NERP

Torres Strait / GBR environmental conditions report:

Recent status and predictions

August 2014

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UQ-GPEM Biophysical Oceanography Group

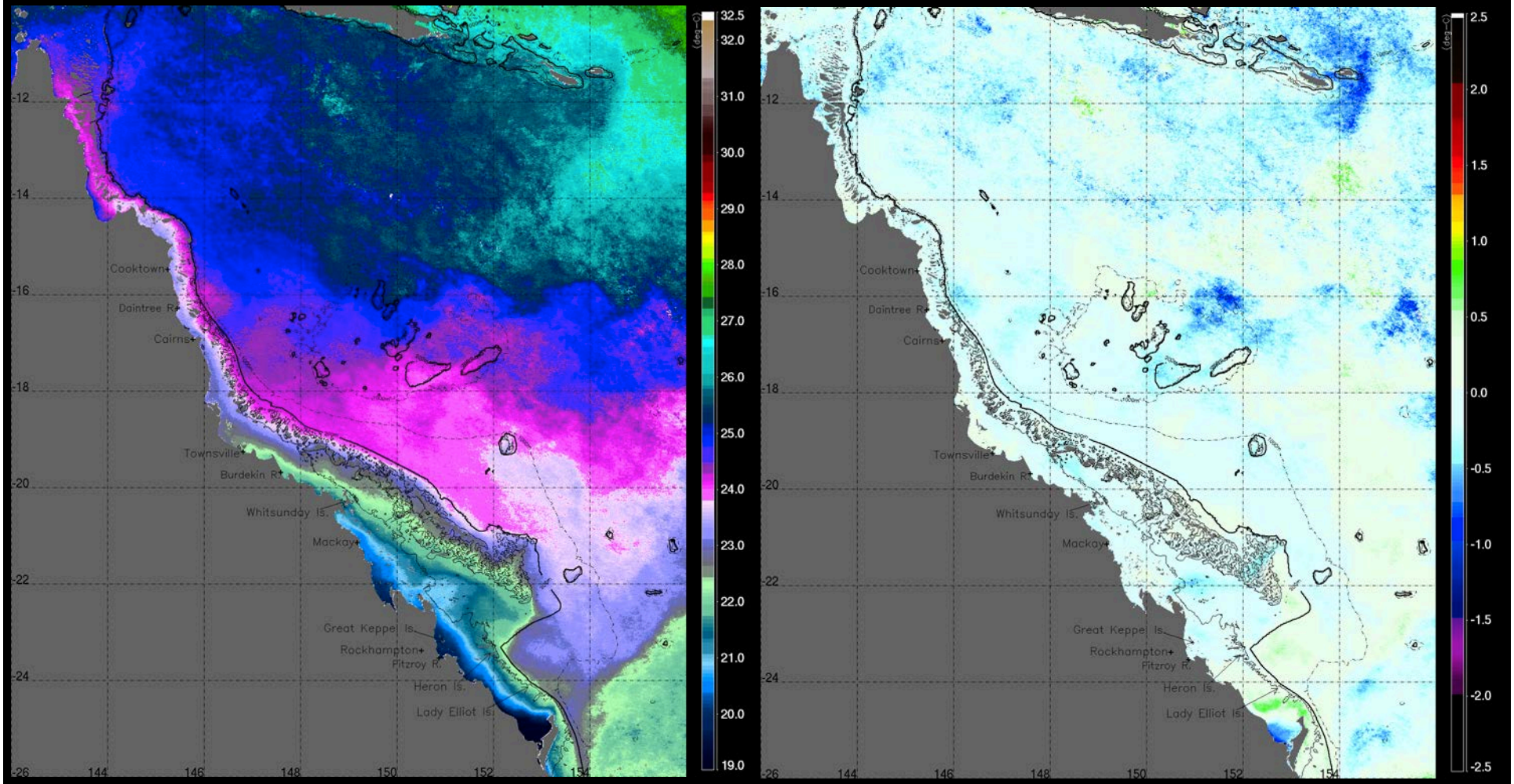
Outline

- Overview
- Recent SST and in situ Temperature evolution
- Monthly means 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

- ENSO neutral conditions continue. However, above average subsurface temperatures developed across the central and east-central equatorial Pacific associated with an equatorial Kelvin wave triggered in July by low level westerly wind anomalies.
- OceanMAPS shows the South Equatorial Current strongly feeding the Hiri Current along the northern GBR with weak East Australia Current flow adjacent to the central-southern GBR.
- MODIS data show only weak negative SST conditions along the length of the GBR and Torres Strait regions for August.
- *In situ* data for August show sea water temperature fluctuations below the long-term mean for most stations except for: (1) Heron Island and (2) Myrmidon Reef sites.
- Increased potential stress level from NOAA Coral Reef Watch indicated for regions south of PNG and northernmost GBR, including Torres Strait, as we head into summer.
- However, POAMA forecasts close to average conditions along the length of the GBR over the next 6 months into January 2015.

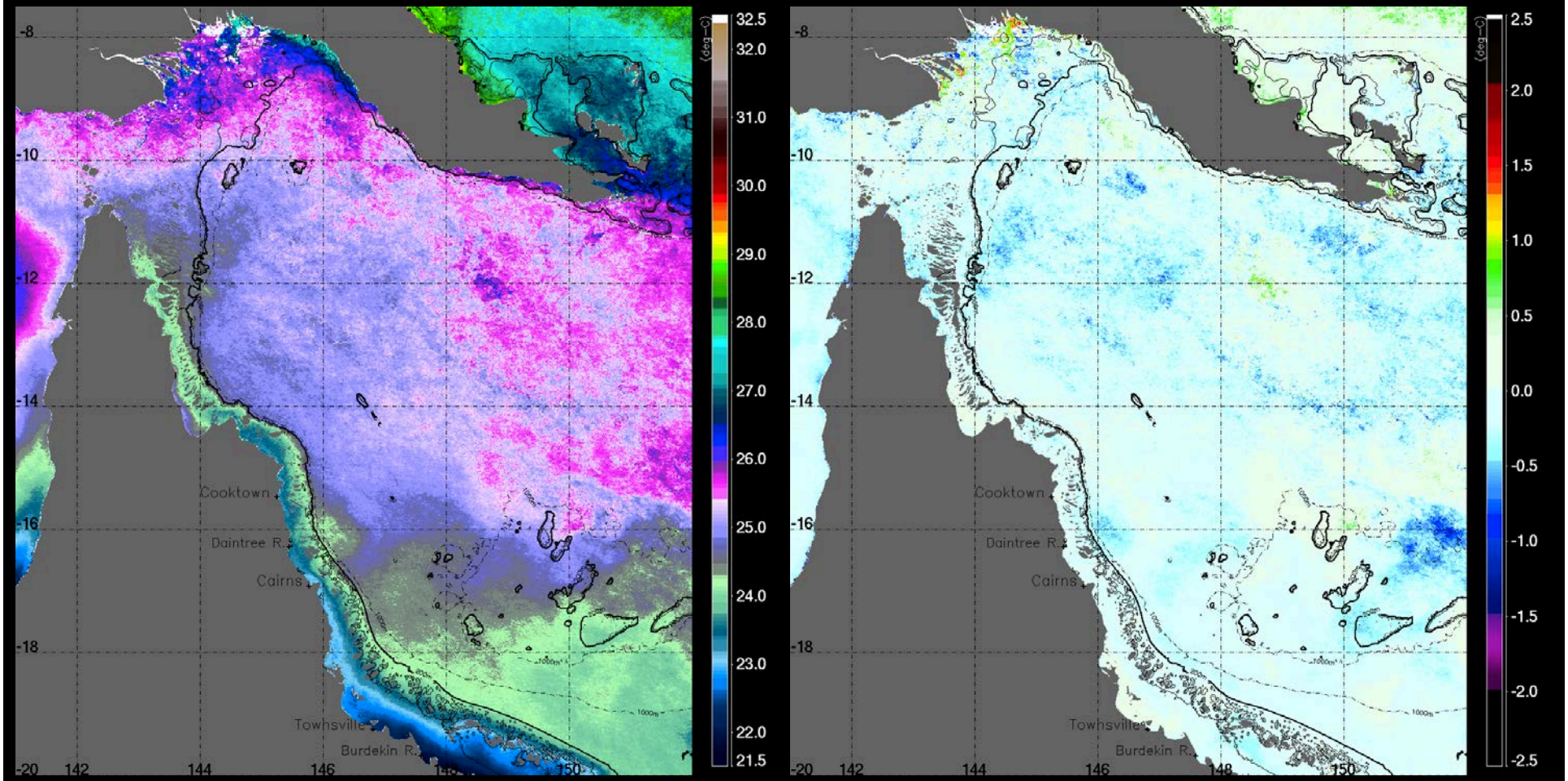
MODIS sea surface temperature (day+night) August 2014



