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IMOS Integrated Marine Observing System

Use of ACSPO VIIRS L3U SST in the Australian Bureau of Meteorology

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Background

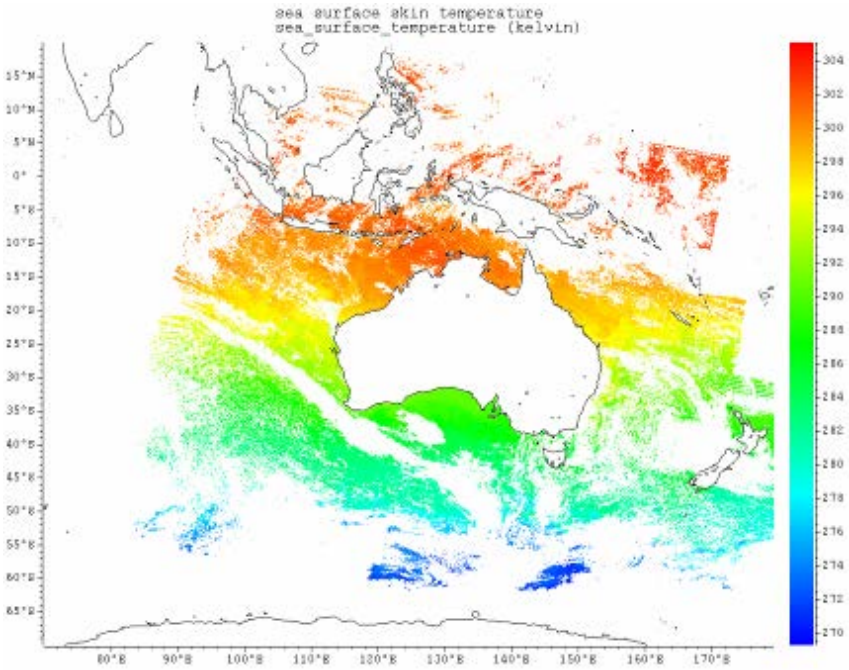
- ABoM currently uses NAVOCEANO's 9 km x 4 km global AVHRR SST data from NOAA-18/19 and METOP-A/B in operational global SST analyses and ocean models
- Need VIIRS SSTs as a follow-on to NOAA-19 AVHRR
- Unable to access VIIRS L2P SST via FTP in real-time due to high volumes so requested 0.02º gridded ACSPO VIIRS L3U files
- NOAA/NESDIS/STAR used ABoM IMOS AVHRR L2P_to_L3U code to produce ACSPO VIIRS 0.02º L3U product with grid aligned with IMOS 0.02º L3U product
- Since July 2015 ABoM has routinely downloaded ACSPO VIIRS L3U files in near real-time for testing for use in operational SST analyses and ocean models

IMOS HRPT AVHRR SST GHRSST products

http://imos.org.au/sstproducts.html

- ABoM and CSIRO have raw 1 km HRPT AVHRR data from NOAA-11 to NOAA-19 from groundstations in Australia and Antarctica
- As part of IMOS, ABoM has produced GHRSST products (L2P and 0.02º gridded L3U, L3C, L3S) over two domains (Australia and Southern Ocean) from 1992 to present
- Useful for comparison with ACSPO VIIRS 0.02º L3U SST

IMOS 1-night L3S



IMOS NOAA-19 fv01 L3C SSTskin vs not bias-corrected VIIRS L3U SSTskin Queensland Coast: 17 Aug 2015 Night

