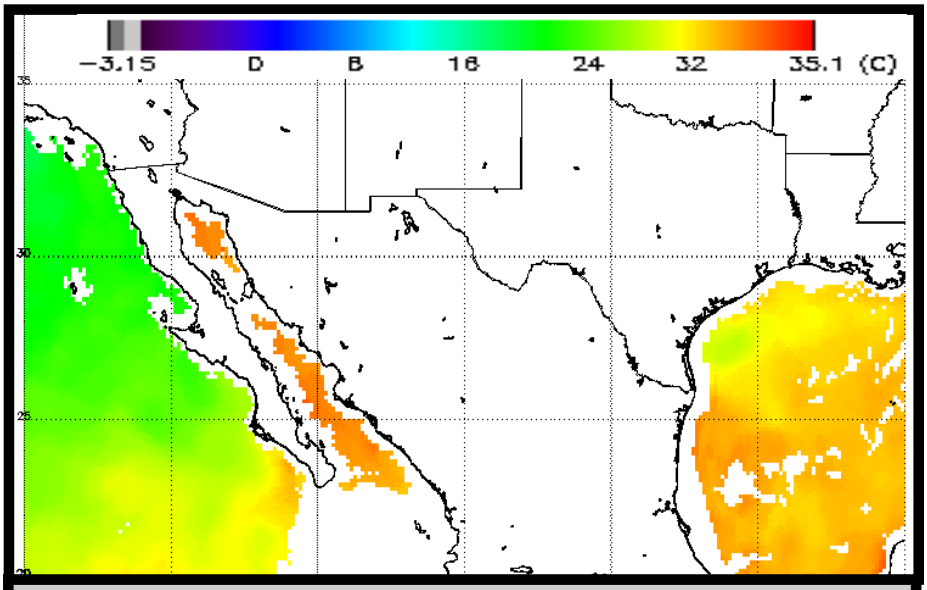
GCOM AMSR2 SST

Quick Guide

Why is AMSR2 Sea Surface Temperature (SST) Important?

The Advanced Microwave Scanning Radiometer-2 (AMSR2) is a passive microwave instrument that can measure sea surface temperatures in both clear-sky and cloudy conditions, excluding areas of precipitation and high winds. Sea surface temperatures are important to monitor as they affect air mass moisture, instability characteristics, diurnal variations, extratropical and tropical development, and ocean health parameters.



AMSR2 Sea Surface Temperature on 30 August 2017.

What is the AMSR2 SST resolution, range, and accuracy?

Algorithm	Temporal Resolution	Spatial Sampling	Range and Accuracy
The algorithm utilizes 12 AMSR2 spectral channels between 6-36 GHz (both horizontal and vertical polarizations)	Every 12 hours	10 km	Range: -3°C to 38°C Accuracy: ± 0.5°C

Impact on Operations

Primary Application:

Tropical cyclones:
Warm ocean temperatures are a source of energy for tropical cyclones, with a threshold of ~26 °C for tropical cyclone formation. Strong temperature gradients along the storm track can be used to forecast rapid intensification or weakening.

Precipitation and coastal convection:
Ocean temperatures have a direct impact on local atmospheric temperatures and precipitation. The resulting diurnal land and sea breeze circulations impact coastal convection.

Limitations

Ocean depth: Measurements vary with ocean depth; AMSR2 SST represents an ocean depth of ~1 mm, while infrared retrievals sense an ocean depth of several µm.

Ocean and atmospheric parameters:
Wind speed and direction, total precipitable water, and 'across track location' of the measurement, impact SST retrieval accuracy and are accounted for in the algorithm. Sea ice, land, sun glint, and C-band RFI can contaminate measurements and contribute to SST errors. AMSR-2 SST quality control flag accounts for all impacts.

Orbital swath width: Orbital swaths do not overlap in the mid-latitudes and tropics, leading to data gaps. These regions may only have coverage once per day.

Coastlines: Microwave radiation is vastly different between land and ocean; SST retrievals cannot have any land in the field-of-view.

