NERP

Torres Strait / GBR environmental conditions report:

Recent status and predictions

10 June 2014

By Marites Magno-Canto
work supervised by Dr. Scarla Weeks
Contact: m.canto@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 close to average conditions along the length of the GBR with slight positive SST anomalies along the Torres Strait region.

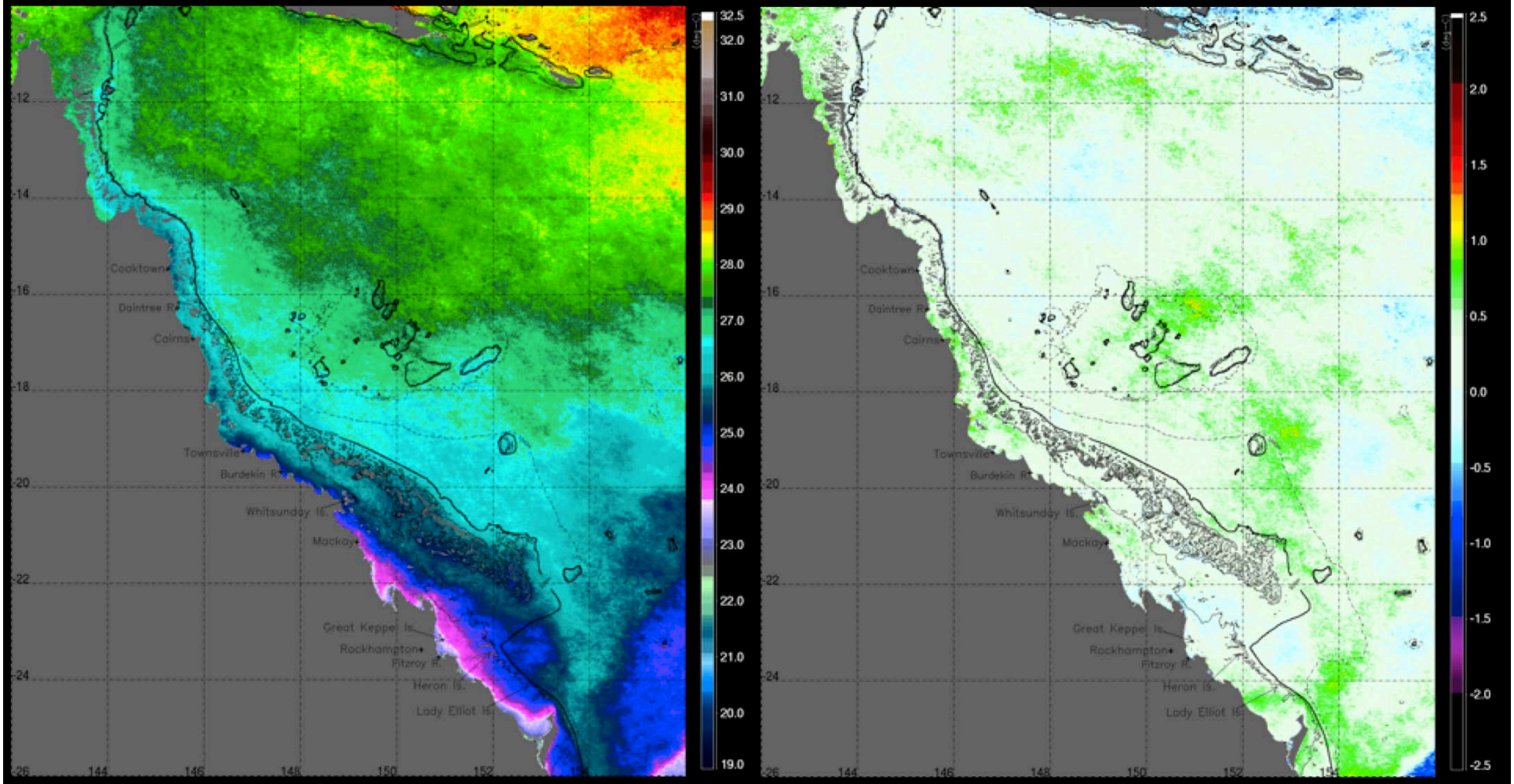
- *In situ* data show sea water temperature fluctuations relative to the long-term mean. Thursday Island weather station, for example, show temperatures slightly above the long term mean.

- POAMA continue to forecast slightly warmer conditions along the southernmost areas of the GBR for the next 6 months with a slightly increased probability of SST anomalies exceeding 0.6°C in the region compared to April

- **Progression of the Kelvin Wave:** In the equatorial Pacific, the strong eastward-propagating Kelvin Wave, initiated in January and reached the west coast of South America last April has become stronger and more widespread. The equatorially-trapped Kelvin wave is related to increased oceanic heat content and warmer than normal subsurface temperatures (red areas) over much of the eastern tropical Pacific

- ENSO neutral conditions continued in the Pacific during May and are expected to remain for the immediate upcoming months, with 70% likelihood of transitioning to El Nino conditions during the austral winter

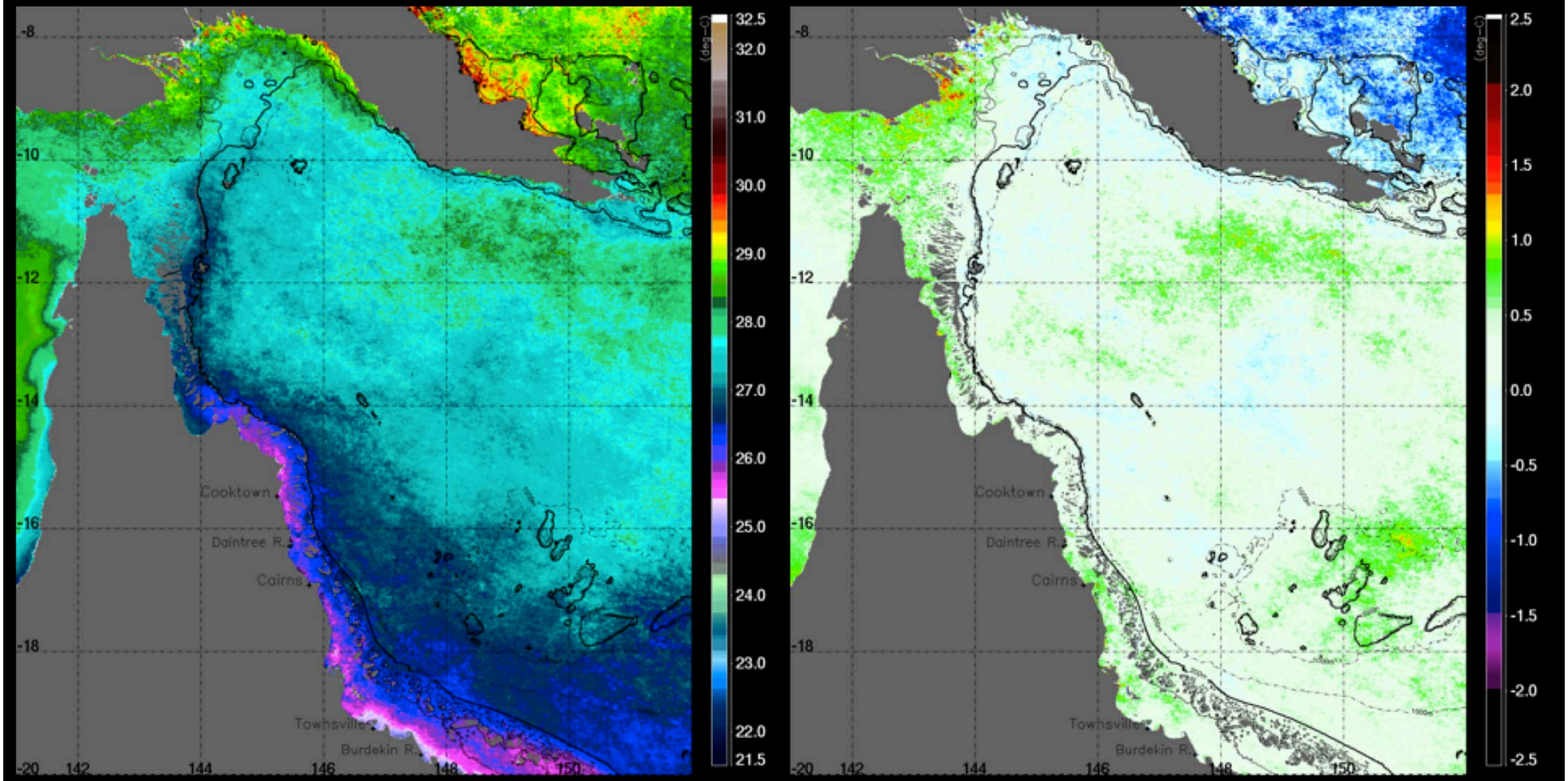
MODIS sea surface temperature (day+night) May 2014