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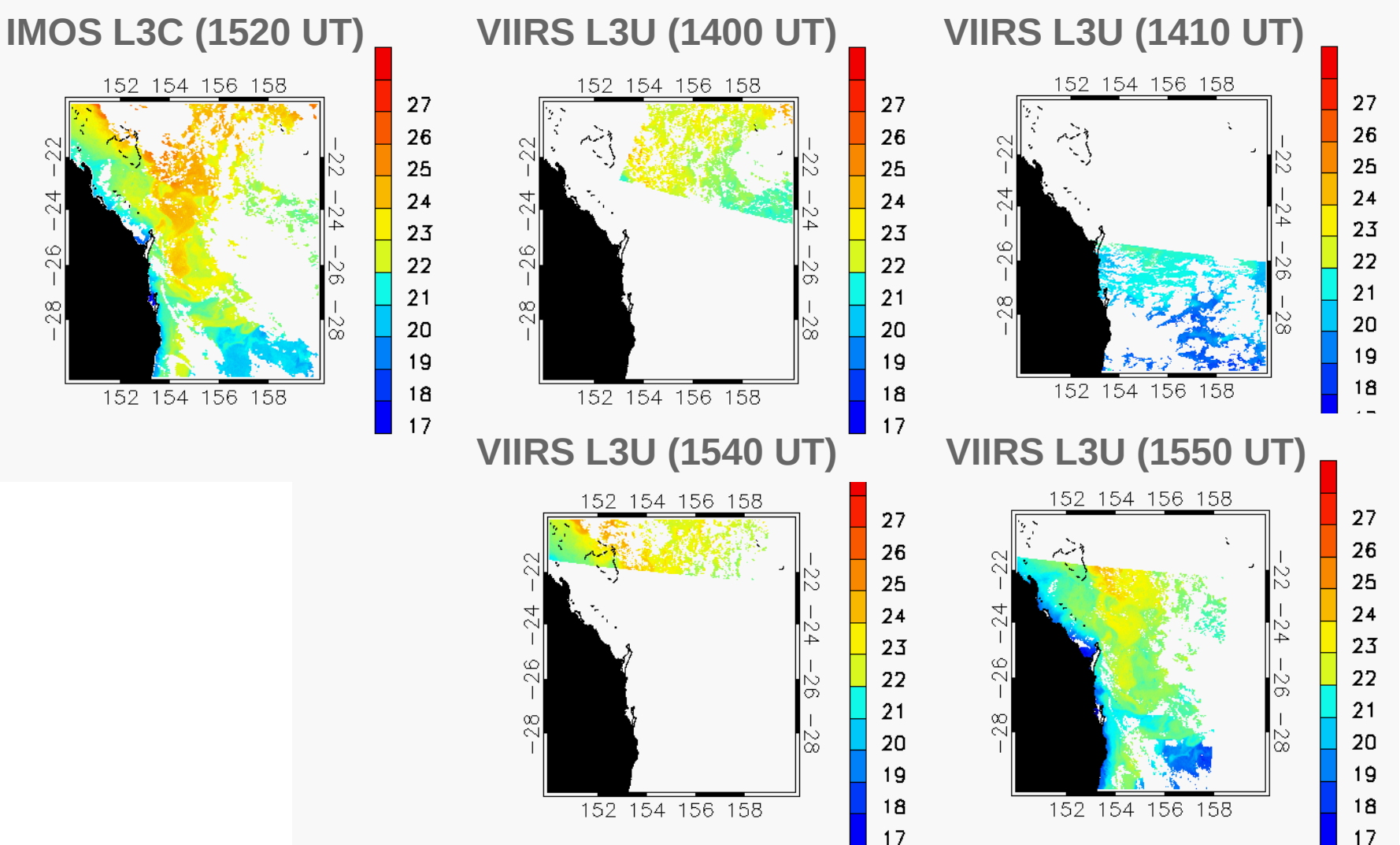

IMOS NOAA-19 fv01 L3C SSTskin vs bias-corrected VIIRS L3U SSTsubskin Queensland Coast: 17 Aug 2015 Night