Note:

- Further cooling of waters through August, as conditions remained close to average for the GBR
- Very weak negative SST anomalies along the length of GBR

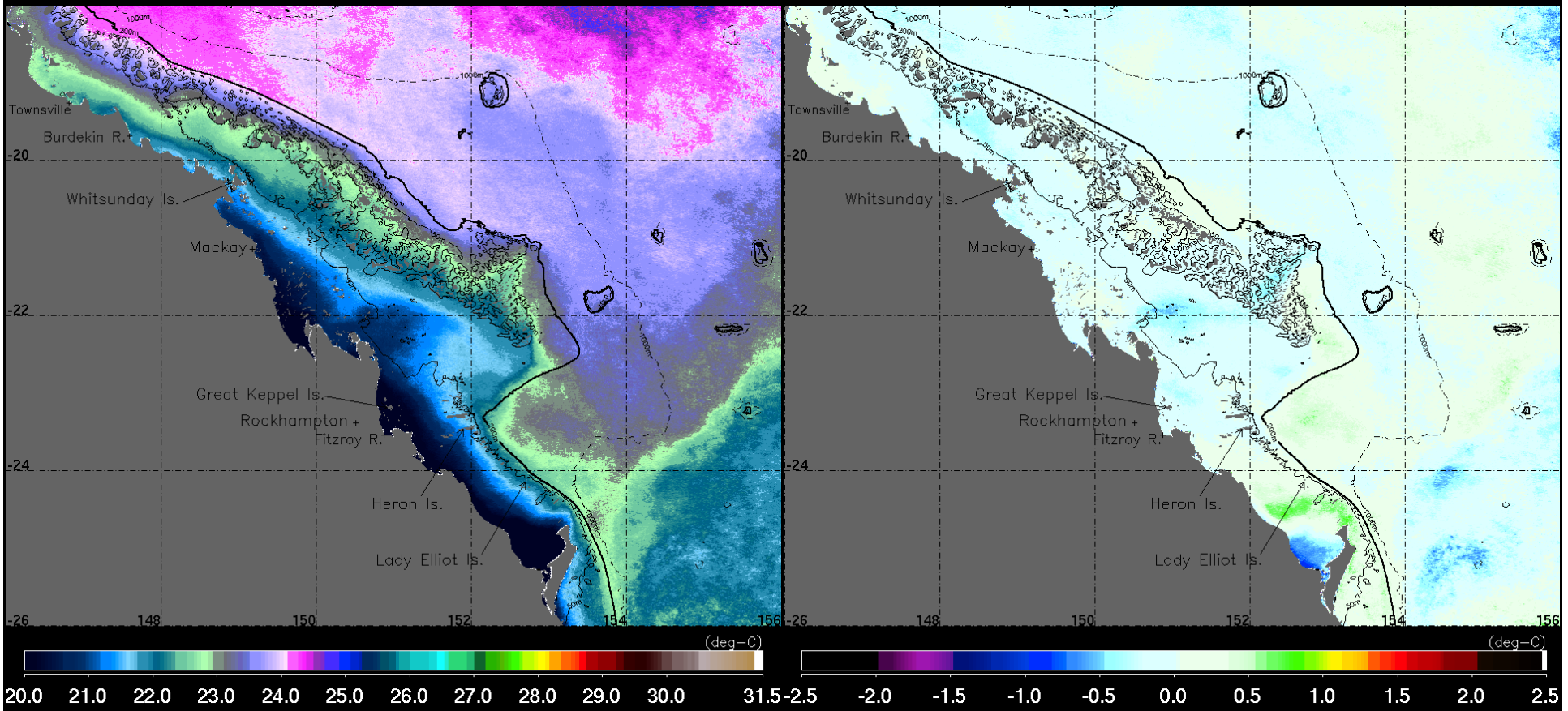
Torres Strait / far northern GBR
MODIS sea surface temperature (day+night)
August 2014



Note:

- Mostly slight negative SST anomalies along the northern GBR and Torres Strait regions

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

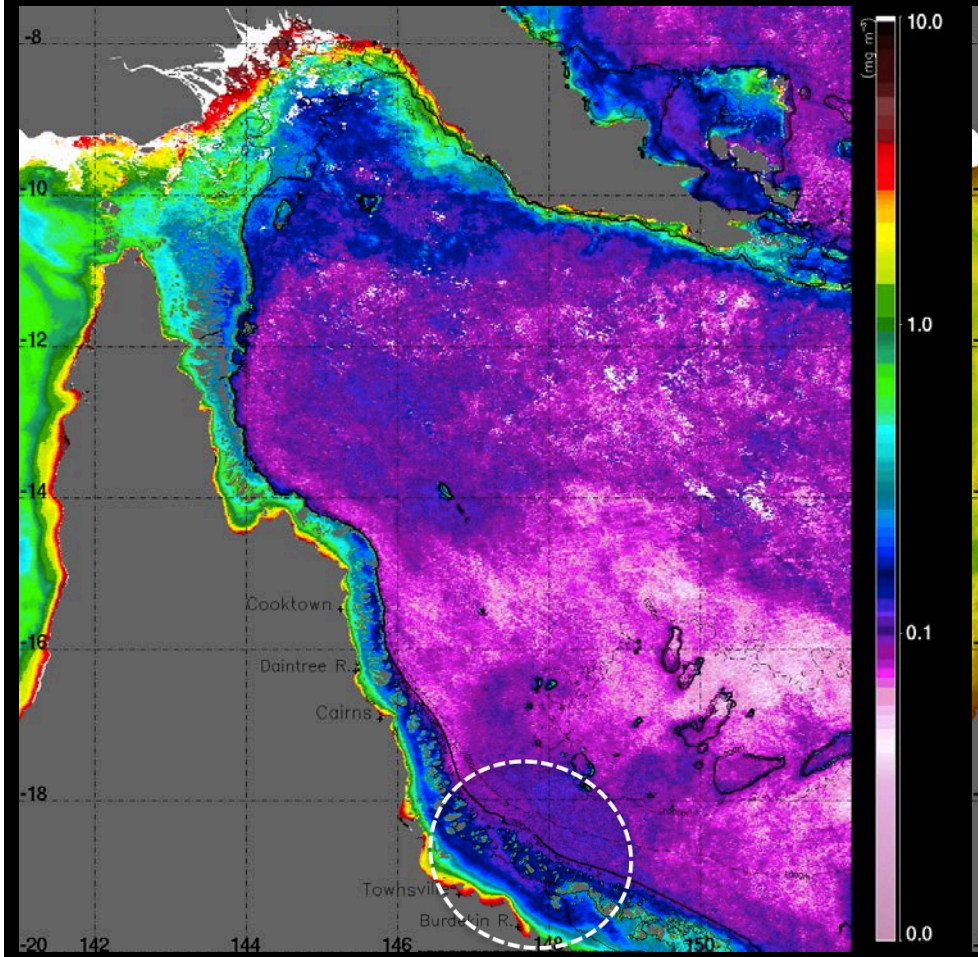


Note:

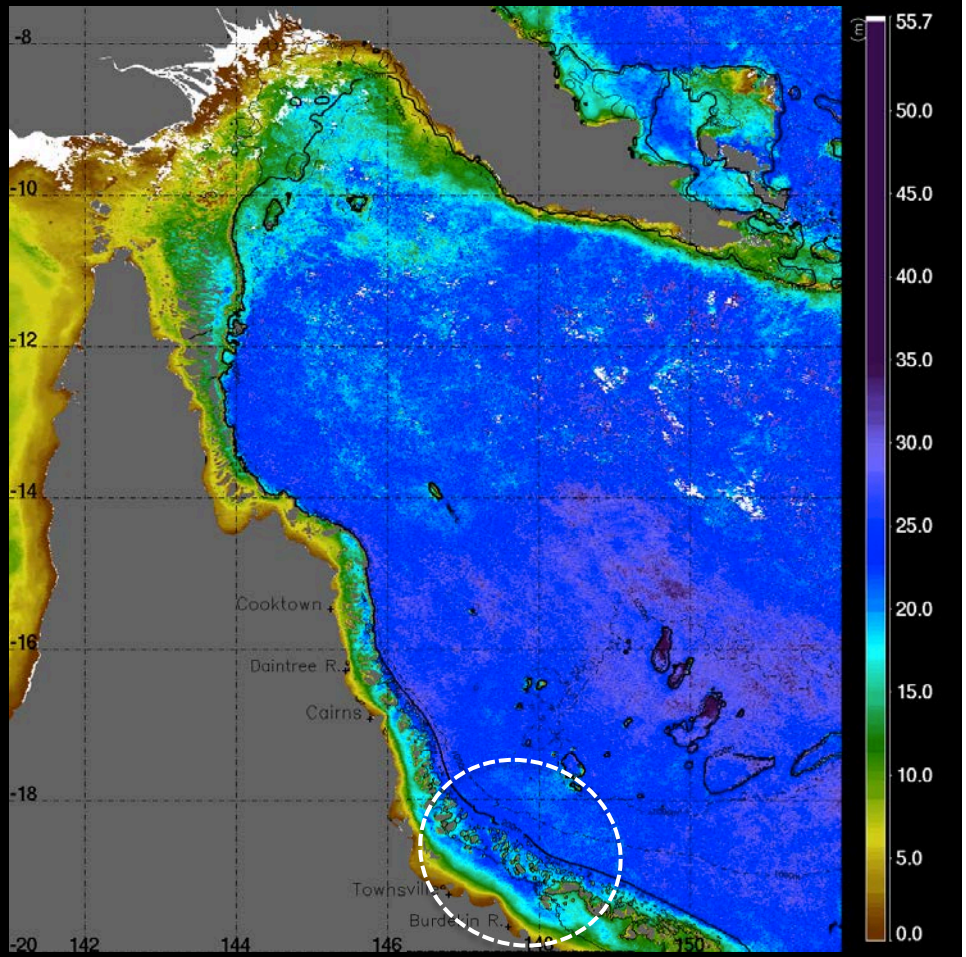
- Inshore temperatures south of the Whitsundays cooled to 19-20˚C during August
- Weak negative SST anomalies along the southern GBR except for slight positive SST anomalies north of Fraser Is. and into Curtis Channel

Torres Strait / far northern GBR
August 2014

MODIS chlorophyll-*a* concentration



MODIS 10% photic depth



Note:

- Close-to-average chlorophyll-a concentrations and photic depth conditions in the Torres Strait / far northern GBR during August
- Stronger oceanic intrusions (dashed circle: low-chlorophyll / high photic depth) apparent through the Myrmidon and Palm Passages compared to July

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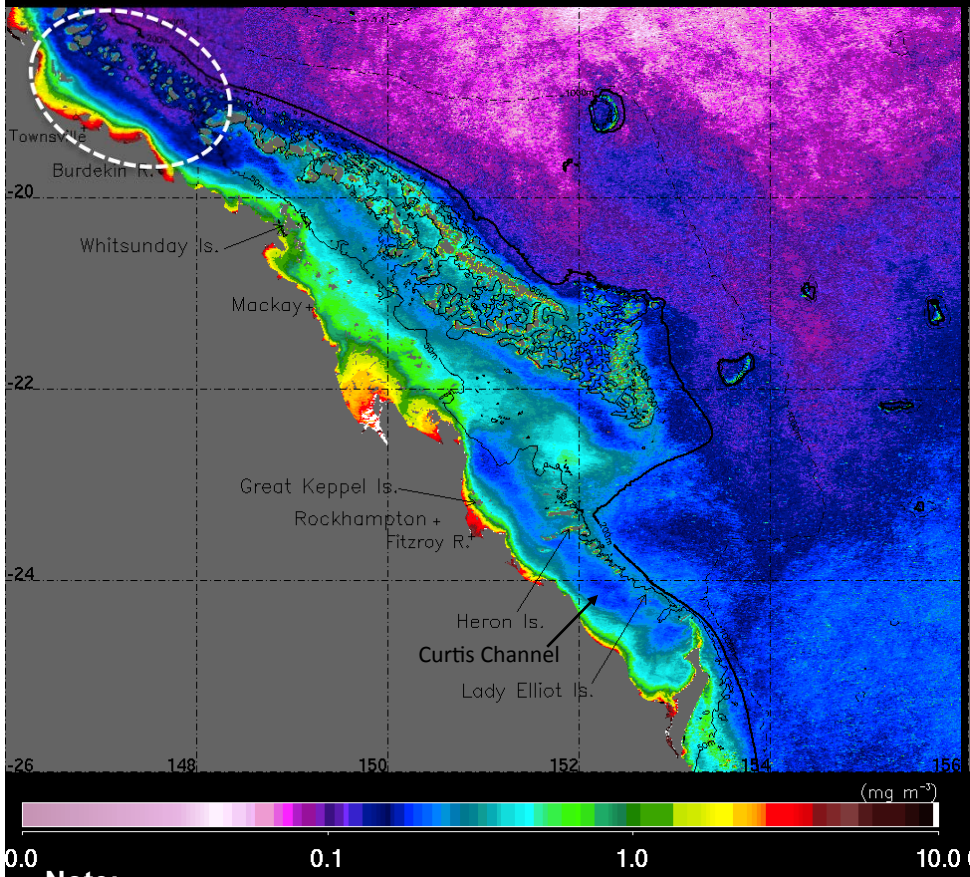
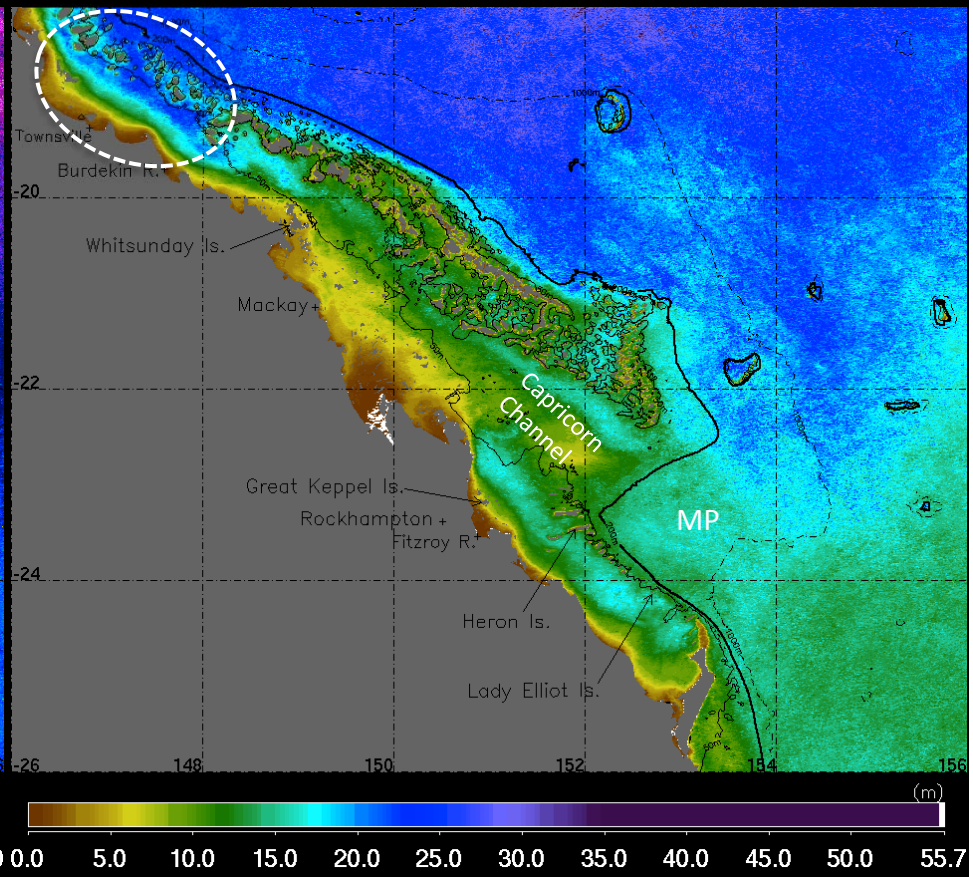
Southern GBR
August 2014

