



Australian Government

Bureau of Meteorology

Report from the Australian RDAC to GHRSSST-XVII

Helen Beggs, Christopher Griffin, Leon Majewski, Pallavi Govekar
and Janice Sisson

Bureau of Meteorology, Melbourne, Australia

Presented at the 17th GHRSSST Science Team Meeting, Tysons Corner, USA,
6th – 10th June, 2016



Australian Government

Bureau of Meteorology

Bureau of Meteorology RDAC

31 Dec 2014

- **Real-time GDS1.6:**

- Daily Regional $1/12^\circ$ SSTfnd L4 ("RAMSSA")
- Daily Global 0.25° SSTfnd L4 ("GAMSSA")

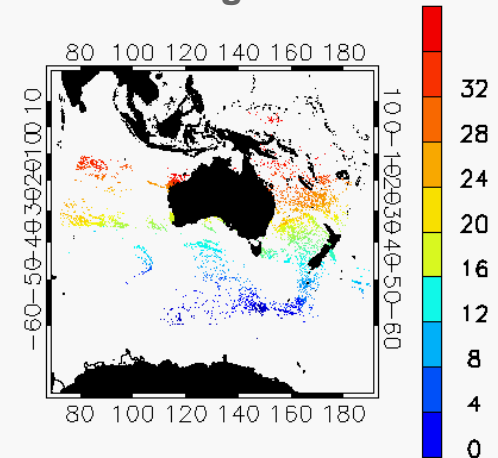
- **Real-time GDS2.0:**

- IMOS fv01 HRPT AVHRR SSTskin
 - L2P and 0.02° L3U, day/night L3C, day/night L3S
- IMOS fv01 HRPT AVHRR SSTfnd
 - 0.02° day+night L3S

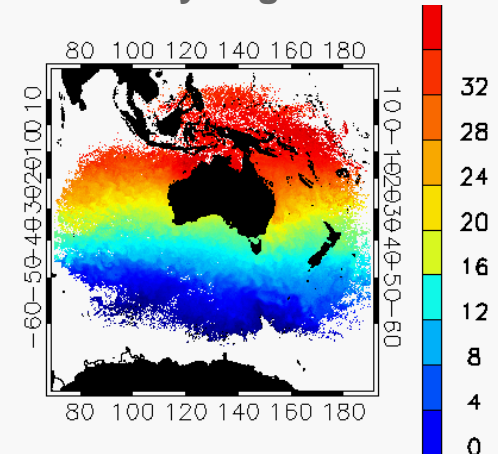
- **Reprocessed GDS2.0:**

- IMOS HRPT AVHRR L2P/L3U/L3C/L3S fv02 products from 1992 to 2015 (NOAA-11 to 19)
- IMOS MTSAT-1R Hourly 0.05° L3U (2006 to 2010)

NOAA-19 Night L3C SSTskin



1 month Day+Night L3S SSTfnd





Data Availability

- **Real-time GDS1.6**

- Operational L4 (RAMSSA/GAMSSA): GDAC, LTSRF and Bureau OPeNDAP server
- Plan to convert to GDS2.0 in 2017

- **Real-time GDS2.0**

- IMOS **fv01** HRPT AVHRR:
 - L2P: Bureau OPeNDAP server (contact h.beggs@bom.gov.au)
 - L3U/L3C/L3S: IMOS Thredds server at <http://rs-data1-mel.csiro.au/thredds/catalog/imos-srs/sst/ghrsst/catalog.html>

- **Reprocessed GDS2.0**

- IMOS **fv02** HRPT AVHRR:
 - L2P: NCI server - Contact h.beggs@bom.gov.au
 - L3U/L3C/L3S: IMOS Thredds server at <http://rs-data1-mel.csiro.au/thredds/catalog/imos-srs/archive/sst/ghrsst-fv02/catalog.html>
- IMOS MTSAT-1R L3U: IMOS Thredds server at <http://rs-data1-mel.csiro.au/thredds/catalog/imos-srs/sst/ghrsst/L3U/mtsatsat1r/catalog.html>