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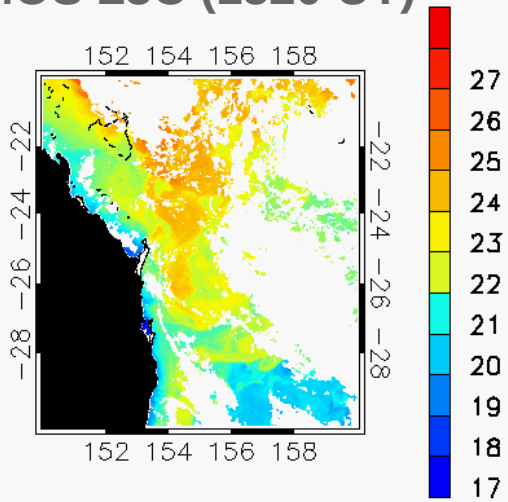
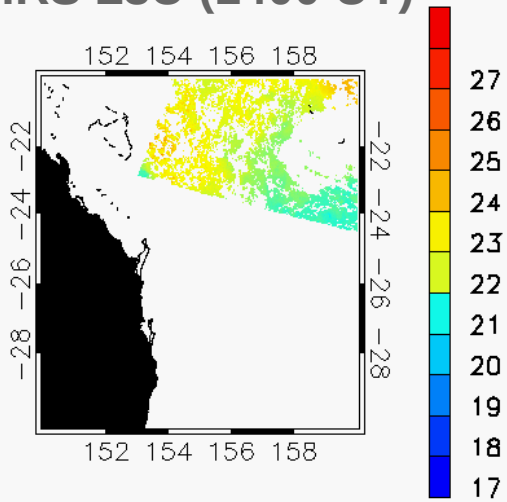
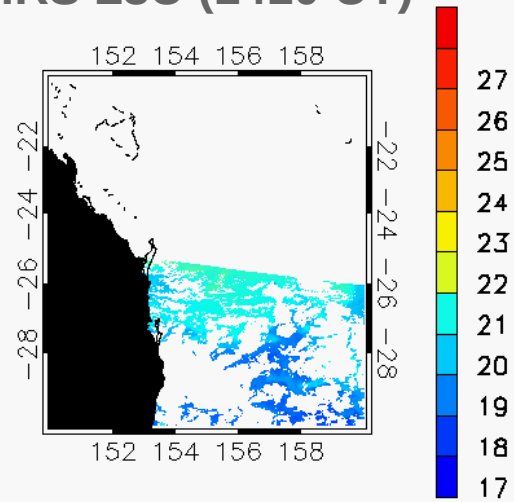
IMOS L3C (1520 UT)



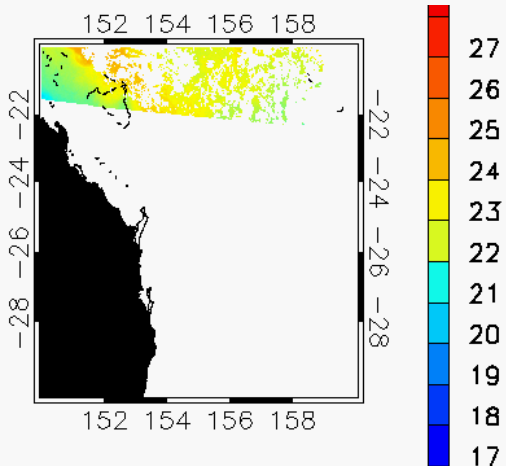
VIIRS L3U (1400 UT)



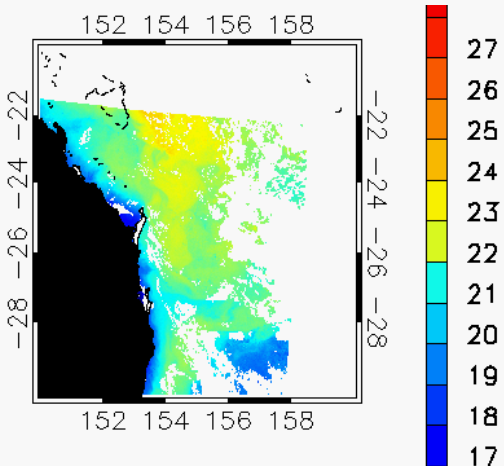
VIIRS L3U (1410 UT)



VIIRS L3U (1540 UT)



VIIRS L3U (1550 UT)



IMOS NOAA-19 fv01 L3C SSTskin vs not bias-corrected VIIRS L3U SSTskin Queensland Coast: 17 Aug 2015 Day

