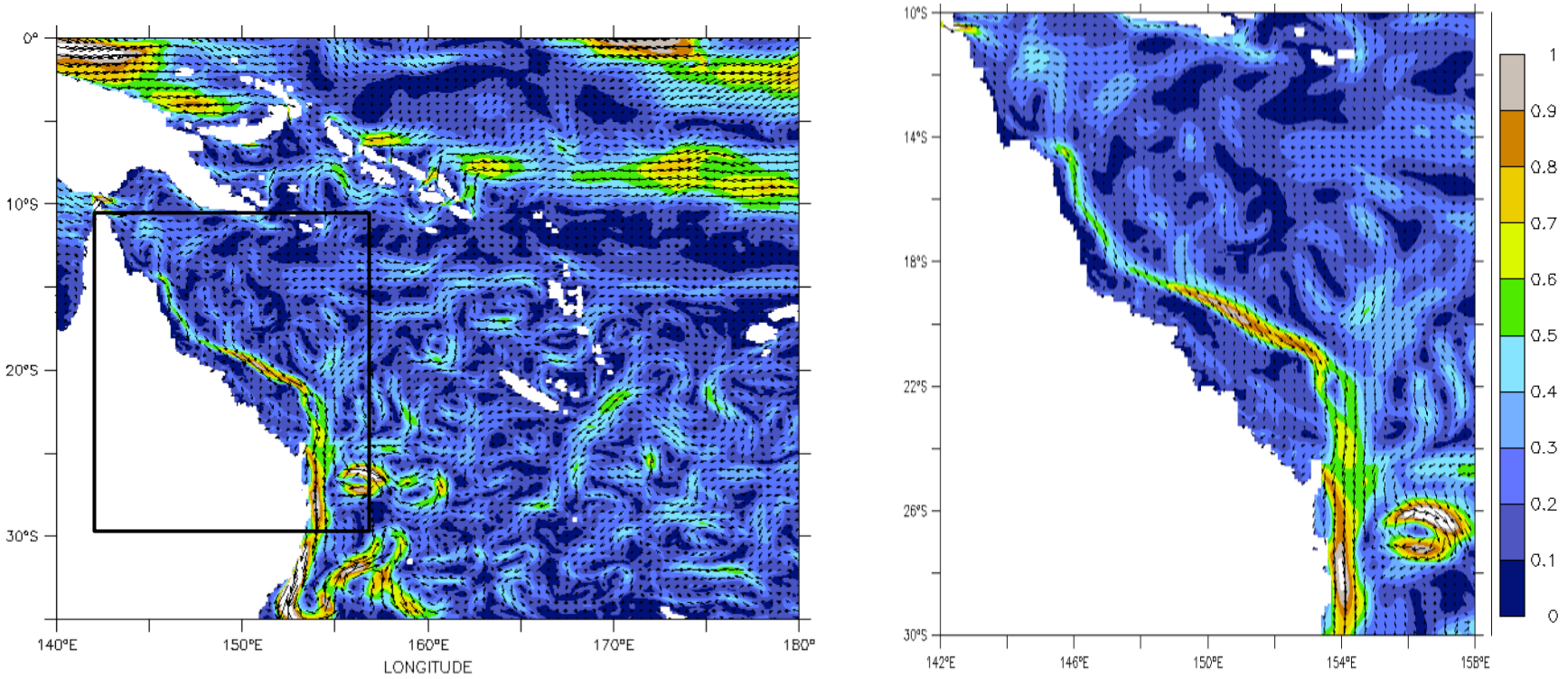
Note:

- The weak negative anomalies present in the east equatorial Pacific during December expanded westward during January, while the positive SST anomalies over the western equatorial Pacific continued to weaken.

OceanMAPS 15m Depth-Average Currents

December 2012

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.