MODIS chlorophyll-*a* concentration



MODIS 10% photic depth



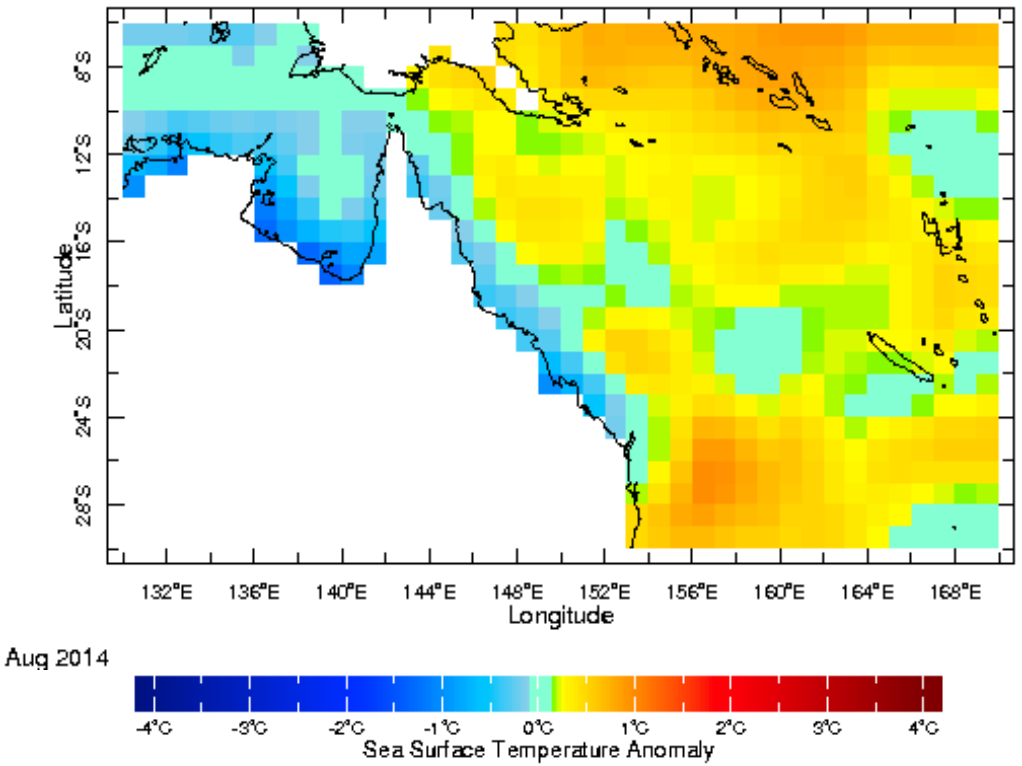
Note:

- Surface (southeastward) outflow along the Capricorn Channel (seen in July images) are still evident in August although extended to a lesser extent beyond the shelf edge
- Lower chlorophyll / higher photic depth waters in Curtis Channel likely related to continued north-westward flow in this region

Sea Surface Temperature Anomaly

from NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2

August 2014



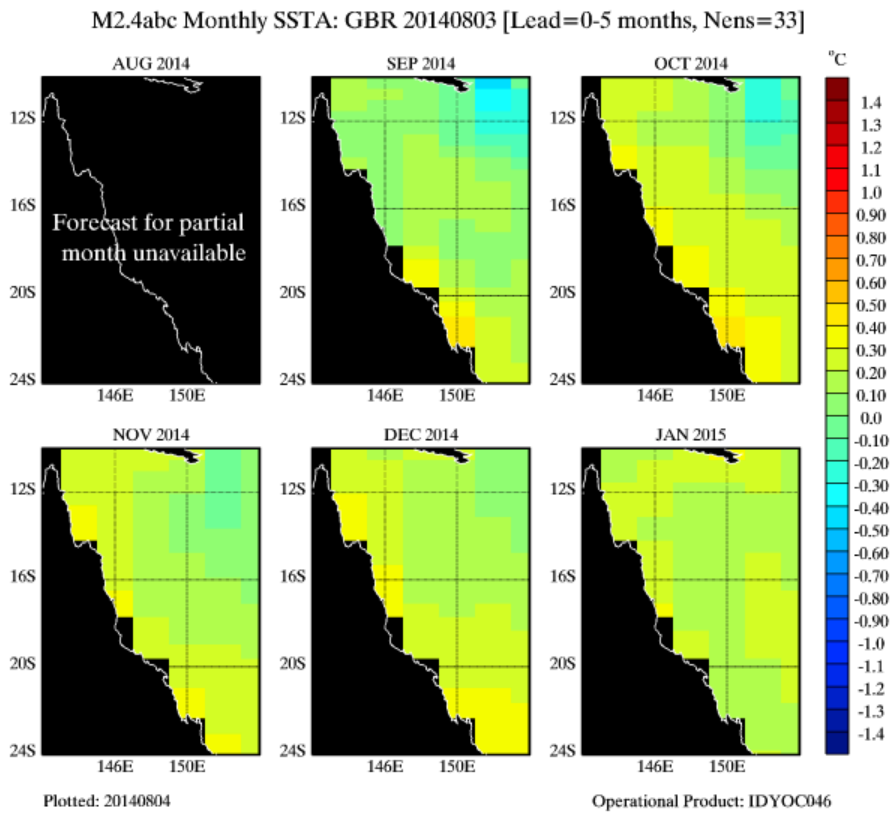
Note:

• NOAA NCEP data depict weak negative SST anomalies along the length of GBR for August, in agreement with MODIS data.