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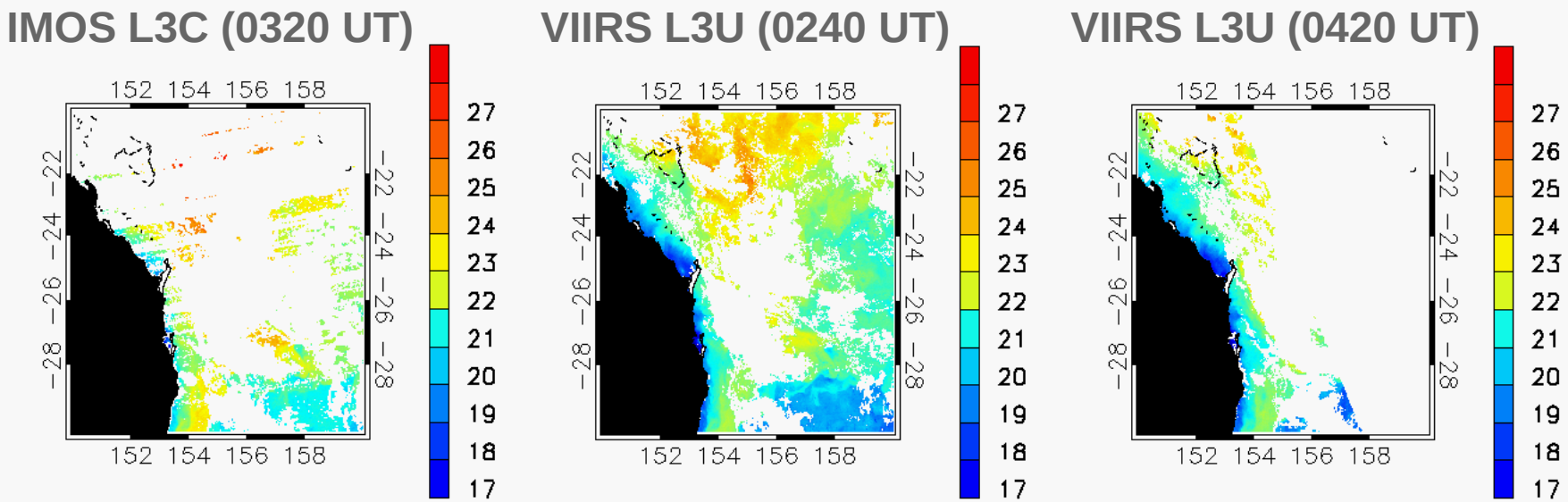