Contributor: Jorel Torres, Erin Dagg and Bernie Connell CIRA/CSU https://www.cira.colostate.edu/

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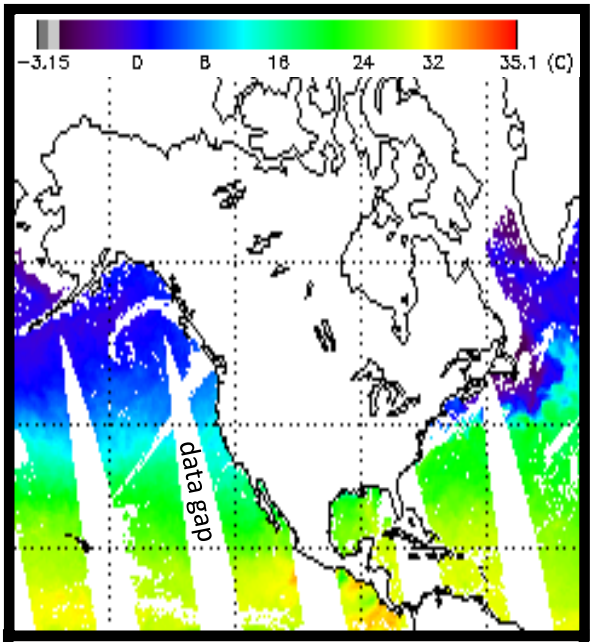
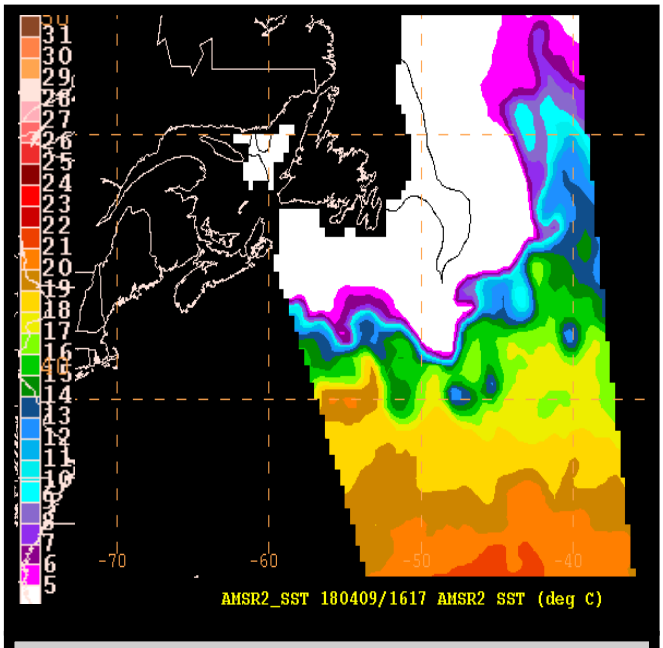


AMSR-2 SST on 28 January 2018. Data gaps occur in the tropics and mid–latitudes where orbital swaths do not overlap.



AMSR-2 SST on 9 April 2018 showing the temperature gradient in the Atlantic Ocean (imagery from N-AWIPS).

Resources

NOAA STAR Webpage

ATBD: GCOM-W1 AMSR2 EDR's

Journal of Selected Topics in Applied Earth Observations and Remote Sensing

Remote Sensing of SST Using AMSR-2 Measurements

Hyperlinks not available when viewing material in AIR Tool

Comparison to GOES-16 SST:

GOES-16 SST and AMRS2 SST on 12 June 2018 at ~1600 UTC. Both products show temperatures near 32 °C in the Gulf of Mexico. GOES-16 SST infrared retrievals are produced only in clear-sky environments (black pixels denote land and cloudy regions). AMSR2 SST retrievals are performed for clear-sky and non-precipitating cloudy conditions, providing more coverage. GOES-16 and AMSR2 data are at 2 km and 10 km spatial sampling, respectively.