NOAA/NESDIS Geostationary and Blended Operational GHRSST SST products

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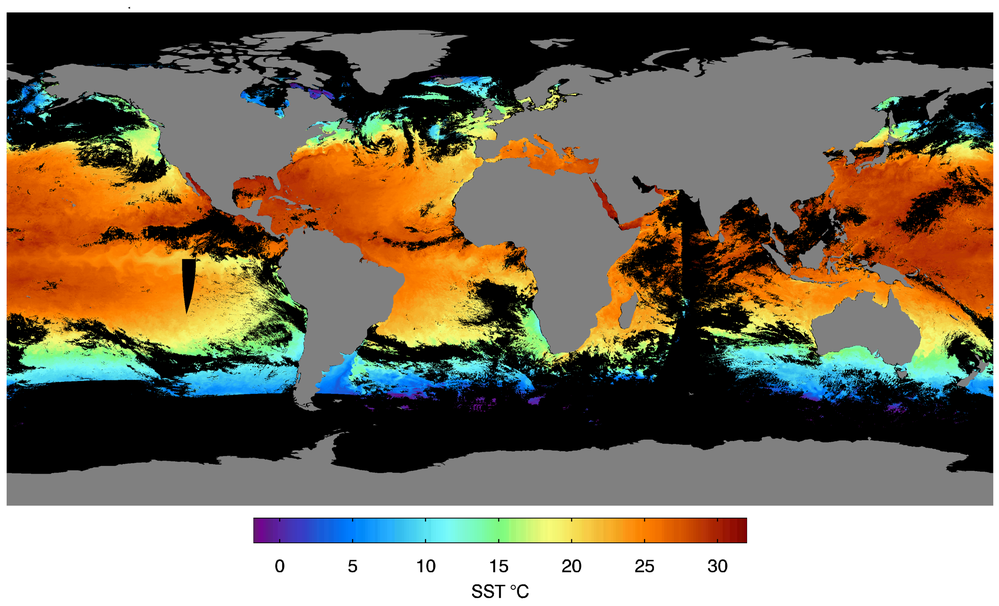
BACKGROUND

NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) generates operational geostationary Level-2P (L2P) Sea Surface Temperature (SST) products in GHRSST GDS2.0 format from Geostationary (GOES) East (E) and West (W), Meteosat Second Generation (MSG) and Multi-function Transport Satellite (MTSAT, now substituted by Himawari) . SST product accuracy has improved with the implementation of a physical retrieval algorithm based on a Modified Total Least Squares algorithm (Koner et al. 2015). Additionally, the operational geostationary SST products are then blended with the polar operational SSTs to produce daily global, 5km resolution SST analyses in GHRSST L4 format. One recent development is the addition of diurnal warming calculation into the final blended product.