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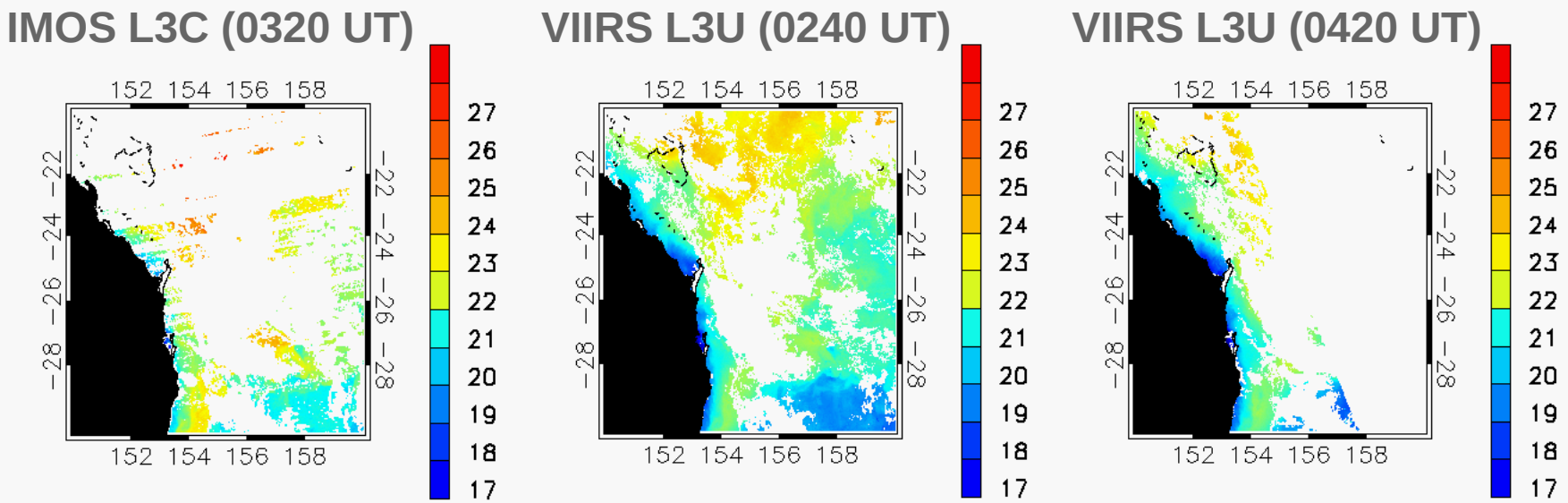
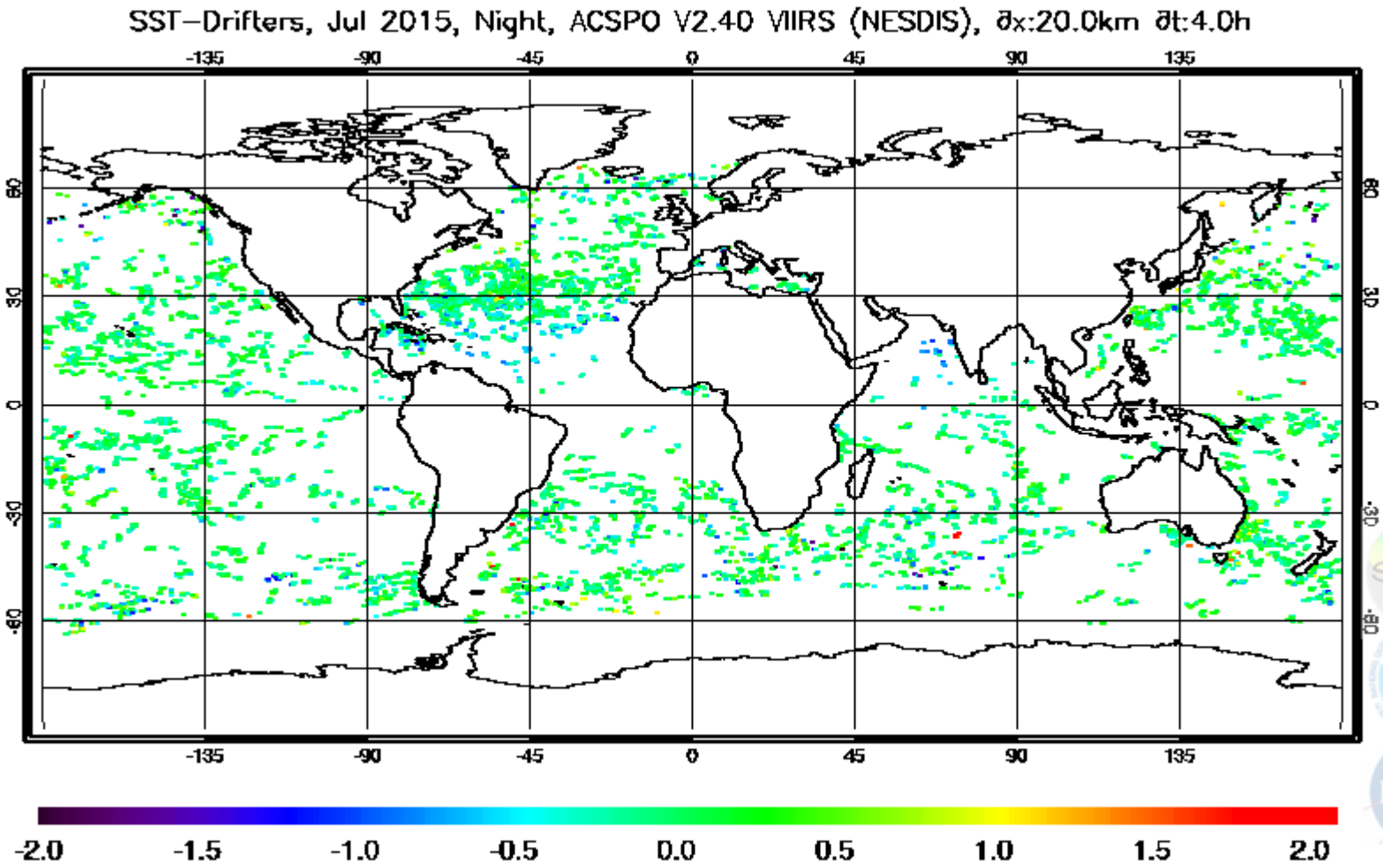