Note:

- Mostly close to average conditions along the length of the GBR

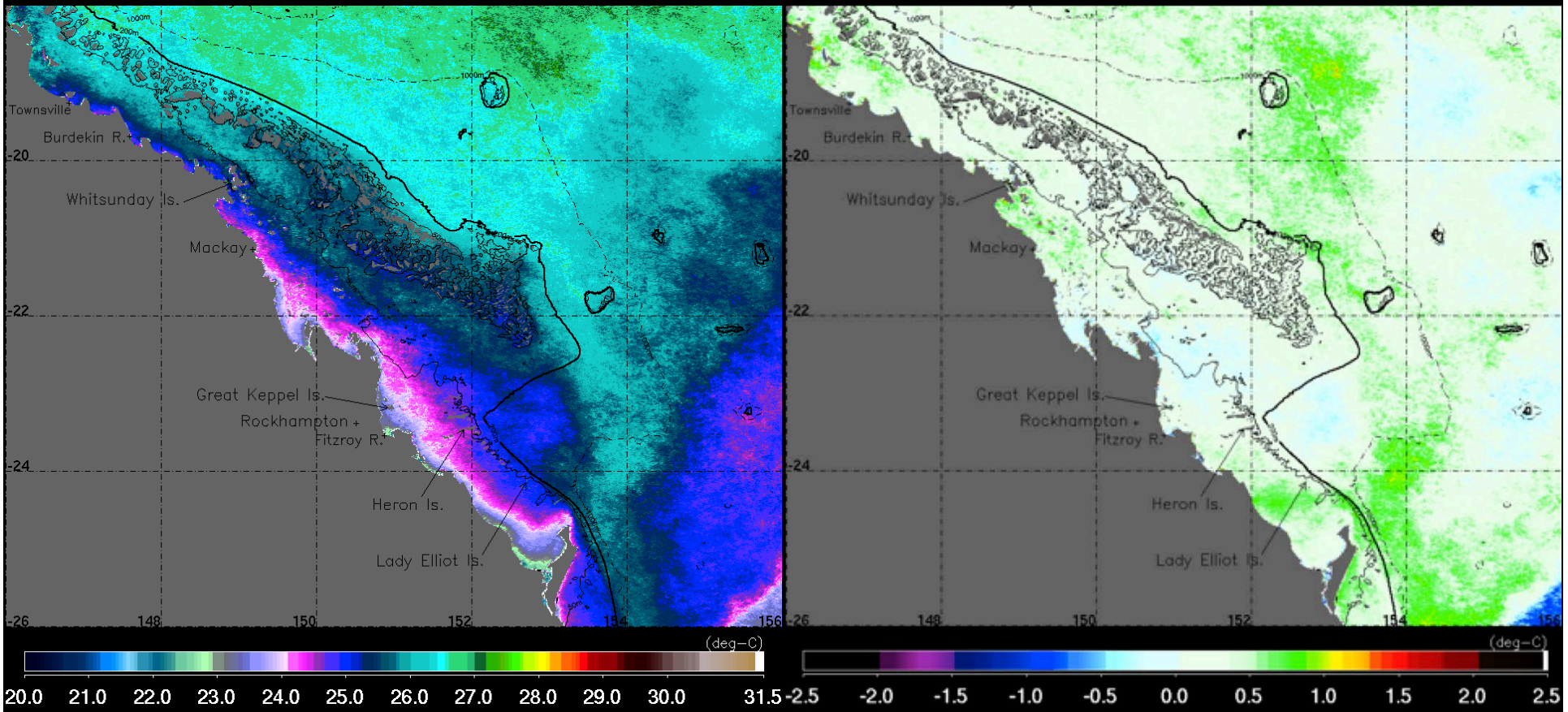
Torres Strait / far northern GBR
MODIS sea surface temperature (day+night)
May 2014



Note:

- Mostly close to average SST conditions throughout the N-GBR
- Weak positive SST anomalies along the Torres Strait region
- Negative anomalies offshore north of 14°S from previous month have already dissipated