Australian Government

Bureau of Meteorology

Main Activities since G-XVI

- **BoM/JMA/NOAA-STAR:** Real-time Himawari-8 L2P SSTs produced since Mar 2016 by regressing against ACSPO VIIRS L3U SSTs (C Griffin presentation in [Next Gen GEO SST Meeting Mon night](#))
- **IMOS/BoM:** Implemented real-time and delayed mode validation of Australian region HRPT AVHRR L2P SST (H Beggs presentation [CDR_TAG](#) Session, Tue pm)
- **BoM:** Operational ocean model OceanMAPS v3 global 0.1° res from Mar 2016
 - significant improvement in SST forecast skill (~ 0.1 K bias/RMSE), likely due to changing the near real time data assimilation from -5 to -3 days
- **UNSW/BoM:** Investigating seasonal patterns of SST DV over Tropical Warm Pool using IMOS AVHRR L3C SSTs (Haifeng Zhang's [poster](#))



Australian Government

Bureau of Meteorology

User Engagement and Education

BoM/GHRSST/CEOS/IMOS:
Satellite Oceanography Users
Workshop, 9-11 Nov 2016,
Melbourne.

- Covering SST, altimetry and ocean colour
- ~65 attendees (local and overseas)
- Desire by IMOS, CSIRO and GA to repeat biannually
- Videos available at <http://ceos.org/home-2/satellite-oceanography-user-workshop-videos-available/>





Australian Government

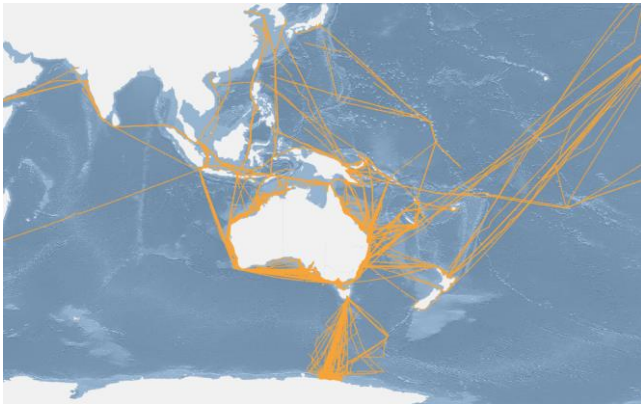
Bureau of Meteorology

IMOS Ship SSTdepth

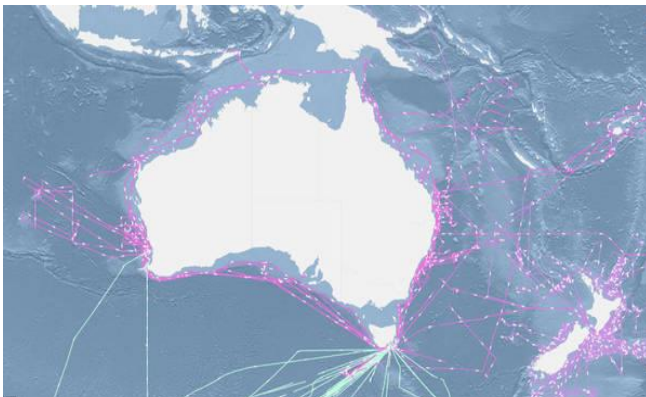
<http://imos.org.au/sstsensors.html>

Over past year 11 IMOS ships reported QC'd RT SSTdepth to GTS, IMOS Ocean Portal and iQUAM v2 (21 ships since 2008, most also collecting wind data)