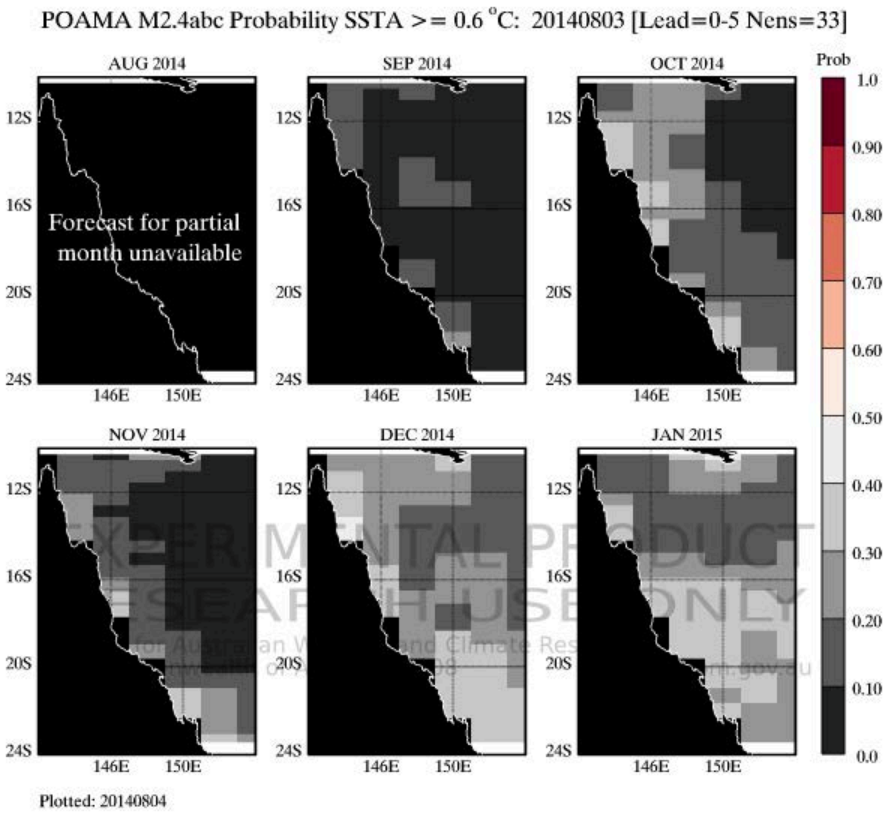
http://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.EMC/.CMB/.GLOBAL/.Reyn_SmithOIv2/

SST anomaly forecast (POAMA-2): Sep 2014 – Jan 2015

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 forecasts mostly close to average conditions along the length of the GBR over the next 6 months into January 2015,
  - with no probability of SST anomalies exceeding 0.6°C in the region

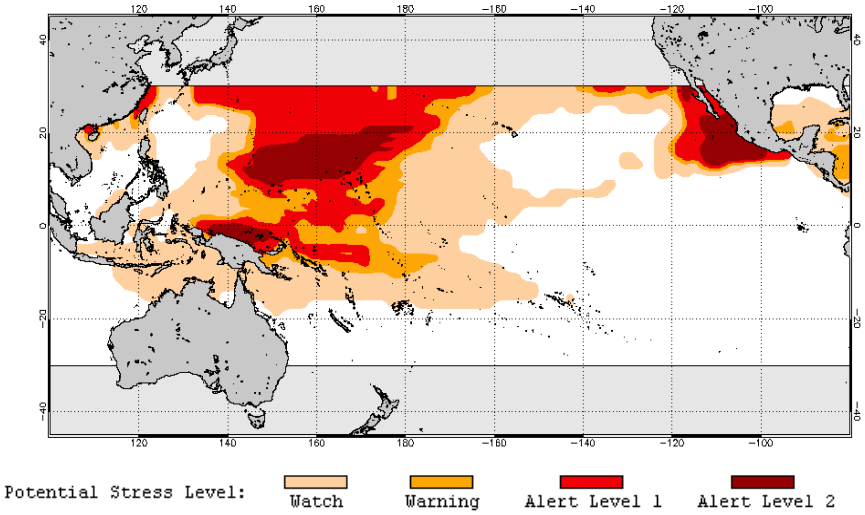
NOAA Coral Reef Watch

Seasonal coral bleaching thermal stress outlook

September to December 2014

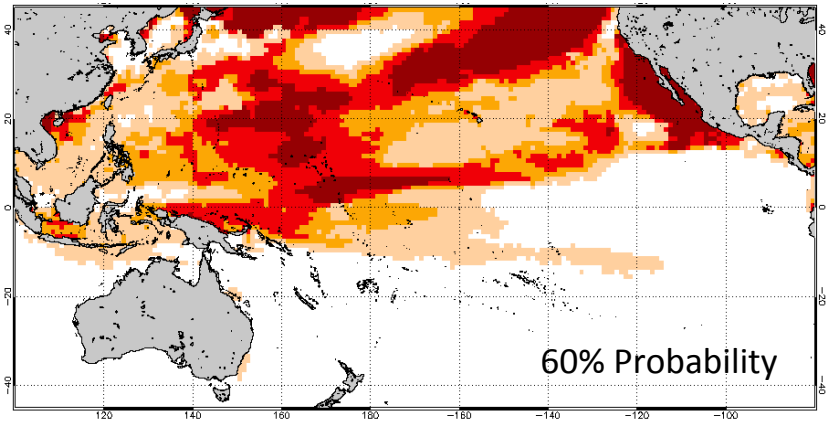
LIM-based

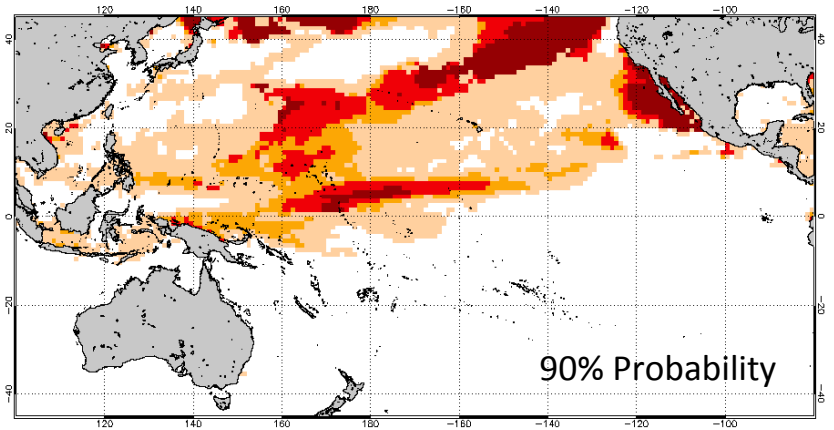
Version 2, experimental, weekly 2x2 degree spatial resolution



CFS-based

Version 2, experimental, weekly 1x1 degree spatial resolution





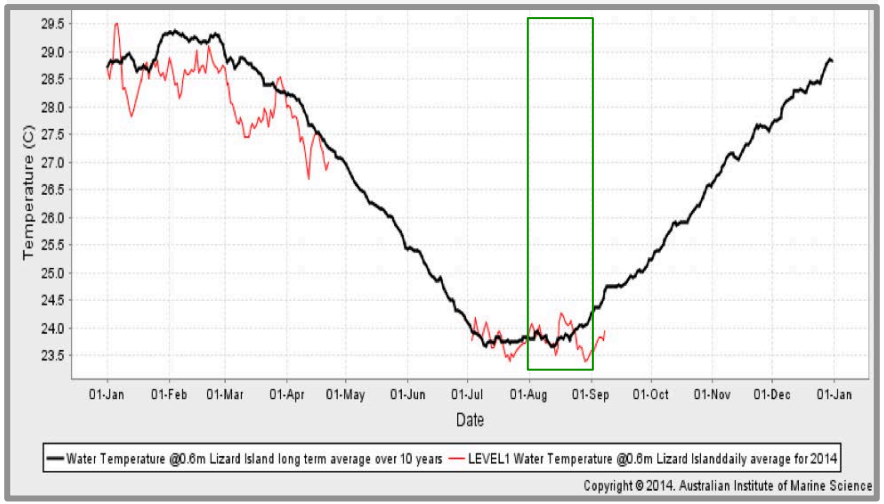
Note:

- Outputs from Coral Reef Watch suggests “Watch” stress level south of PNG and in northernmost portion of the GBR, including Torres Strait, as we head into summer.