Southern GBR
MODIS sea surface temperature (day+night)
May 2014

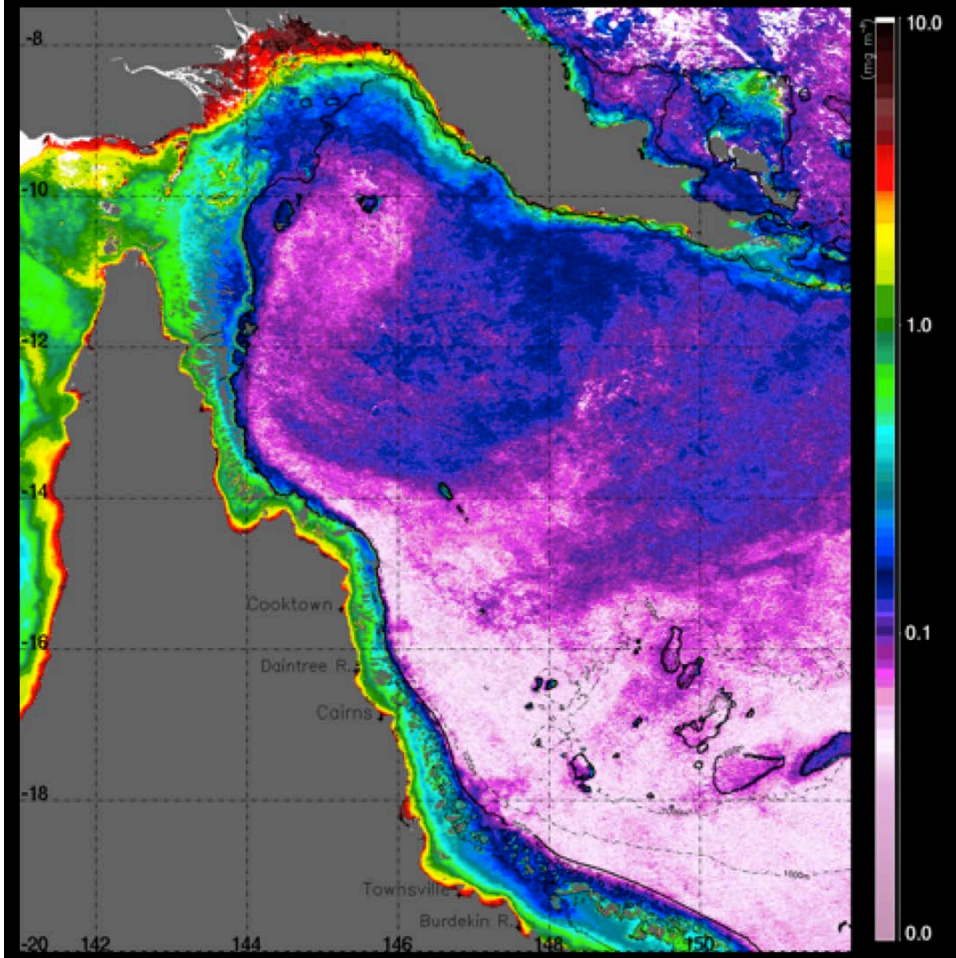


Note:

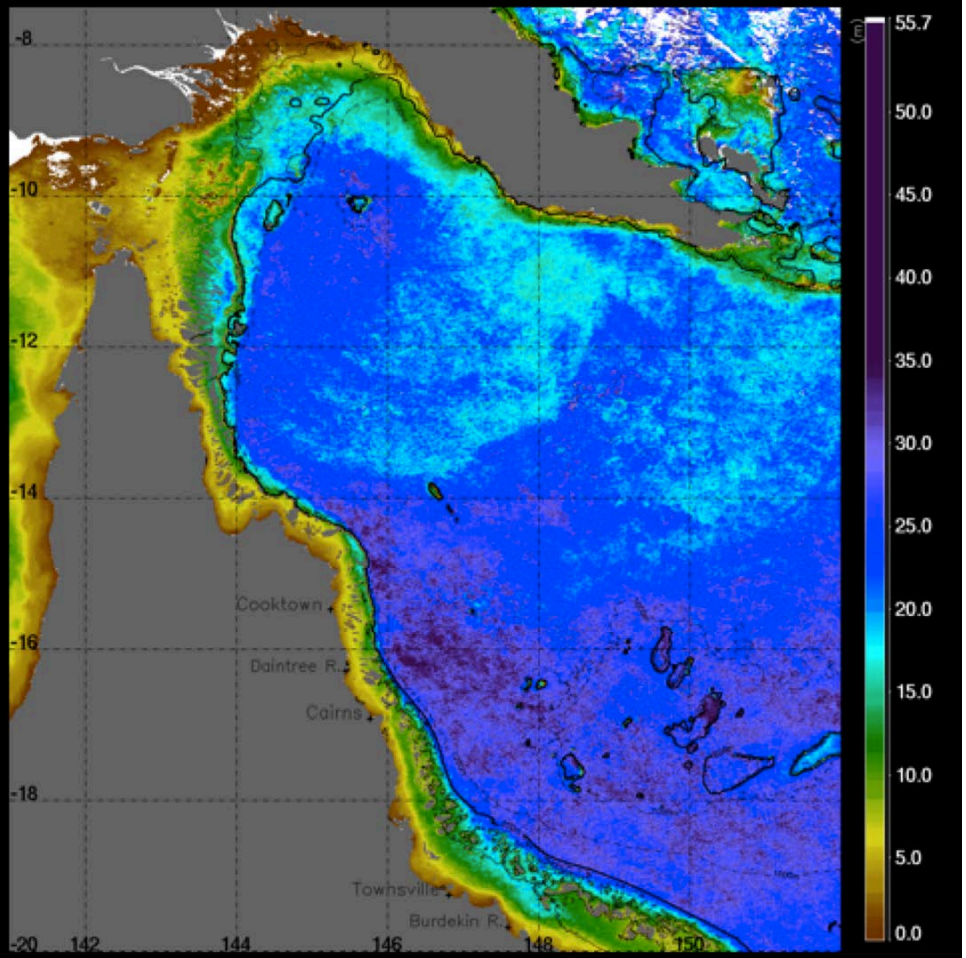
- Mostly close to average conditions present on the S-GBR for May.
- Weak positive SST anomalies apparent around the Capricorn Eddy region

Torres Strait / far northern GBR
May 2014

MODIS chlorophyll-*a* concentration



MODIS 10% photic depth

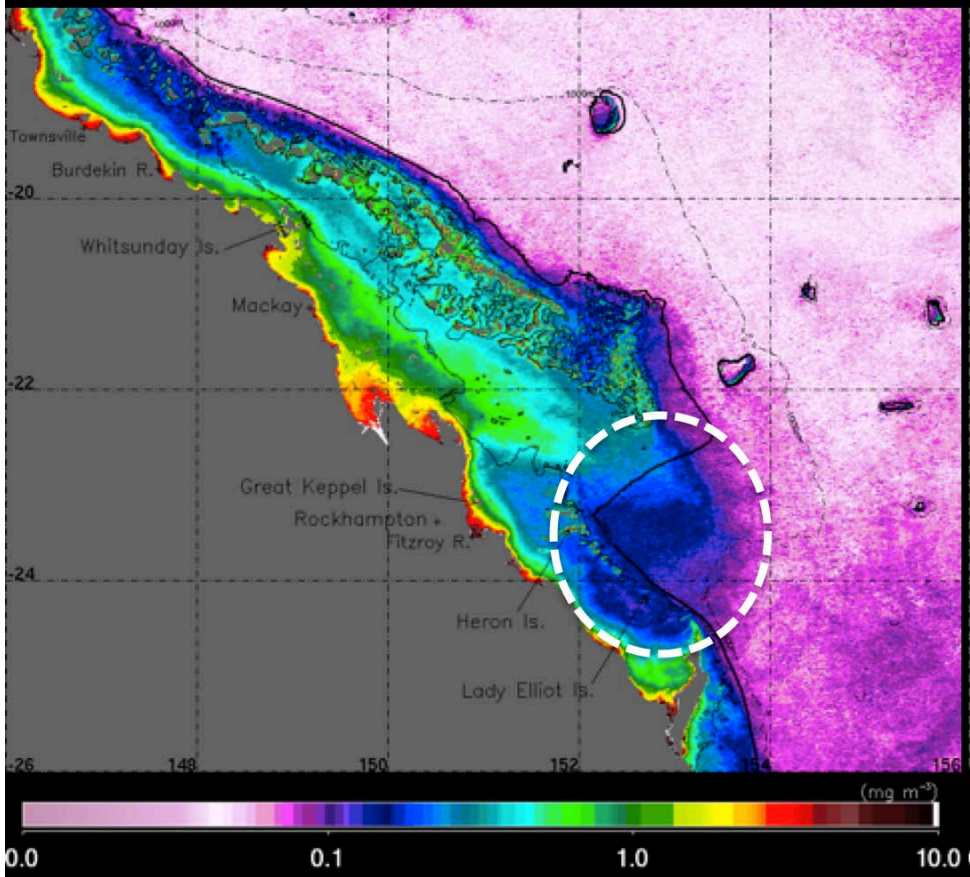


Note:

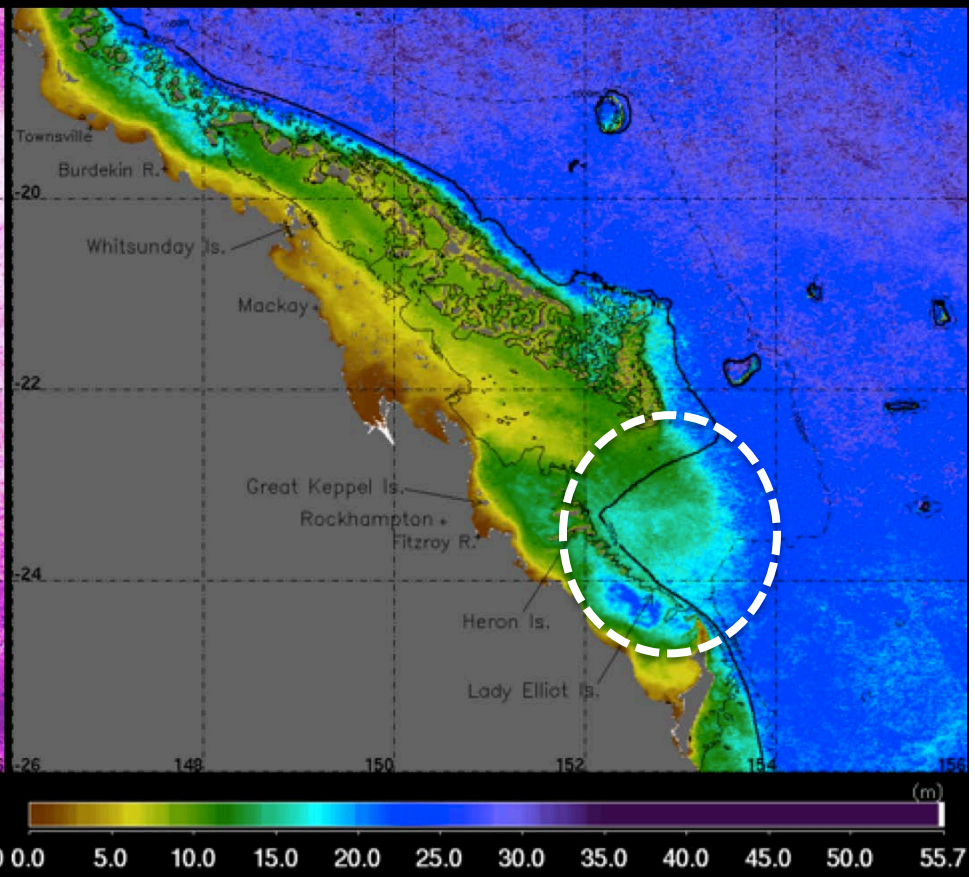
- Similar to April 2014, surface signals corresponding to PNG Gyre still apparent in both chlorophyll-*a* and photic depth monthly mean images as lower chlorophyll and deeper photic depth oceanic waters, respectively.

Southern GBR
May 2014

MODIS chlorophyll-*a* concentration



MODIS 10% photic depth

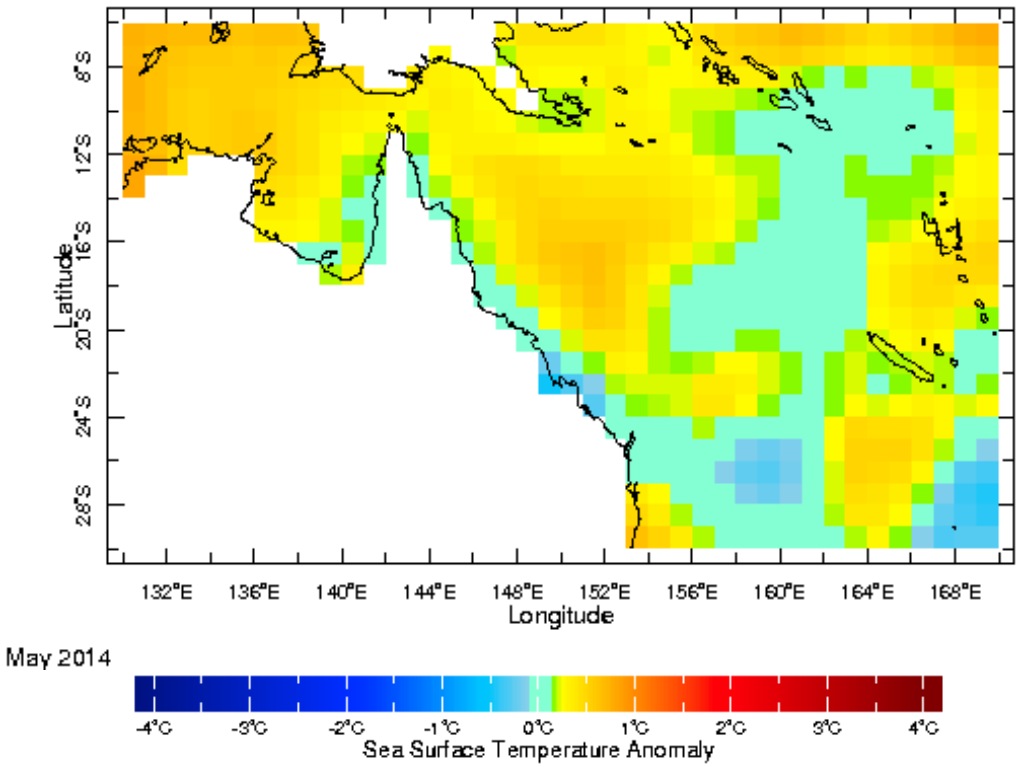


Note:

- Surface manifestation of the Capricorn Eddy (circled region) also clearly apparent in both chlorophyll-*a* and photic depth monthly mean images similar to the previous month.
- Clear intrusions into the Curtis Channel associated with the dynamics of the Eddy also evident