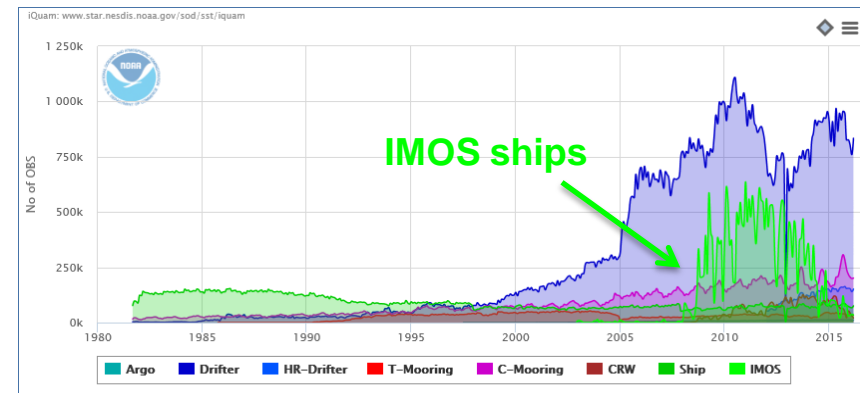
SOOP SST



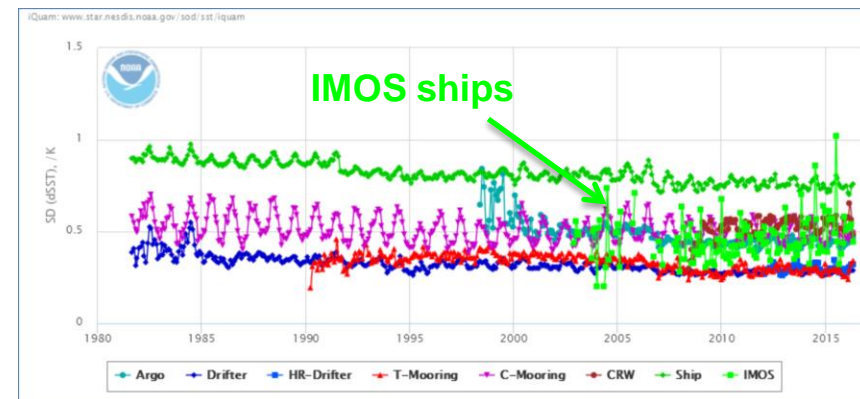
RV SST + fluxes



NESDIS iQUAM v2 Number in situ SST obs



NESDIS iQUAM v2 SD(in situ SST – CMC)



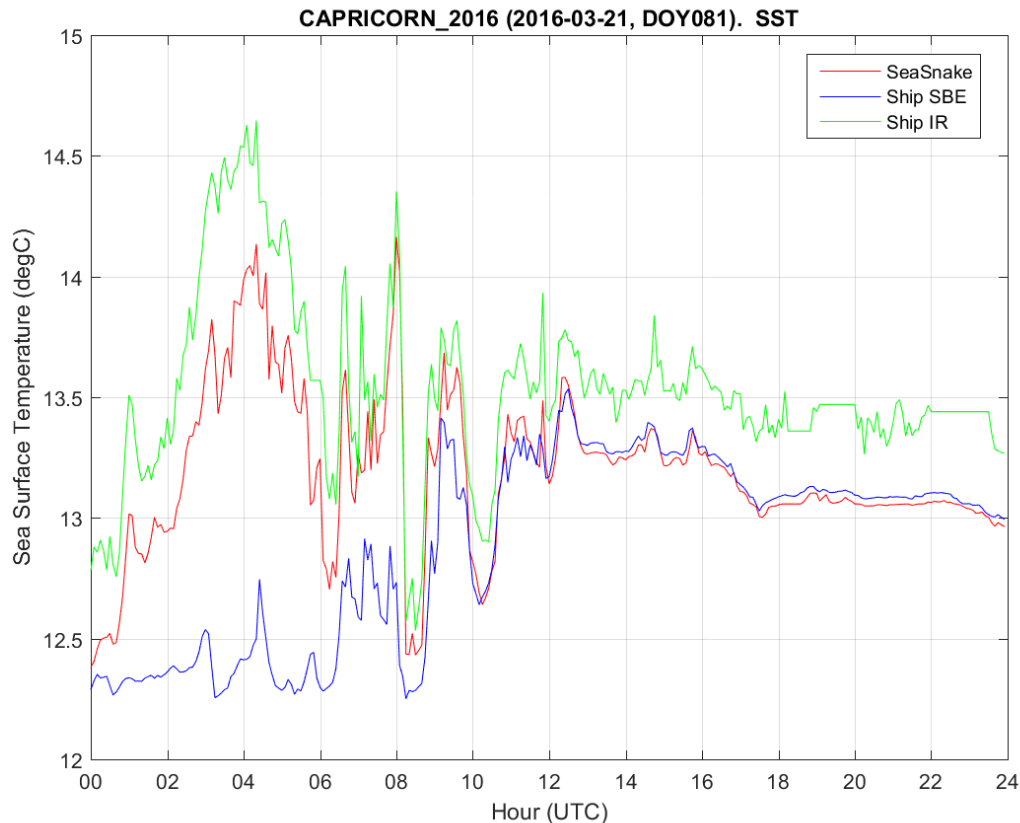


Australian Government

Bureau of Meteorology

IMOS Ship SSTskin

CSIRO/IMOS/BoM: ISAR on RV Investigator delivering skin SST data from Mar 2015 but needs reprocessing and QA