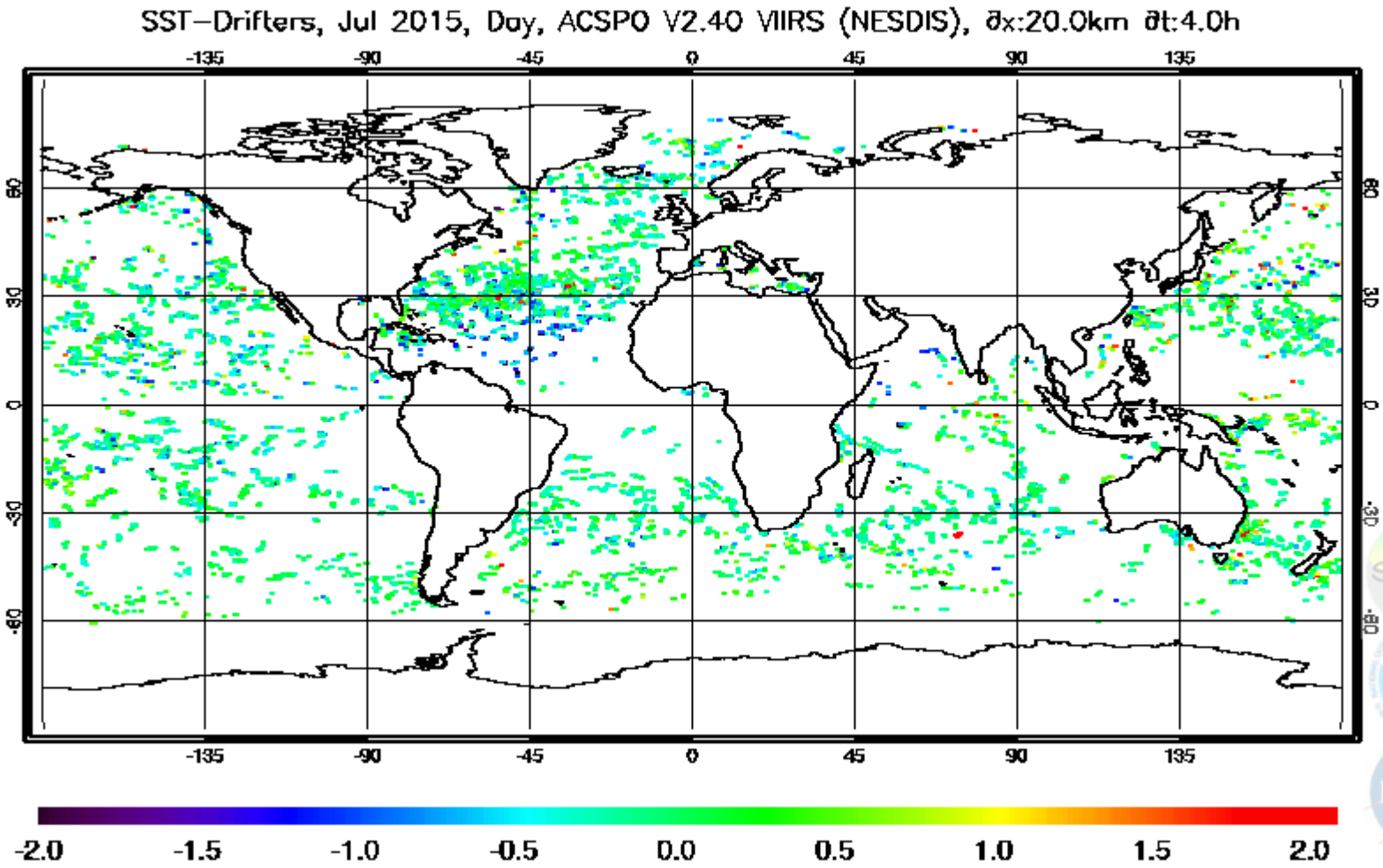
IMOS NOAA-19 fv01 L3C SSTskin vs bias-corrected VIIRS L3U SSTsubskin Queensland Coast: 17 Aug 2015 Day