Sea Surface Temperature Anomaly

from NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2



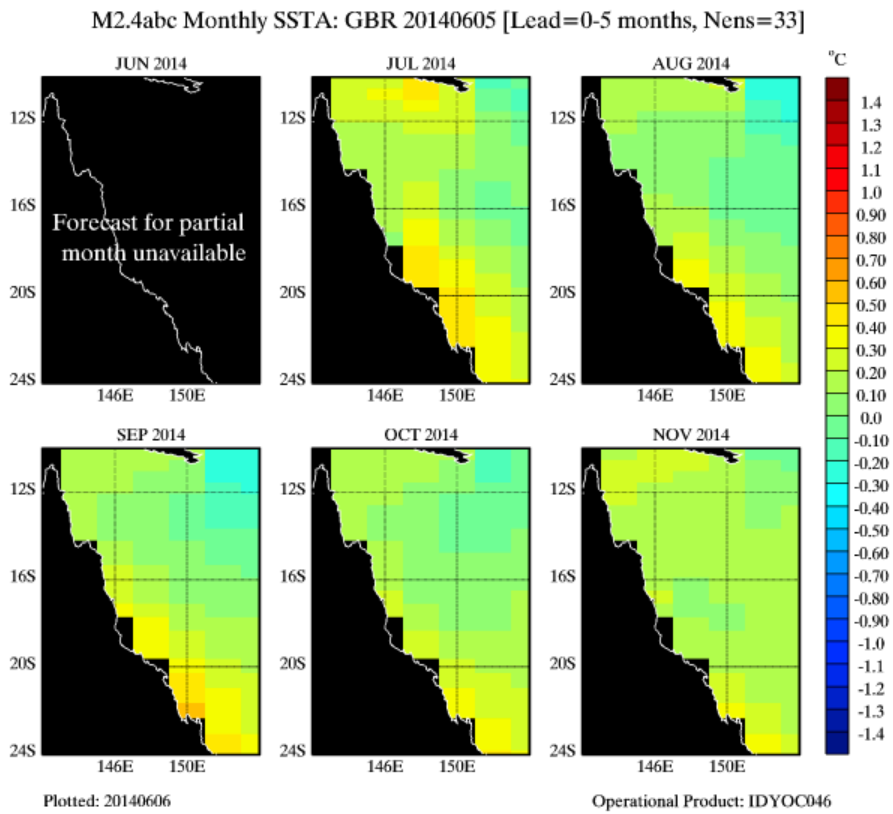
Note:

- In agreement with MODIS data, Reynolds SST show close to neutral conditions along the length of the GBR and a weak positive SST anomalies along Torres Strait region

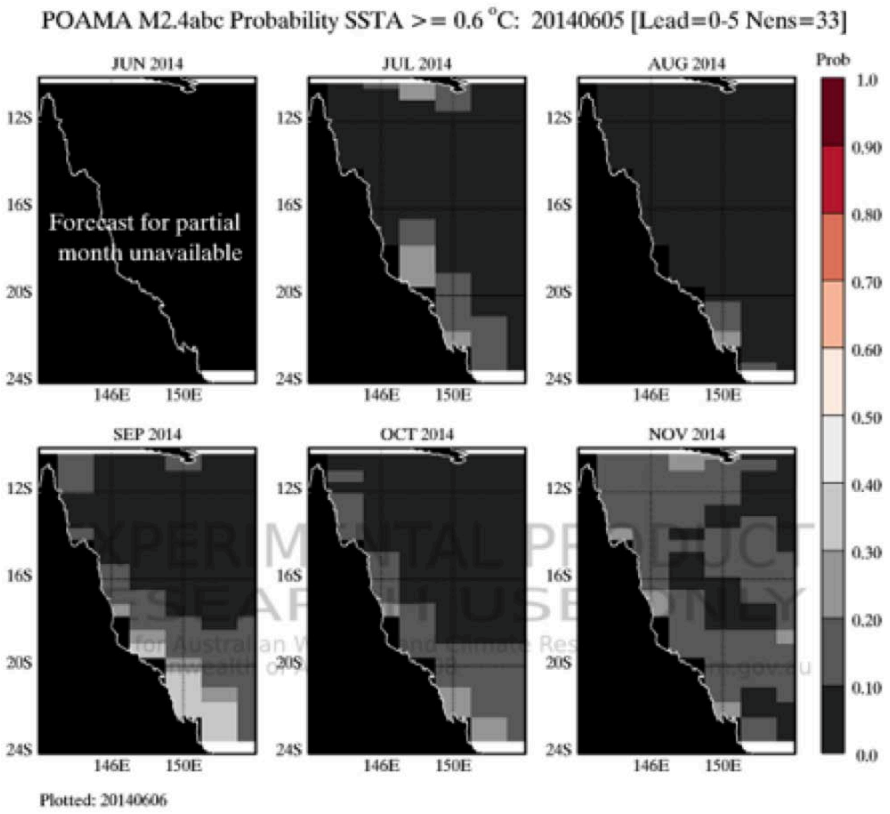
http://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.EMC/.CMB/.GLOBAL/.Reyn_SmithOIv2/

Sea surface temperature 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 continue to forecast slightly warmer conditions along the southernmost areas of the GBR for the next 6 months with a slightly increased probability of SST anomalies exceeding 0.6°C in the region compared to April.

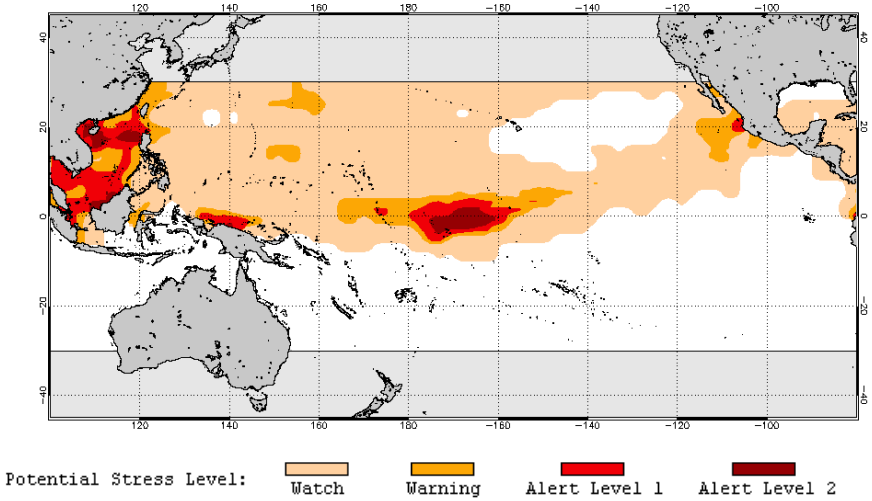
NOAA Coral Reef Watch

Seasonal coral bleaching thermal stress outlook

June to September 2014

LIM-based

Version 2, experimental, weekly 2x2 degree spatial resolution



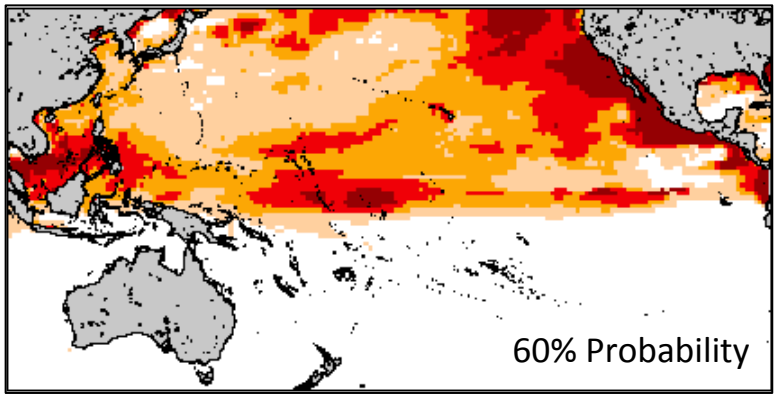
Note:

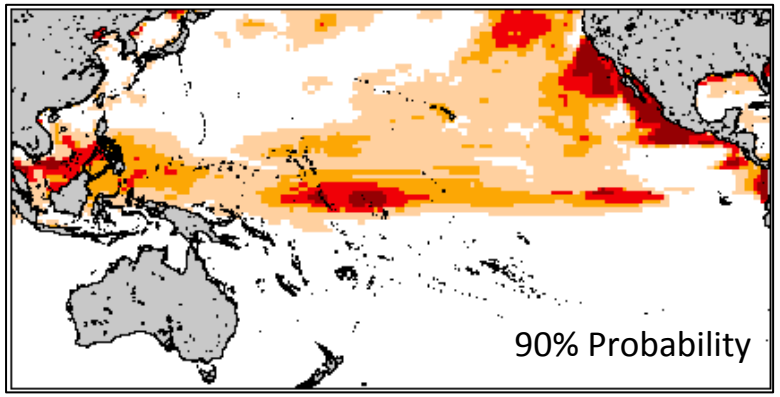
- Outputs from Coral Reef Watch continue to depict no potential stress levels for the upcoming months over the GBR and Torres Strait areas.

(These outlooks are based on SST predictions from: CRW's experimental statistical Linear Inverse Model (LIM-based – left panel) and the NCEP Climate Forecast System (CFS-based – right panel) systems)

CFS-based

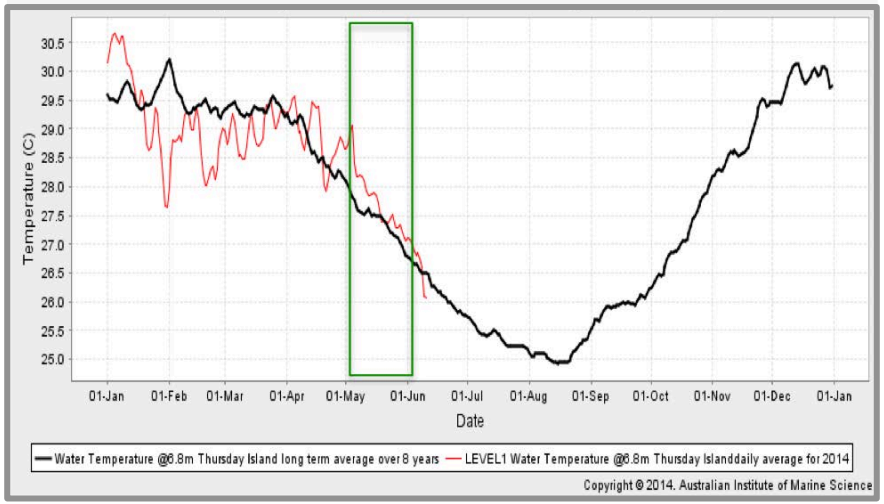
Version 2, experimental, weekly 1x1 degree spatial resolution



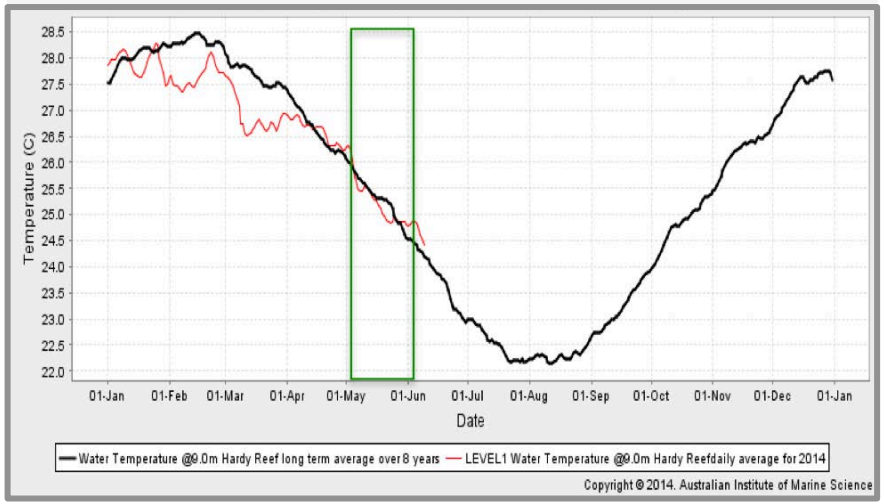


Water temperatures from IMOS Sensor Network (FAIMMS) (AIMS operated)

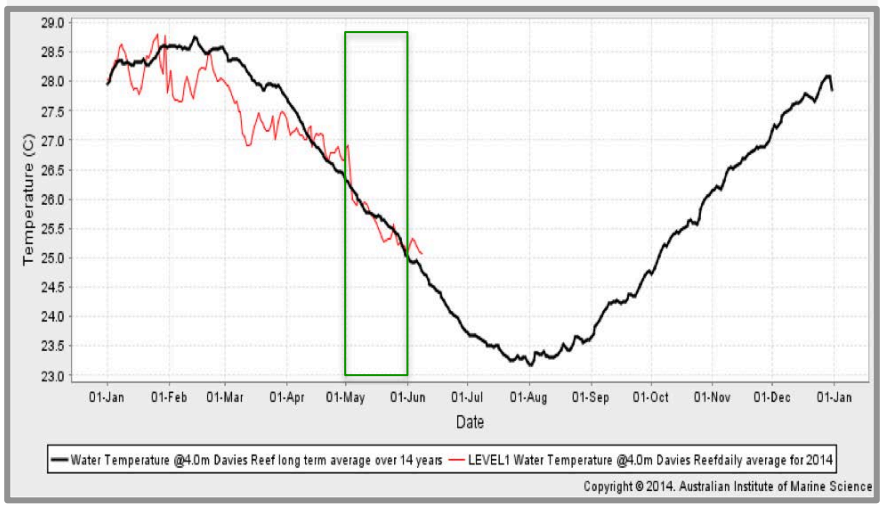
Water temperature @6.8m Thursday Island Weather Station trend against longterm average