Australian Government

Bureau of Meteorology

Plans for 2016/2017

- Provide Himawari-8 GDS2.0 10-min L2P and L2C files to collaborators and Bureau systems (e.g. eReefs coastal ocean model and Global 0.1° OceanMAPS ocean model)
- Test ingesting ACSPO VIIRS 0.02° L3U products into BoM operational SST analyses, ocean models and IMOS L3S products
- Produce IMOS direct broadcast GHRSSST products from METOP-B or VIIRS
- Reprocess ISAR SSTskin data from RV Investigator Mar 2015 onwards
- Investigate replacing RAMSSA/GAMSSA L4 with OceanMAPS 0.1° global ocean model nowcast SST



Australian Government

Bureau of Meteorology

Issues to be raised at G-XVII

- Are RT, QA'd, IMOS ship SSTdepth measurements of value to GHRSSST for validation? ([ESI/CDR Breakouts](#) Tue)
- How do we work together to get most value from relatively sparse ship SSTskin measurements? ([ESI Breakout](#) Tue am)
- How best to composite multiple L2P products – particularly from different sensors? ([C Griffin presentation](#) Thur pm)
- How to distribute the IMOS HRPT AVHRR L2P data? ([DAS-TAG](#) Tue)
- What are the pros/cons of using an Ocean GCM nowcast or forecast SSTdepth instead of L4 SSTfnd for NWP? ([ESI Breakout](#) Tue am)



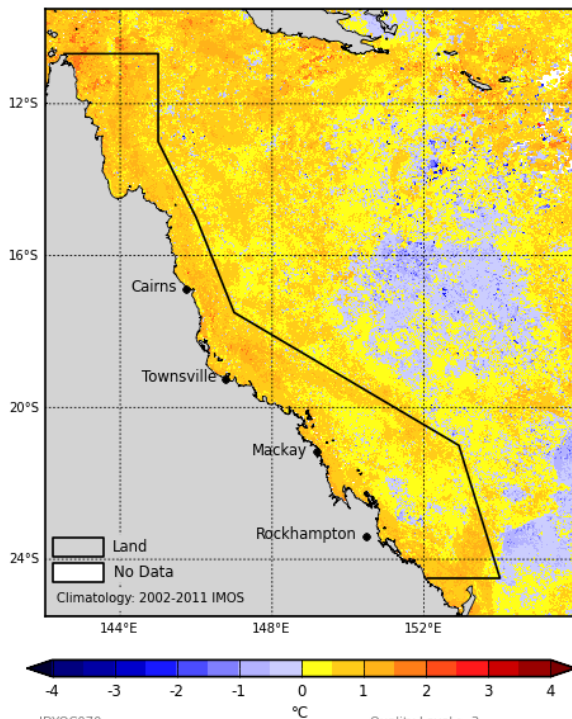
Australian Government
Bureau of Meteorology

Coral Bleaching Nowcasting using IMOS GHRSSST data

ReefTemp NextGen uses IMOS night-only 1-day 2 km L3S AVHRR SST
<http://www.bom.gov.au/environment/activities/reeftemp/reeftemp.shtml>

