ACSPO Regional Monitor for SST: ARMS v1.20

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Introduction

The NOAA ACSPO (Advanced Clear-Sky Processor for Ocean) Regional Monitor for SST (ARMS; www.star.nesdis.noaa.gov/sod/sst/arms/) system was designed to monitor NOAA SST products online in near real time, focusing on areas of interest to NOAA users, including coastal and internal waters, high-latitudes, dynamic and cloudy regions. Since the 2016 GHRSST Meeting in Washington, DC, ARMS has been updated to version 1.20 (v1.20). Compared to v1, images in v1.20 are presented with higher resolution. SSES (Single-Scanner Error Statistics) bias correction button was added. Five hi-res L4 SST (CMC, OSTIA, NOAA Geo-Polar Blended, MUR, and RAMSSA) and two geo SSTs (from Himawari-8 and GOES-16) have been added. ACSPO L3U (un-collated) products have been also included with masking flags consistent with L2P. Adding Australian L3S (super-collated) SSTs and improvements to the website speed are underway.

ARMS (ACSPO Regional Monitor for SST)

- Fig. 1 shows a screenshot of the ARMS v1.20. On the left is the control panel. The SST maps are generated using the NOAA Coast Watch Data Analysis Tool (CDAT)
- Currently monitored in ARMS are 27 regions in the Atlantic, Pacific, Indian and Arctic Oceans, and two inland water

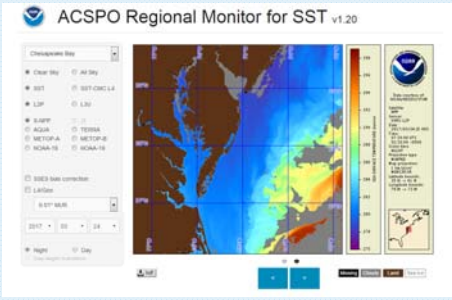

Fig. 1: A screenshot of the ARMS system.

- ARMS monitors clear-sky and all-sky ACSPO SSTs & ΔSST=Sat– CMC L4 SST
- Monitored are ACSPO SSTs from the following polar satellites:
  - ◊ L2: SNPP VIIRS, N18/19/Metop-A/B FRAC/GAC ; Terra/Aqua MODIS
  - ◊ L3U: SNPP VIIRS, Metop-A/-B AVHRR FRAC; Terra/Aqua MODIS
- Ts without and with SSES bias correction
- User can compare SSTs from polar satellites to geo (H8 AHI, G16 ABI), four global L4 hi-res SSTs (0.01° JPL MUR, 0.05° Met Office OSTIA, 0.05° NOAA Geo Polar Blended, 0.10° Canadian Met Centre CMC), and one regional L4 SST (0.09° BoM RAMSSA). When "L4/Geo" radio button is checked, the corresponding L4 of the same day or the geostationary SST of the closest UTC would display, and disappears when unchecked
- Time coverage: Jul. 18th 2015 – present
- Figures are stratified into 3 categories based on scene time: day, night, and day/night (including both daytime and nighttime pixels; often observed in high-latitudes)
- Data are available for downloading using the hdf button
- All information about the satellite, projection, region etc is displayed in the right panel

ACSPO L3U vs. L2P

- ACSPO VIIRS L3U products have been produced and monitored in ARMS v1
- AVHRR FRAC L3U onboard Metop-A/-B are now available in v1.20. Similar to VIIRS L3U, the FRAC L3U has a comparable data coverage to L2P. Data noise is reduced, while the spatial patterns are well preserved (the location of fronts, currents, *etc.*)
- The masking flags (cloud mask, ice mask, etc.) of ACSPO L3U are same as those in L2P.
- Generating GAC, MODIS and AHI/ABI L3U and adding in ARMS underway

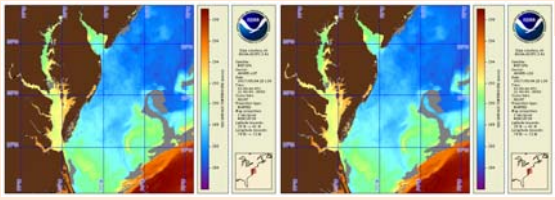

Fig. 2: An example of L2P vs. L3U of AVHRR FRAC Metop-A.