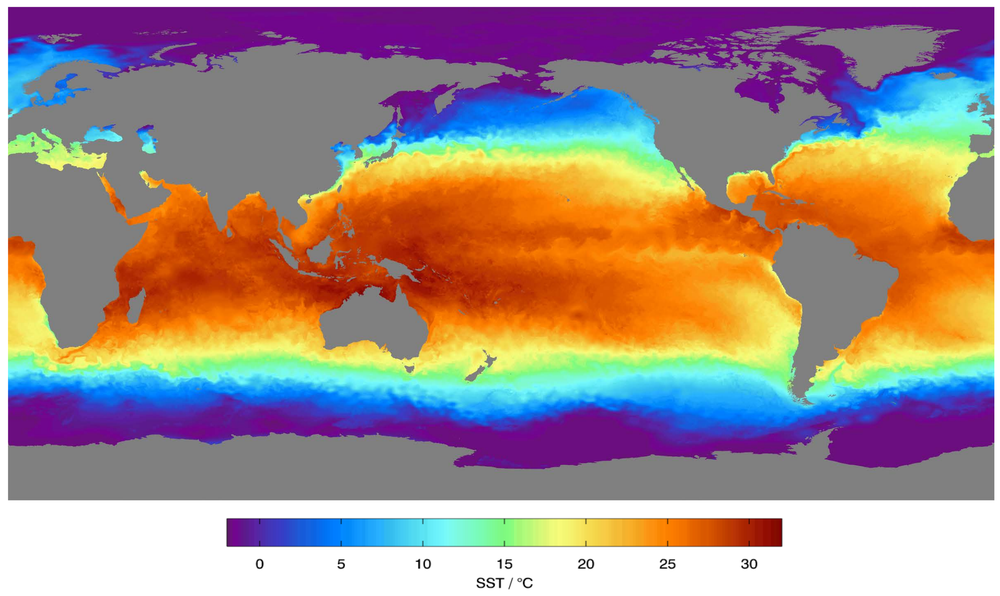
GEOSTATIONARY SST COVERAGE

GOES-W GOES-E Meteosat-10 {gap} Himawari-8



The image is a 24 hour merged composite of the Operational geostationary SST ,products generated by NOAA (GOES-W (15), GOES-E (13), MSG, gap, Himawari data)

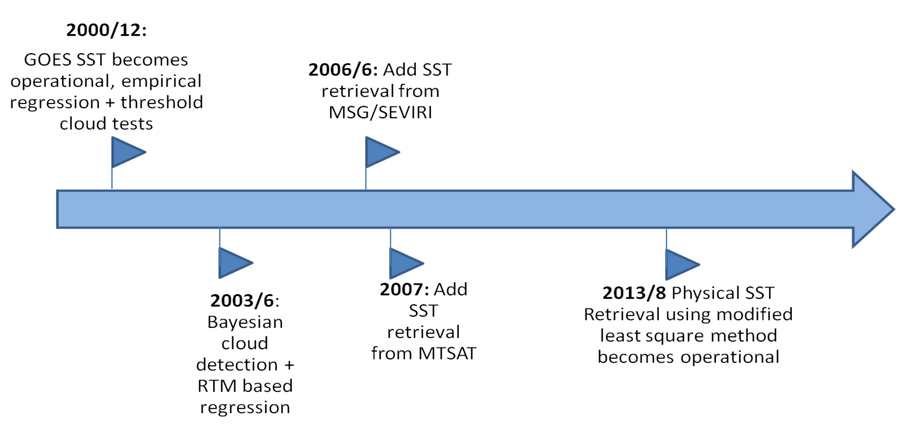
BLENDED SST ANALYSIS



These 5-km blended SST analyses are produced daily from 24 hours of polar and geostationary sea surface temperature satellite retrievals (NPP, Metop-B, GOES-E/W, MTSAT-2 and Meteosat-10). MTSAT-2 will be replaced by Himawari-8 in November 2015.

OPEARTIONAL SST RETRIEVAL

History of GEO SST retrieval algorithms at NOAA/NESDIS



Current geostationary SST retrieval: MTLS physical retrieval + Bayesian cloud detection for clear sky (Koner et al 2015, Merchant et al 2005)

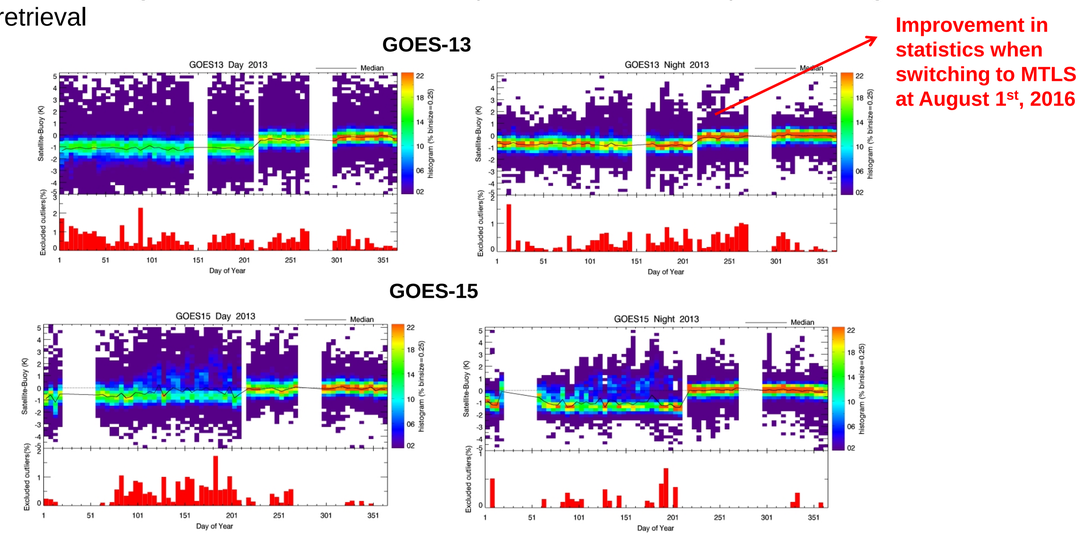
Geo-Polar Blending: A multi-scale OI with data-adaptive correlation length scale, resulting in 5km global L4 product (Maturi et al 2016)