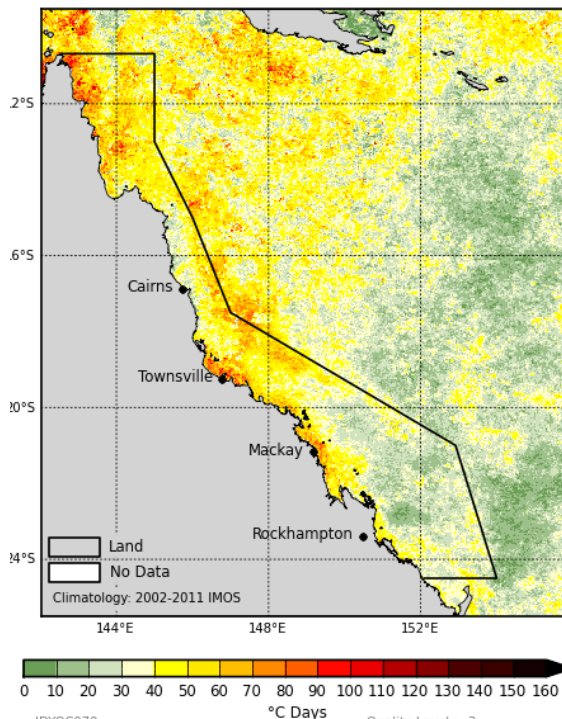
SST Anomaly

IMOS 14-day Mosaic: SST Anomaly
31 March 2016 GBR region

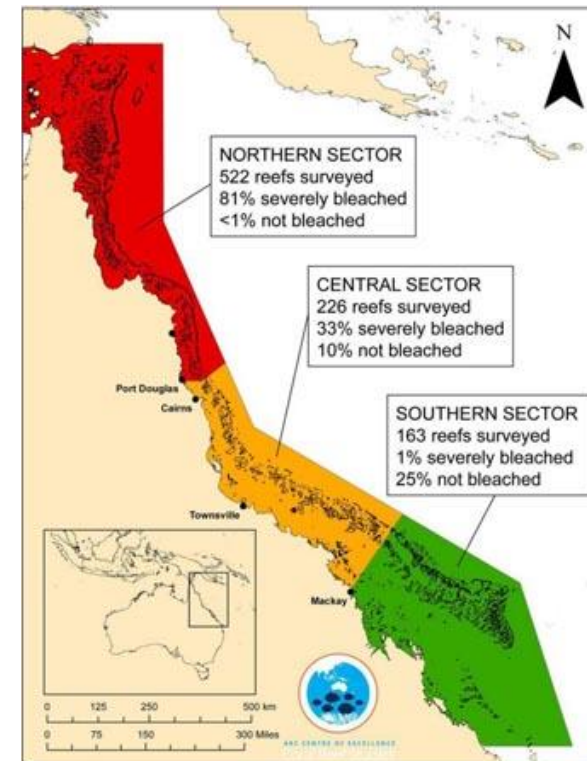


Degree Heating Days

IMOS 14-Day Mosaic: DHD
31 March 2016 GBR region



Corals bleached 2016





Australian Government

Bureau of Meteorology

For further information contact:

Helen Beggs,
Ocean Remote Sensing Scientist,
Ocean Modeling Research Team,
Research and Development Branch,
Bureau of Meteorology,
Melbourne, Australia

Email: h.beggs@bom.gov.au



Australian Government
Bureau of Meteorology

Daily Regional and Global Multi-Sensor SST analyses (RAMSSA and GAMSSA)

<http://www.bom.gov.au/marine/sst.shtml>

Format: GHRSSST v1.6 L4 netCDF3

Depth: Foundation SST estimate

Resolution: 0.083° regional, 0.25° global daily

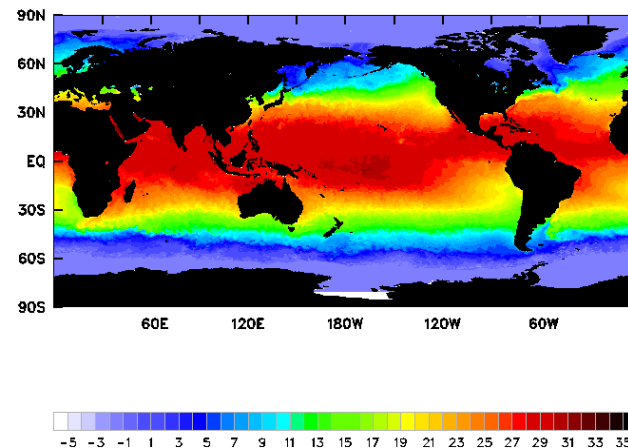
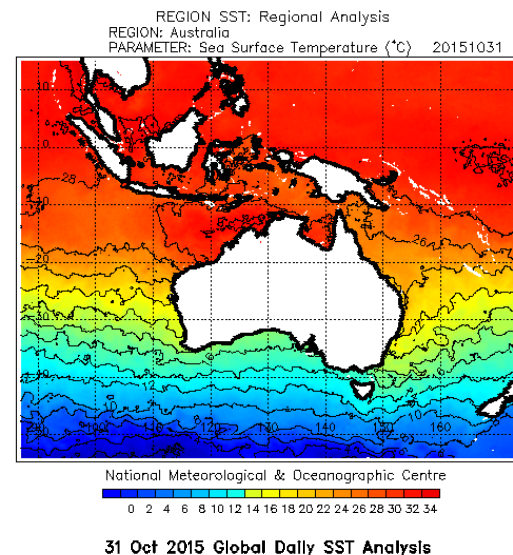
Available: 2008 to real-time

Method: Optimal interpolation

SST inputs:

- 1 km IMOS HRPT AVHRR (NOAA-18,-19) L2P SSTskin
- 9 km NAVOCEANO GAC AVHRR GHRSSST-L2P SST1m
- ~50 km AMSR-2 (GCOM-W) L2P SSTsubskin
- ~50 km WindSat L2P_gridded SSTsubskin
- Buoy and ship in situ SSTdepth

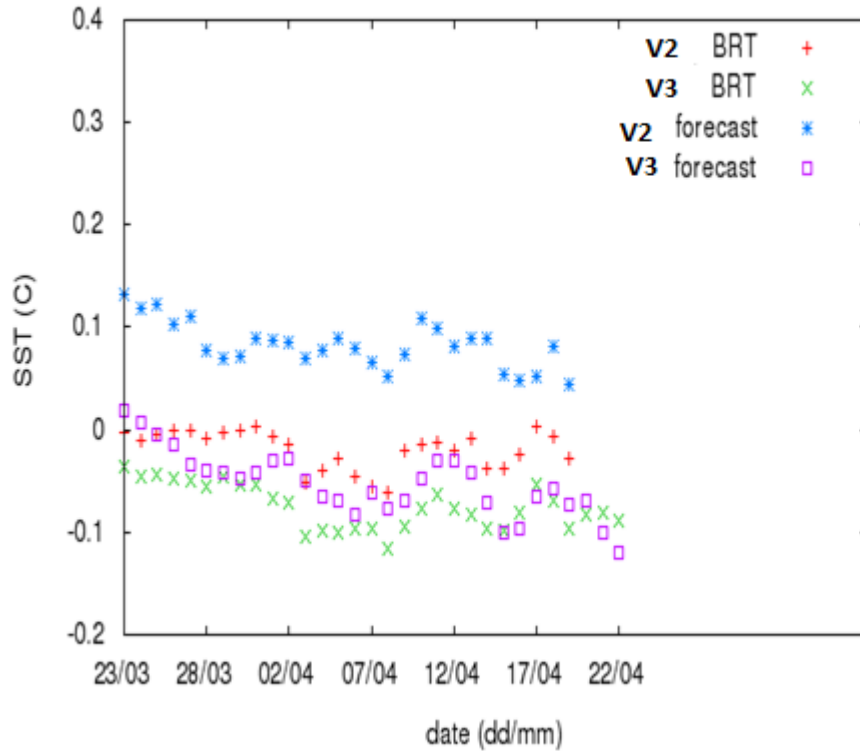
Uses: Boundary condition for NWP models, initialising Seasonal Prediction Model, validating ocean forecasts, GHRSSST Multi-Product Ensemble