Geostationary SSTs from Himawari-8 and GOES16

- Himawari-8 AHI is available for 3 Pacific regions and 6 regions around Australia. In general, AHI has a Larger coverage than VIIRS (Fig. 3)
- ABI on board G16 had been added for 11 regions (will be publicly released pending GOES-R program review)

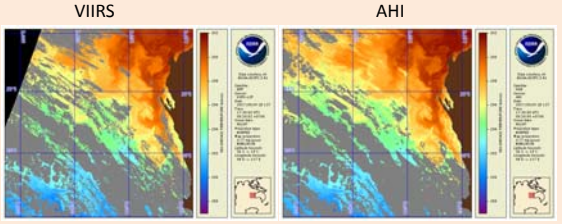

Fig. 3: An example of how VIIRS L2P compares to AHI in ARMS. AHI of the closest UTC time to selected polar satellite will display when "L4/Geo" is checked.

L4 SSTs

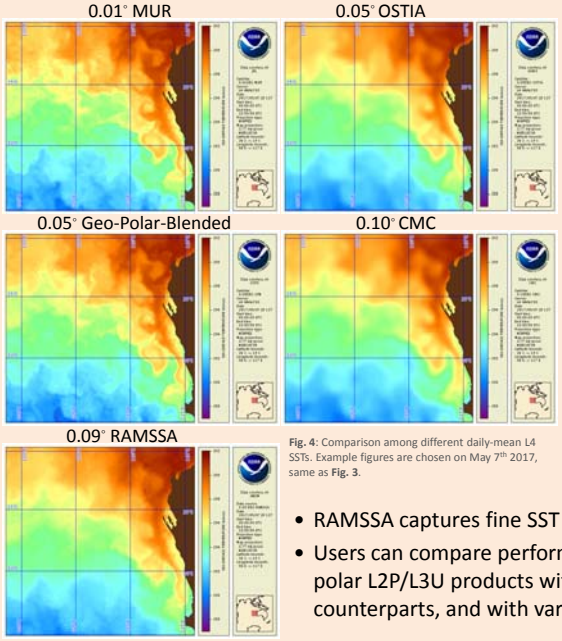

Fig. 4: Comparison among different daily-mean L4 SSTs. Example figures are chosen on May 7th 2017, same as **Fig. 3**.

- MUR, OSTIA, Geo Polar Blended and CMC are available for all 27 regions
- RAMSSA is only available for 6 regions near Australia
- 0.01° MUR shows fine structure, but may be off when satellite data are not available
- 0.05° Geo Polar Blended also preserves fine structure well
- RAMSSA captures fine SST structure quite well
- Users can compare performance of different polar L2P/L3U products with their geostationary counterparts, and with various L4 analyses

SSES vs. no SSES

- SSES bias correction reduces regional biases in regression SST, and effects of residual cloud, view zenith angle and diurnal warming on SST , and brings it closer to *in situ* SST

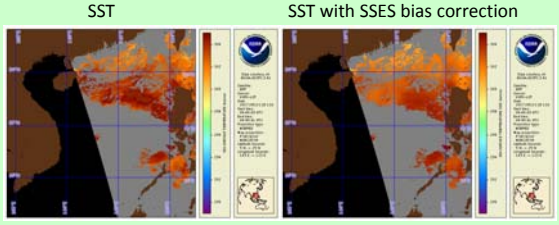

Fig. 5: Example of SST without/with SSES bias correction for South China Sea on May 12th 2017. Local time is 12:40:00 to 12:50:00.

Example of SSES bias correction on the diurnal warming magnitude during the daytime

Summary

- The ACSPO Regional Monitor for SST (ARMS: www.star.nesdis.noaa.gov/sod/sst/arms/) website has been updated to v1.20. It provides a better figure resolution. Himawari-8 SST and five hi-res L4 SSTs have been added for comparison with polar SSTs. Users can compare different polar/geo/L4 SSTs. SSES bias corrected SSTs are also available.
- ACSPO L3U products (both VIIRS and AVHRR FRAC) show good regional performance with reduced noise and well preserved spatial patterns, and comparable data coverage and global performance statistics to L2P.
- The future work includes improving the efficiency of website site access, and adding several regions around Australia and BoM L3S SST products.