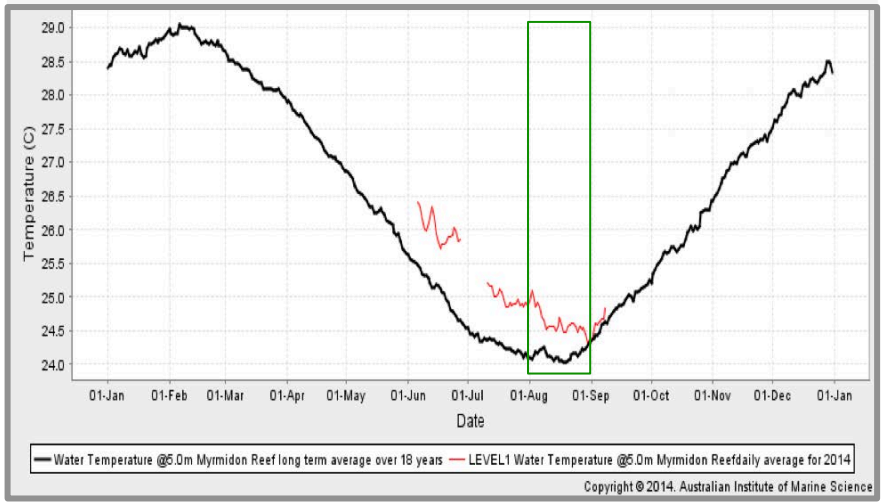
(These outlooks are based on SST predictions from: CRW’s experimental statistical Linear Inverse Model (LIM-based – left panel) and the NCEP Climate Forecast System (CFS-based – right panel) systems)

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

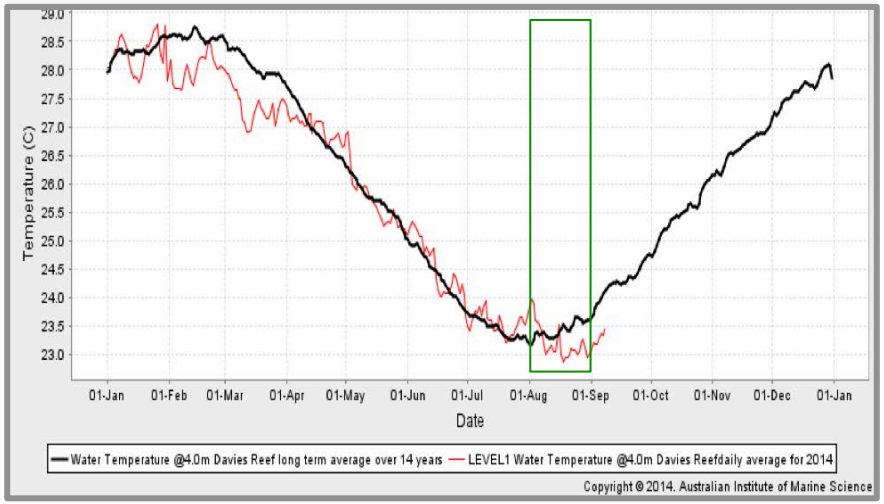
Water temperature @0.6m Lizard Island Sensor Float 3Trend against longterm average



Water temperature @5.0m Myrmidon Reef Platform trend against longterm average



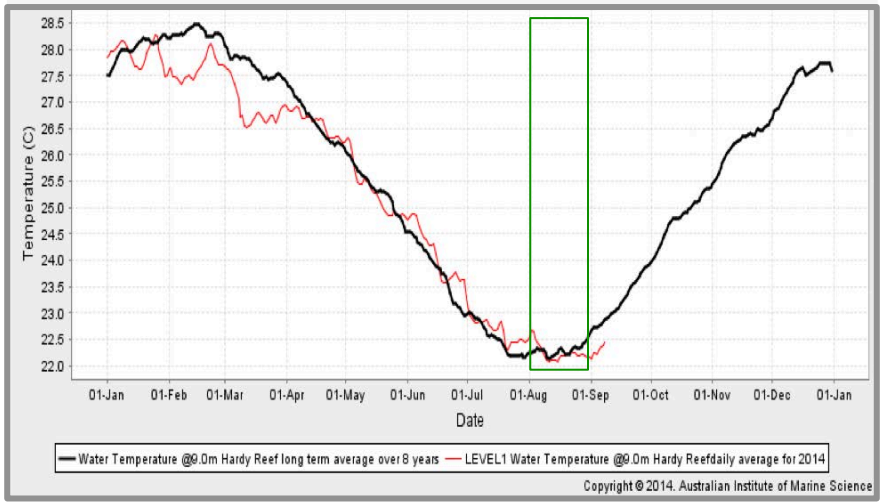
Water temperature @4.0m Davies Reef Platform trend against longterm average



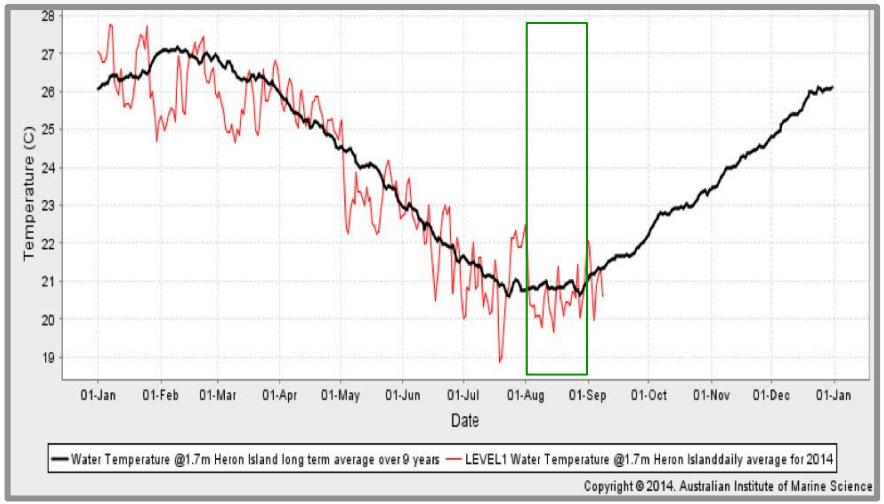
- Lizard Island and Davies Reef sensors show mostly below average temperatures for August
- Myrmidon Reef weather station shows temperatures well above the long-term mean during August. This is likely related to the strong intrusions of relatively warmer EAC waters of oceanic origin through this channel, as seen in MODIS images