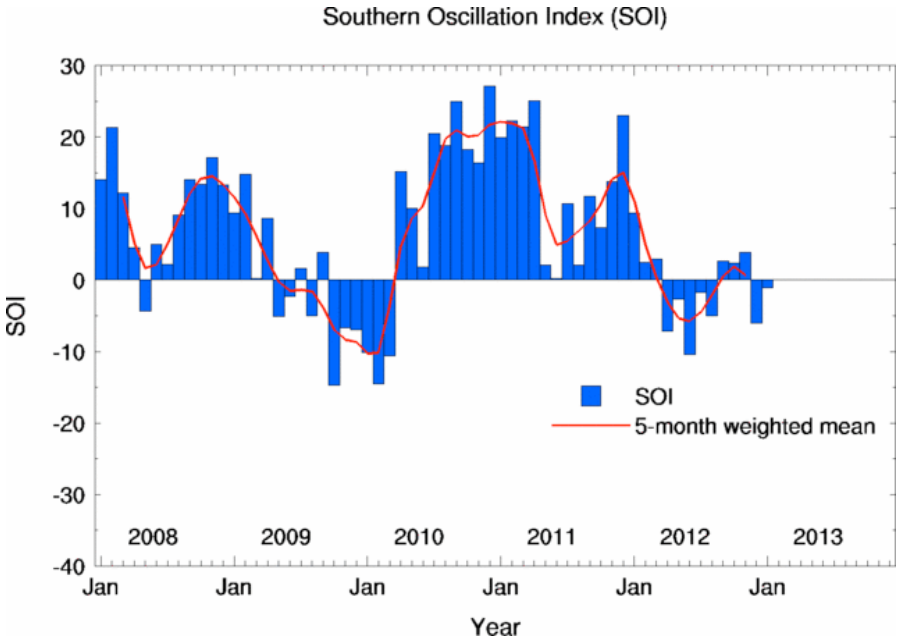


Behind Real Time analysis
15 m Depth-Averaged Currents (m/s).

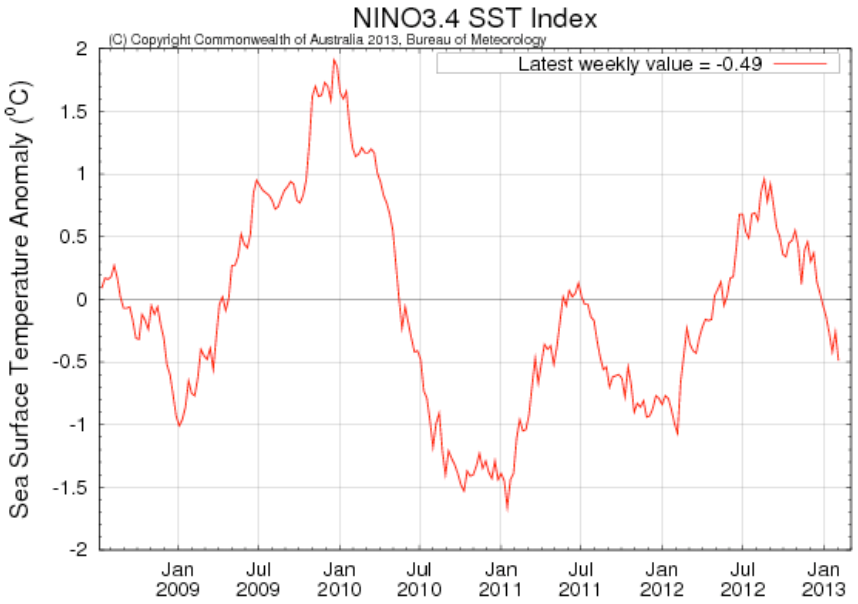
Note:

- A strong and well defined EAC is apparent along the GBR shelf-edge, starting further north (at ~14°S) and being more intense than during December.
- Strong eddy activity continues off SE Queensland.

ENSO index



Negative SOI = El Niño



Positive Nino 3.4 index= El Niño

Note:

- ENSO-neutral conditions continued during January and are expected to persist for the upcoming months.