ACSPO VIIRS L2P SST – Drifter SST
1-31 July 2015 Night



ACSPO VIIRS L2P SST – Drifter SST
1-31 July 2015 Day



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Initial Findings

- Night-time bias-corrected VIIRS L3U SST as much as 1ºC colder than IMOS NOAA-19 fv01 L3C SSTskin but generally within +/- 0.5ºC of drifting buoy SSTs off Queensland coast
- Daytime bias-corrected VIIRS L3U SST as much as 2ºC colder than IMOS NOAA-19 fv01 L3C SSTskin but generally within +/- 1ºC of drifting buoy SSTs off Queensland coast
- VIIRS L3U SSTs (filtered for QL = 5) have greater spatial coverage than IMOS fv01 NOAA-19 L3C SSTs (filtered for QL ≥ 4) - particularly close to Queensland coast
- Daytime VIIRS L3U SSTs have greater spatial coverage than IMOS fv01 NOAA-19 L3C SSTs, possibly due to ACSPO VIIRS system having better daytime cloud identification

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Future use of VIIRS L3U SSTs

Over coming 12 months VIIRS SST is highest priority satellite SST data stream to add to data ingested into:

- RAMSSA/GAMSSA L4 analyses
- OceanMAPS3 Global 0.1º Ocean Model
- eReefs Great Barrier Reef ~ 4 km Ocean Model
- Trial IMOS 0.02º VIIRS+AVHRR L3S
  - currently near real-time IMOS 0.02º AVHRR L3S products ingest only NOAA-18 and NOAA-19 SSTs

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Questions

1. What is the correlation radius of the VIIRS 0.02º L3U? (Very important for DA into ABoM ocean models)
2. How reliable are the sses_bias and sses_standard_deviation values in the VIIRS L3U files? Both will be needed for assimilation into the ABoM's ocean models.
3. What are the spatial biases with respect to in situ SST in the VIIRS SST products – particularly within a few kilometres of coasts?
4. How accurate/reliable are the wind speed values in the VIIRS L3U files? (Note: We know that other GHRSST L2P files contain 10 m wind speeds interpolated to the SST observation location from relatively coarse global NWP models.)

EXTRA SLIDES FOR DISCUSSION

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Regional Australian Multi-Sensor SST Analysis

Depth: Foundation (pre-dawn SST)