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

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



Water temperature @1.7m Heron Island Relay Pole 1 trend against longterm average



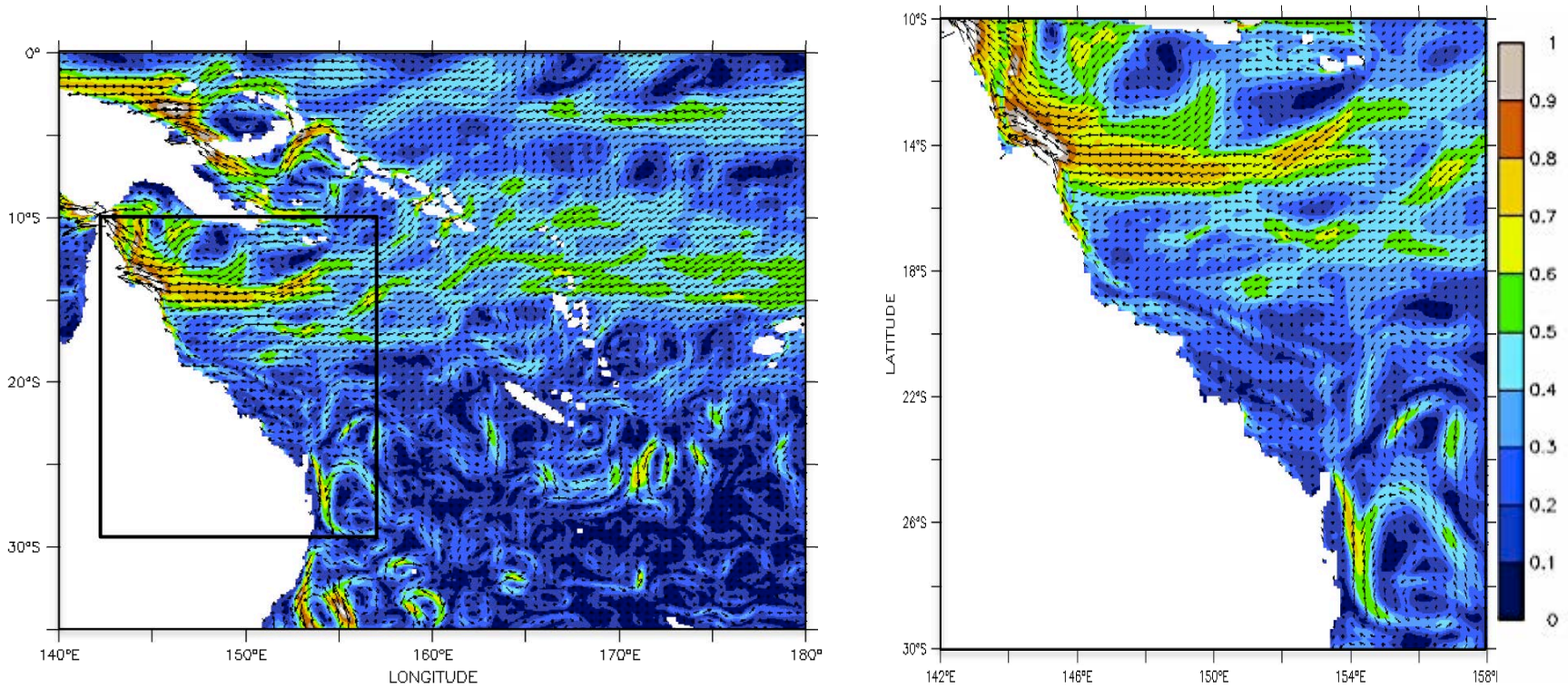
Note:

- AIMS weather station data from Hardy Reef show *in situ* sea water temperature close to the long term average for August, while Heron Is. data show considerably strong fluctuations relative to the long term mean

OceanMAPS 15m Depth-Average Currents

August 2014

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.



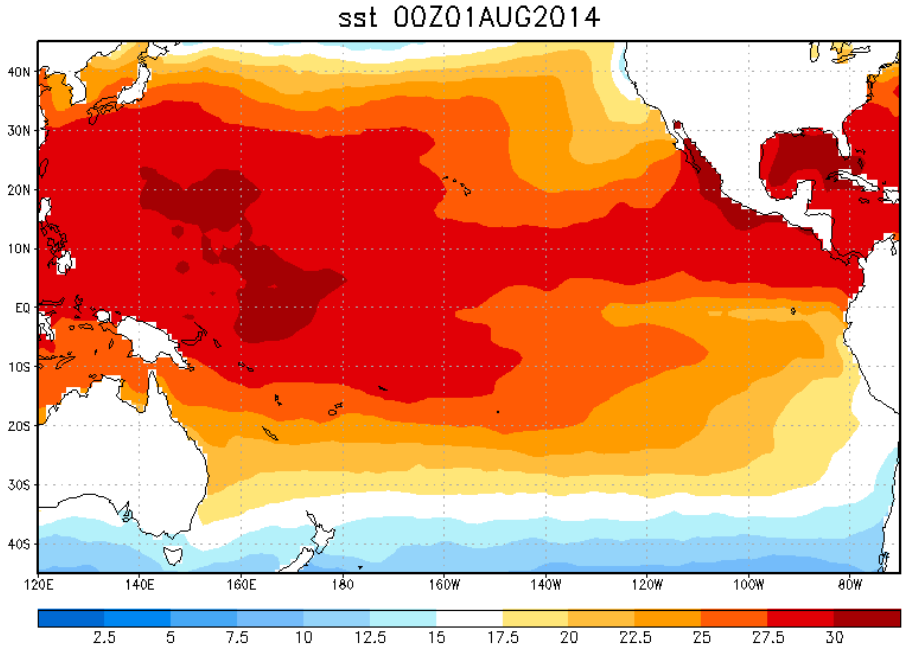
Behind Real Time analysis 15 m Depth-Averaged Currents (m/s)

Note:

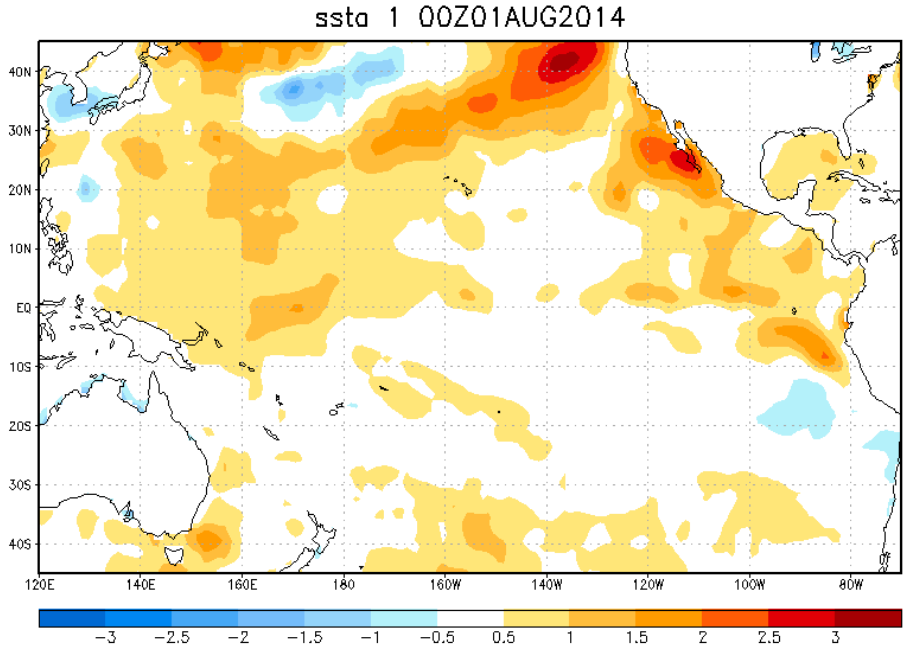
- South Equatorial Current (SEC) inflow primarily feeding the Hiri / North Queensland Current along the N-GBR, with
- very weak EAC flow along the GBR shelf edge
- Intensified EAC flow off Fraser Is.
- Eddy dynamics south of 30°S restricting EAC flow to a 'thin streak' of warm water