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

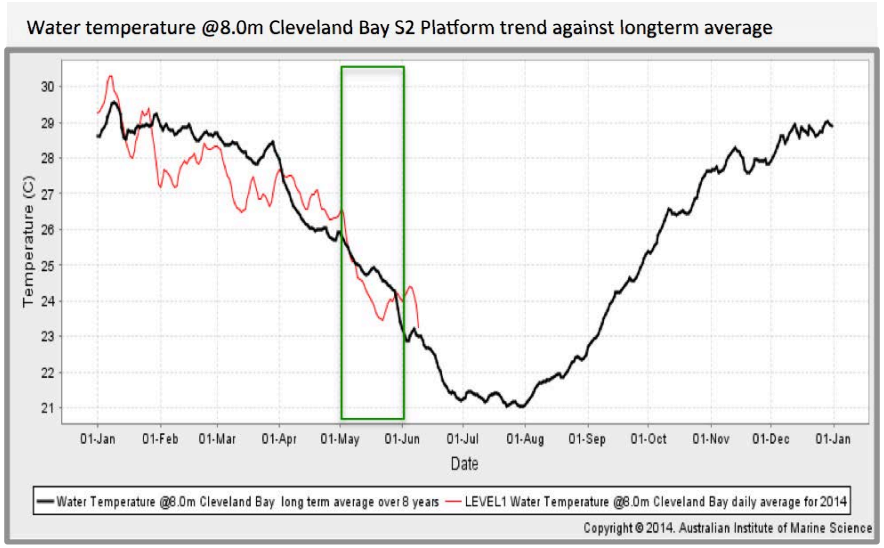


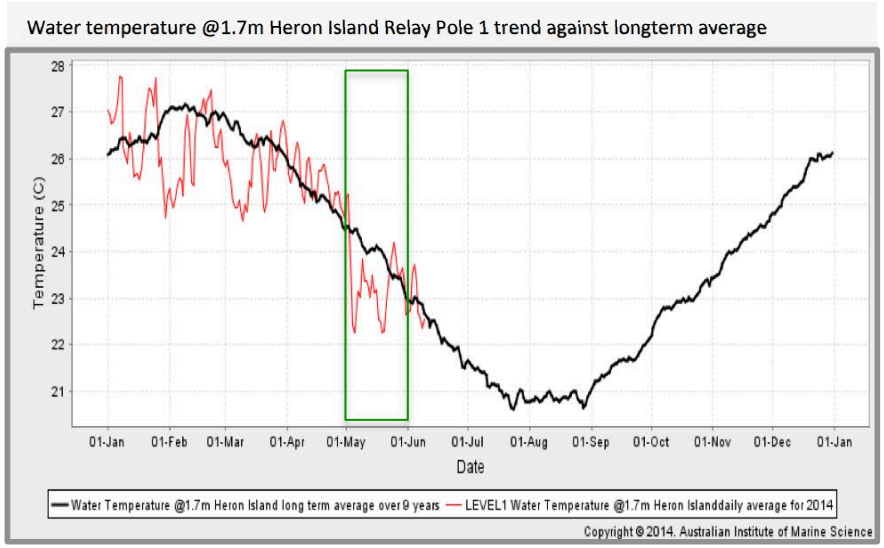
Water temperature @4.0m Davies Reef Platform trend against longterm average



- Data from these AIMS weather stations show *in situ* sea water temperatures fluctuating slightly above (Thursday Island) or close to the long-term mean throughout May (Hardy and Davies Reef stations).

Water temperatures from IMOS Sensor Network (FAIMMS) (AIMS operated)



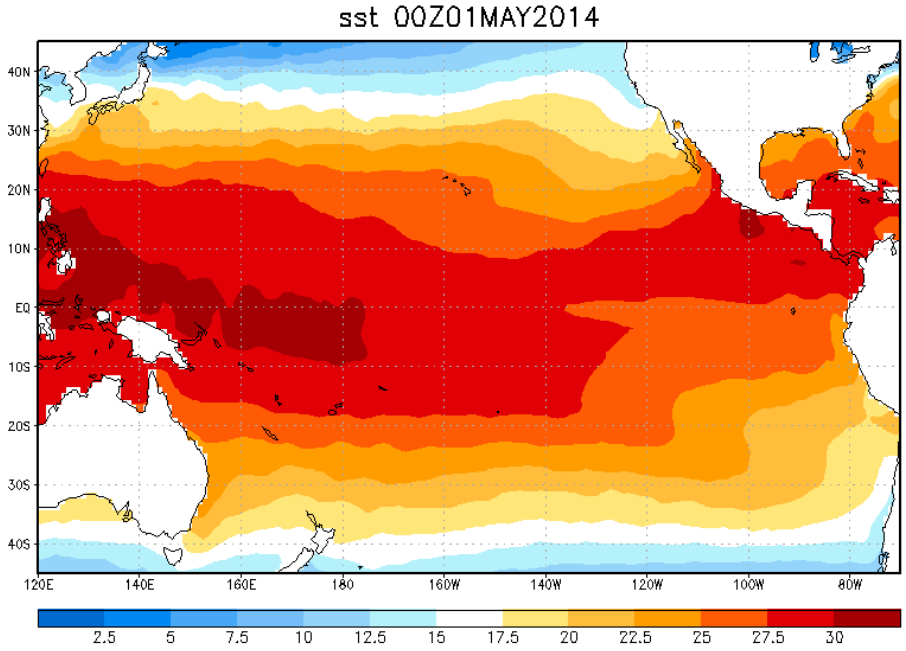


Note:

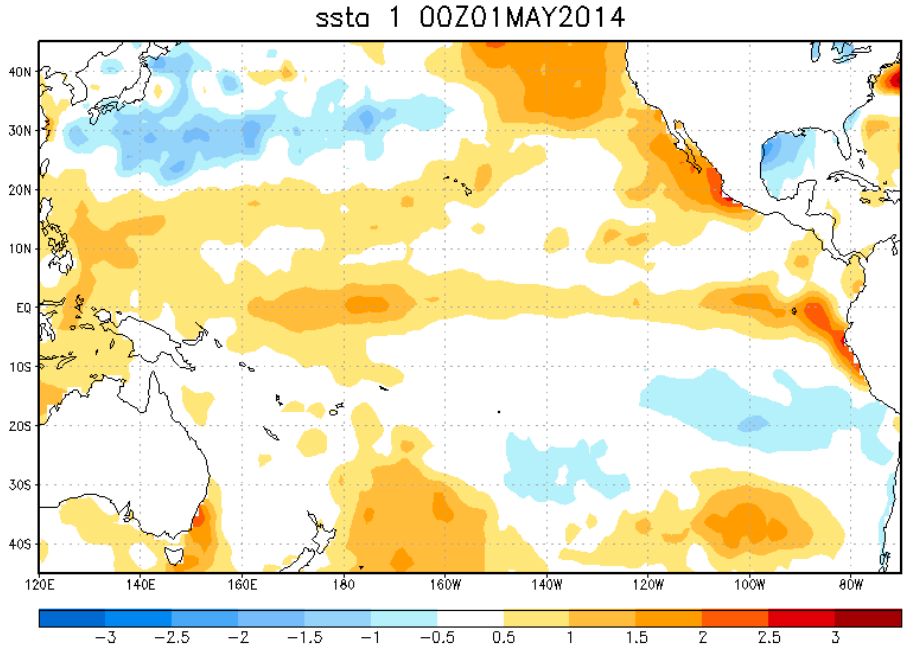
- Data from AIMS weather stations at Cleveland Bay and Heron Is. shows *in situ* sea water temperatures mostly well below the long-term mean except during the last week of May.