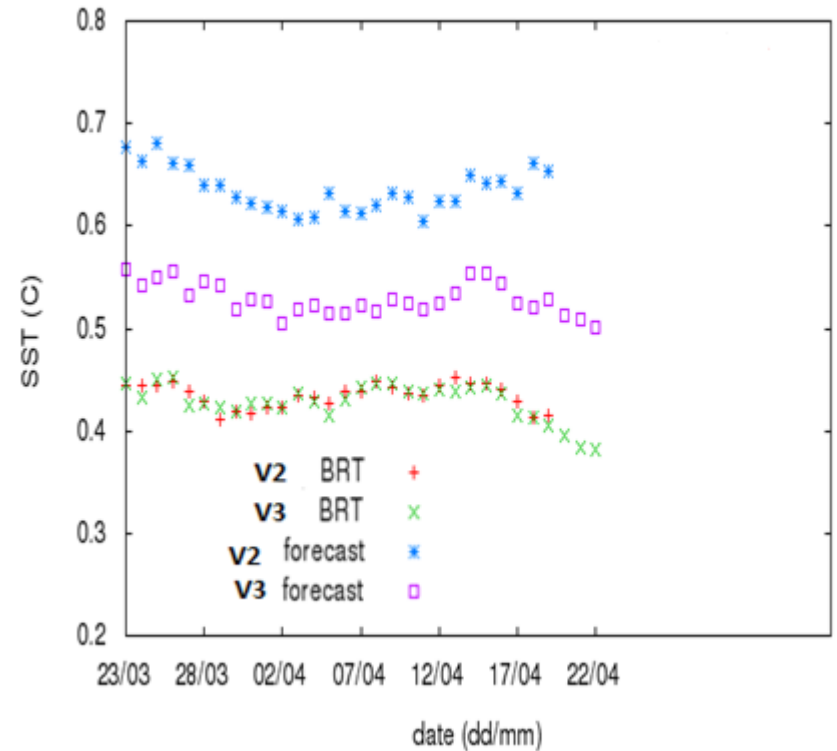


OceanMAPSv2 and v3 SST Compared with RAMSSA

Mean_Err of day 2



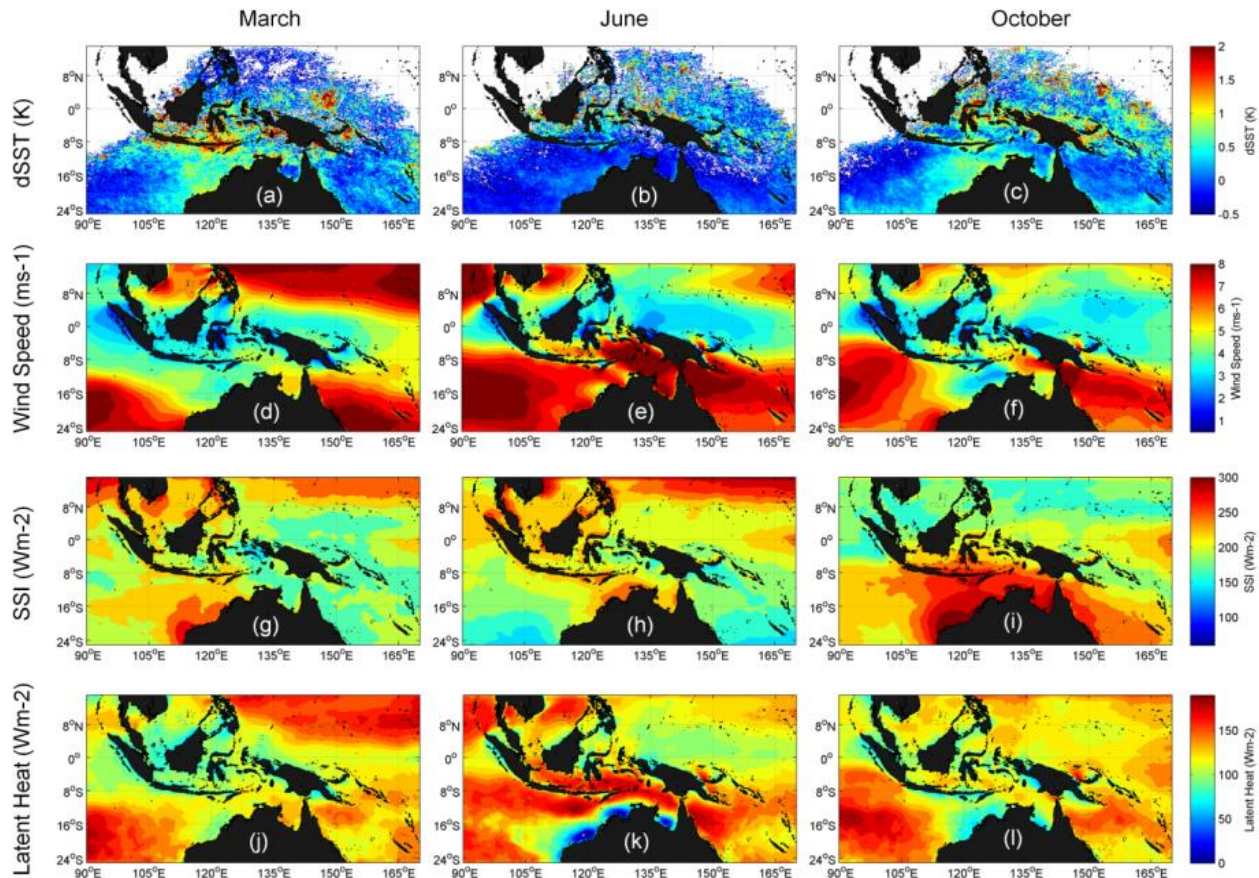
RMSE of day 2





Applications of IMOS-GHR SST products

UNSW/BoM: Investigating seasonal patterns of SST DV over Tropical Warm Pool using IMOS AVHRR L3C SSTs (see Haifeng Zhang's [poster](#))





Australian Government

Bureau of Meteorology

BoM Daily Global SST Analysis (GAMSSA) verification by NESDIS SQUAM

<http://www.star.nesdis.noaa.gov/sod/sst/squam/L4/index.html#>

St Dev (SST analysis – GAMSSA)