NOAA optimum interpolation sea surface temperature

OISST August 2014



OISST anomaly August 2014



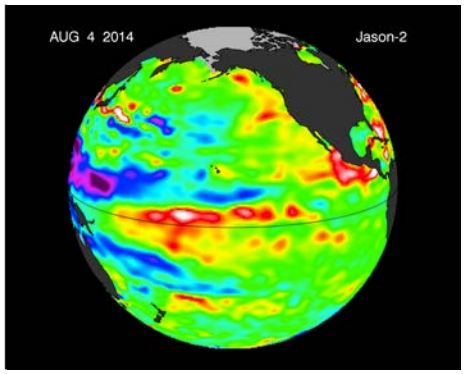
Note:

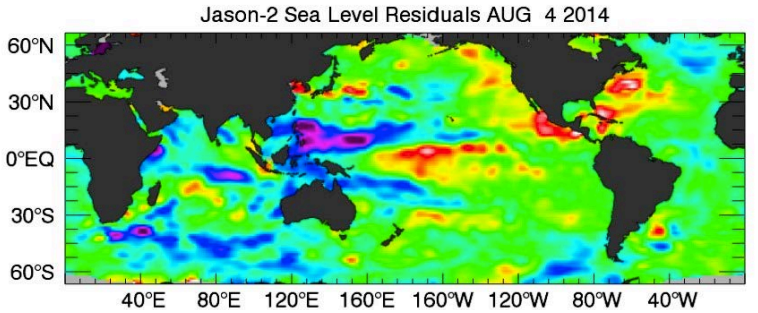
- NOAA OISST data show positive SST anomalies along the eastern equatorial Pacific continued to dissipate during August

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

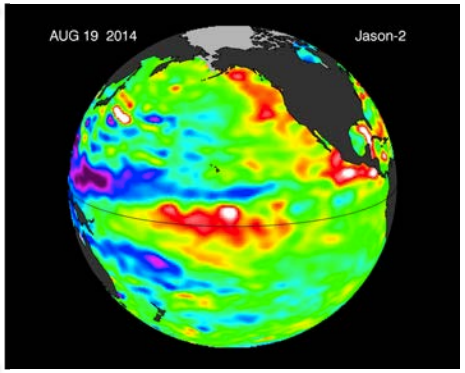
Sea surface height anomalies from Ocean Surface topography: Jason-2 (NASA/French)

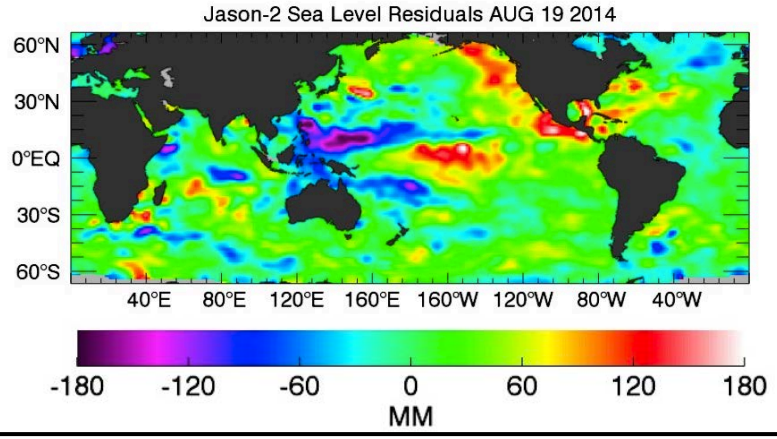
4th Aug 2014





19th Aug 2014



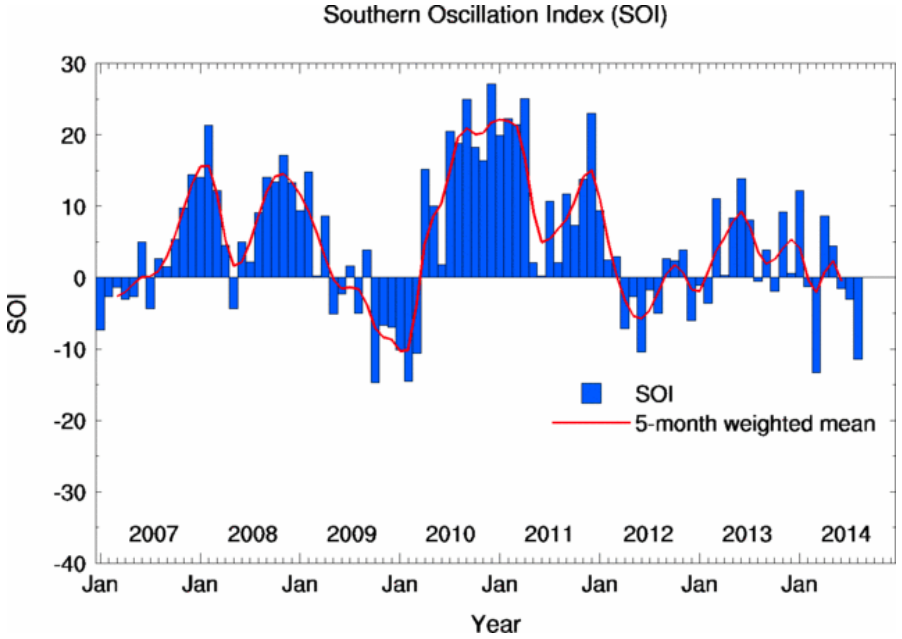


Note:

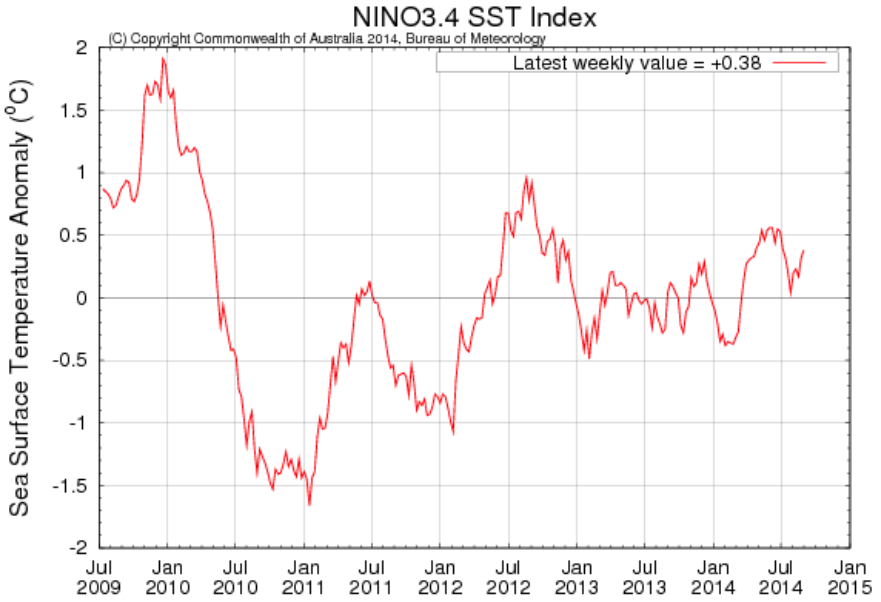
- Subsurface heat content anomalies in the central Pacific increased during August as above average subsurface temperatures developed across the central and east-central equatorial Pacific – this warming is associated with an equatorial Kelvin wave triggered in July by low level westerly wind anomalies (NCEP)

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 continue. However most models continue to predict El Niño (60 – 65%) will develop during Sep–Nov and to continue at weak strength into early 2015.
- The SOI has remained negative for most of austral winter while the El Niño 3.4 SST index showed an overall warming in August to +0.4°C.

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