NOAA optimum interpolation sea surface temperature

OISST MAY 2014



OISST anomaly MAY 2014



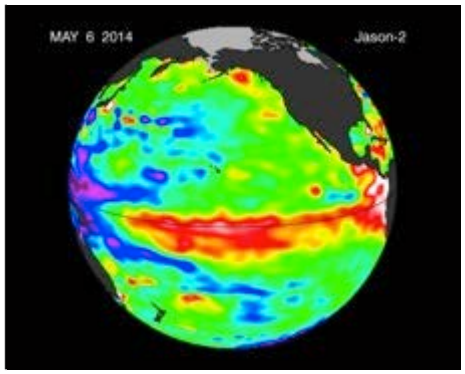
Note:

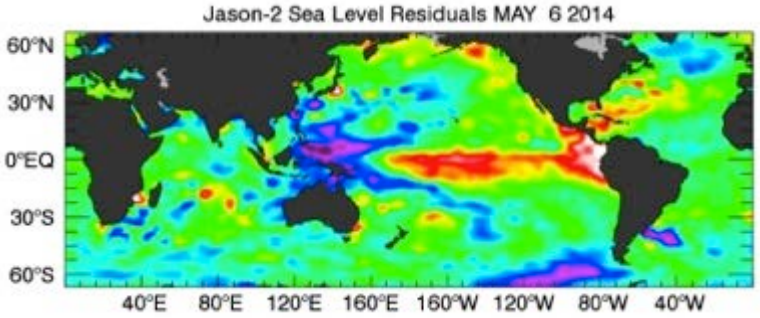
- The pattern of positive SST anomalies over the equatorial Pacific continue to become more widespread during May. Increased SST anomalies also apparent across the eastern Pacific. This pattern is consistent with the progression of the Kelvin Wave (see next slide).

http://www.emc.ncep.noaa.gov/research/cmb/sst_analysis/

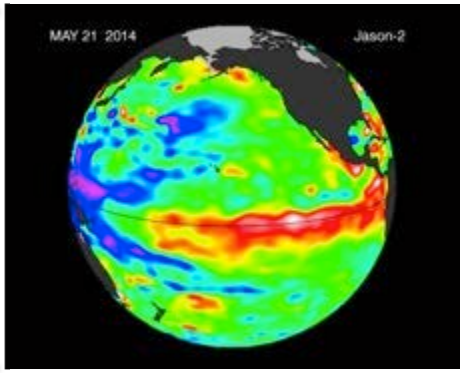
Sea surface height anomalies from Ocean Surface topography: Jason-2 (NASA/French)

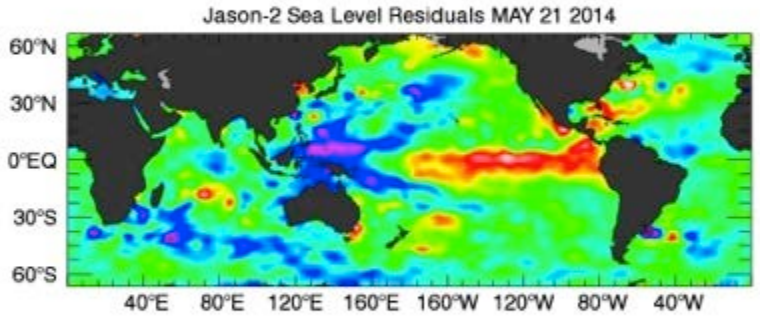
6th May 2014





21st May 2014



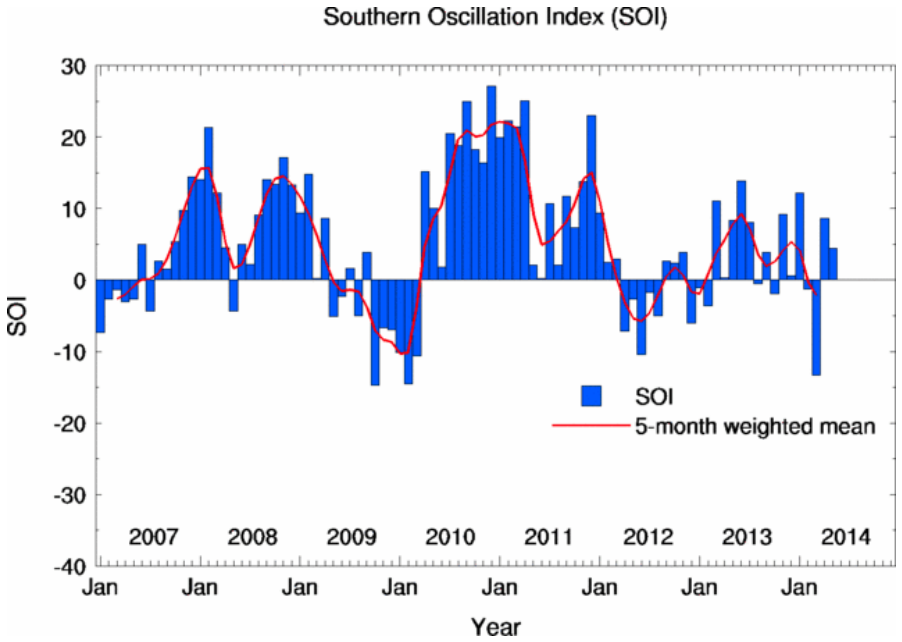


Note:

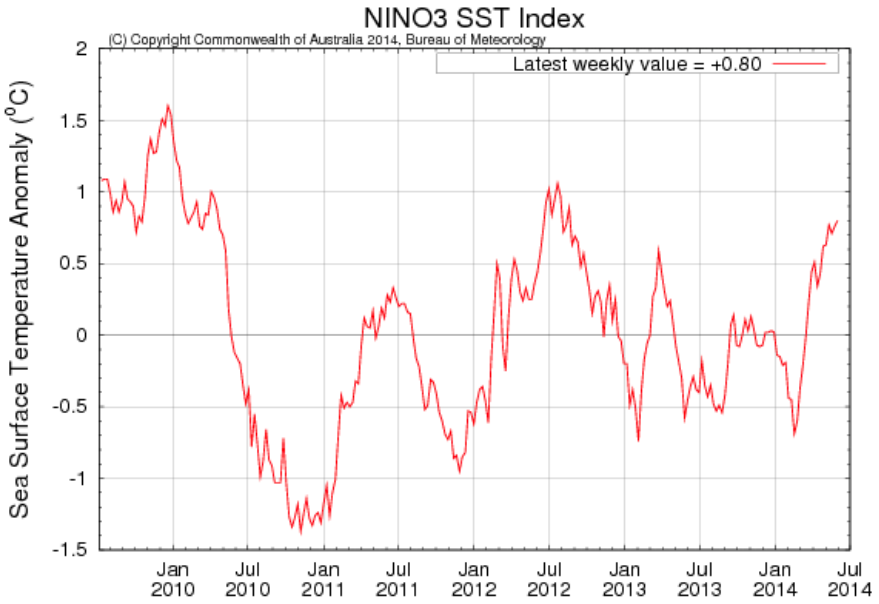
- During May, sea-level height data shows the eastward-propagating Kelvin Wave (initiated in January this year) along the west coast of South America as stronger and more widespread compared to previous months. The equatorially-trapped Kelvin wave is related to increased oceanic heat content and warmer than normal subsurface temperatures (red areas) over much of the eastern tropical Pacific.

http://sealevel.jpl.nasa.gov/science/elninopdo/latestdata/

ENSO Index



Negative SOI = El Niño



Positive Nino 3.4 index= El Niño

Note:

- ENSO neutral conditions continued during May despite increased positive SST anomalies over the equatorial Pacific.
- These ENSO neutral conditions are still expected to persist in the upcoming months although models indicate 70 to 80% likelihood of conditions transitioning to El Nino during the austral winter to summer months, respectively.

SOI: http://www.bom.gov.au/climate/current/soi2.shtml
ONI: http://134.178.63.141/climate/enso/indices.shtml