Analysis is performed at 3 different scales
- Final result is interpolated from these analyses based on data density
- Preserves fine-scale features without introducing excessive noise

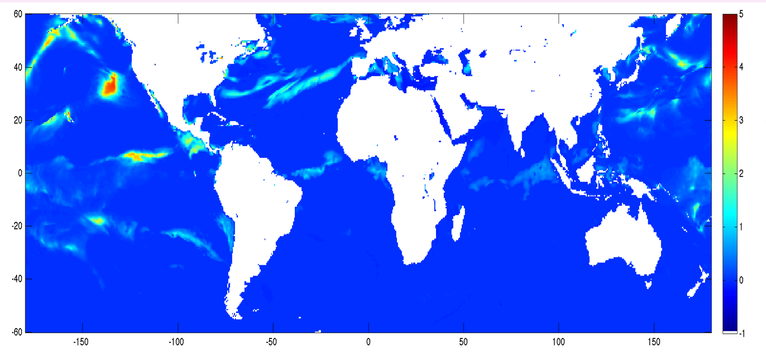
MTLS PHYSICAL RETRIEVAL

Sea Surface Temperatures generated by physical retrieval methodology

- MTLS (Modified Total Least Squares, Koner et al) works better than other physically based retrievals in our case
- Improves retrievals when compared to regression, particularly for GOES
- Reduces regional biases and scatter compared to the current operational regression-based retrieval

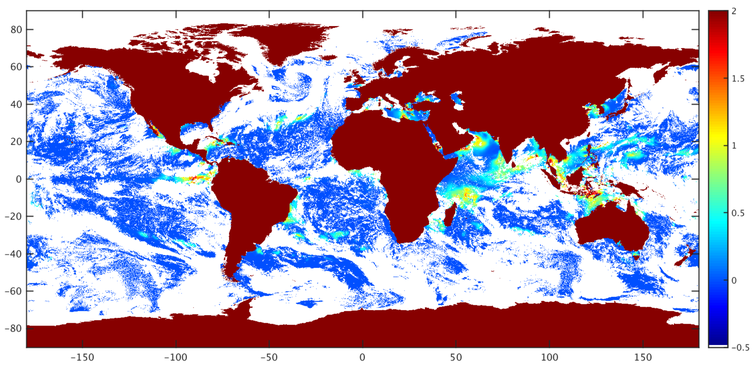


EFFECT OF DIURNAL ADJUSTMENT



Diurnal warming amplitude was calculated using turbulence model and stokes' drift.

VIIRS



Effect of diurnal adjustment on VIIRS

Summary

The geostationary SST and blended SST Analyses products provide to the user community a uniquely powerful data set for studying SST and makes it possible to study such effects as diurnal warming of the ocean surface and the evolution of mesoscale features such as fronts and eddies. The temporal and increased data coverage of the geostationary satellites and the gap free SST analyses provides reliable, accurate data coverage in important oceanographic, meteorological, and climatic regions.

Acknowledgments

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