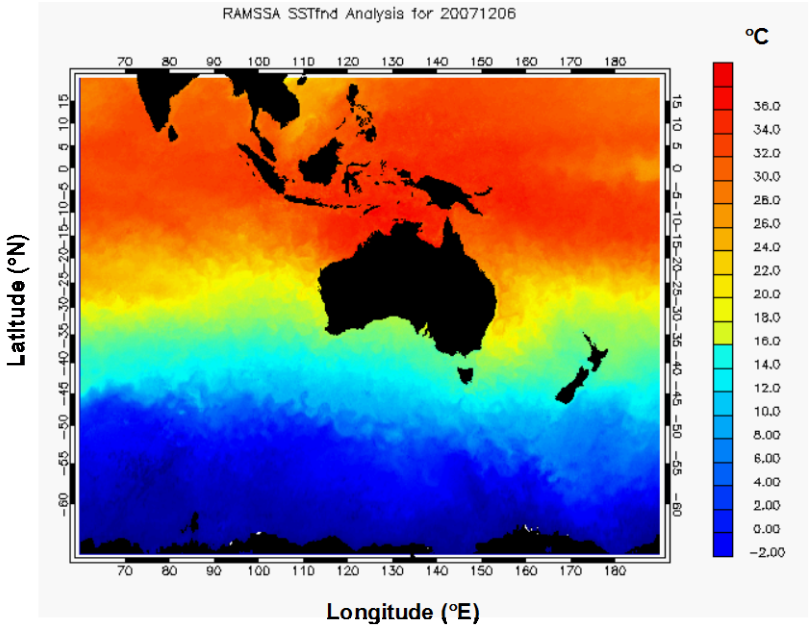
Resolution: Daily, 1/12°

Domain: 60ºE - 170ºW , 20ºN - 70ºS

Data Inputs:

- 1 km IMOS HRPT AVHRR (NOAA-18,-19) **L2P**
- 9 km NAVOCEANO GAC AVHRR (NOAA-18, NOAA-19, METOP-A, METOP-B) **L2P**
- 25 km JAXA AMSR-2 (Aqua) **L2P**
- Buoy, ship, Argo, CTD, XBT obs (GTS)
- 1/12° NCEP ice concentration analyses
- BGF: Combination of previous day's RAMSSA SST and Reynolds climatology

Uses: Boundary condition for ABoM operational regional NWP models



Global Australian Multi-Sensor SST Analysis

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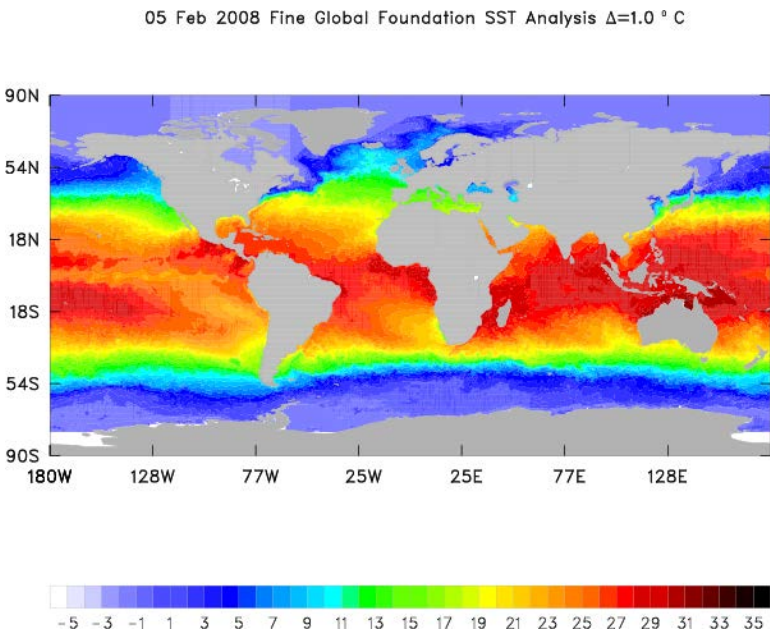
Depth: Foundation (pre-dawn SST)

Resolution: Daily, 1/4°

Domain: Global

Data Inputs:

- 1 km IMOS HRPT AVHRR (NOAA-18,-19) **L2P**
- 9 km NAVOCEANO GAC AVHRR (NOAA-18, NOAA-19, METOP-A, METOP-B) **L2P**
- 25 km JAXA AMSR-2 (Aqua) **L2P**
- Buoy, ship, CTD, XBT obs (GTS)
- 1/12° NCEP ice concentration analyses
- BGF: Combination of previous day's GAMSSA SST and Reynolds climatology



Uses: Boundary condition for ABoM operational global NWP models; Initialises ABoM seasonal prediction model; Contributes to GMPE.