



NOAA's Indian Ocean Heat Content Product



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THE NESDIS OCEAN HEAT CONTENT PRODUCT SUITE

Ocean heat content (OHC), the amount of heat energy (in kilojoules per square centimeter), is an important component in the determination of potential tropical cyclone intensification. To measure the heat content of the upper ocean, NOAA produces a daily operational suite of satellite-derived Oceanic Heat Content (OHC) products for the North Atlantic, and the North and South Pacific Oceans at 0.25° horizontal resolution (https://www.ospo.noaa.gov/Products/ocean/ocean_heat.html), including the Mixed Layer Depth, Depth of the 20 °C and 26 °C Isotherms, and Heat Content of all waters warmer than 26 °C.

OPERATIONAL USES

The NOAA OHC Product Suite has been shown to be the best product available for Hurricane Intensity Forecasting in the North Atlantic and North and South Pacific Basins. The OHC Product Suite has been validated against one million *in situ* measurements from multiple platforms to assess biases and uncertainties. Figure 1 shows the data flow diagram for the OHC Product Suite. The algorithm is initialized by a custom 0.25° gridded Sea Surface Height and the NOAA 5 km Geo-Polar Blended SST Analysis. This suite of OHC products is planned to be extended to the Indian Ocean over the next two years.

CLIMATE STUDY

Ocean heat content is also an important climate change indicator; more than 90% of the warming on the Earth over the past 50 years occurred in the Ocean. The OHC Indian Ocean suite of products will provide valuable insight to key climate science questions such as: 1) thermodynamic processes in the equatorial wave guides associated with eastward propagating Kelvin Waves (associated with ENSO and the Madden-Julian Oscillation) across the tropics. Benefits for climate studies are a new understanding of the upper ocean thermodynamics, dynamics and air-sea interaction processes relevant to tropical cyclone intensity forecasting, climatic variability (e.g., the spatial and temporal distribution of OHC anomalies), fisheries, and coral reef bleaching. Figure 2 shows the seven tropical cyclone “basins”. Figure 3 shows the 5km Geo-Polar Blended SST Analysis over the Indian Ocean*, a L4, gap-free daily product used to generate the OHC.

* The Ocean Heat Content algorithm is initialized by a 0.25° gridded Sea Surface Height and the 5km Geo-Polar Blended SST Analysis. The latter requires geostationary coverage over the Indian Ocean. Currently, Meteosat-8 coverage (over the Indian Ocean) is sent to NOAA/NESDIS and used together with a physical retrieval algorithm to generate SST. A loss of this coverage will prevent both the current operational and the next-generation OHC Indian Ocean product suites from being generated. The next-generation OHC algorithm is designed to support the full 5 km resolution in all the derived products.

DATA FLOW DIAGRAM

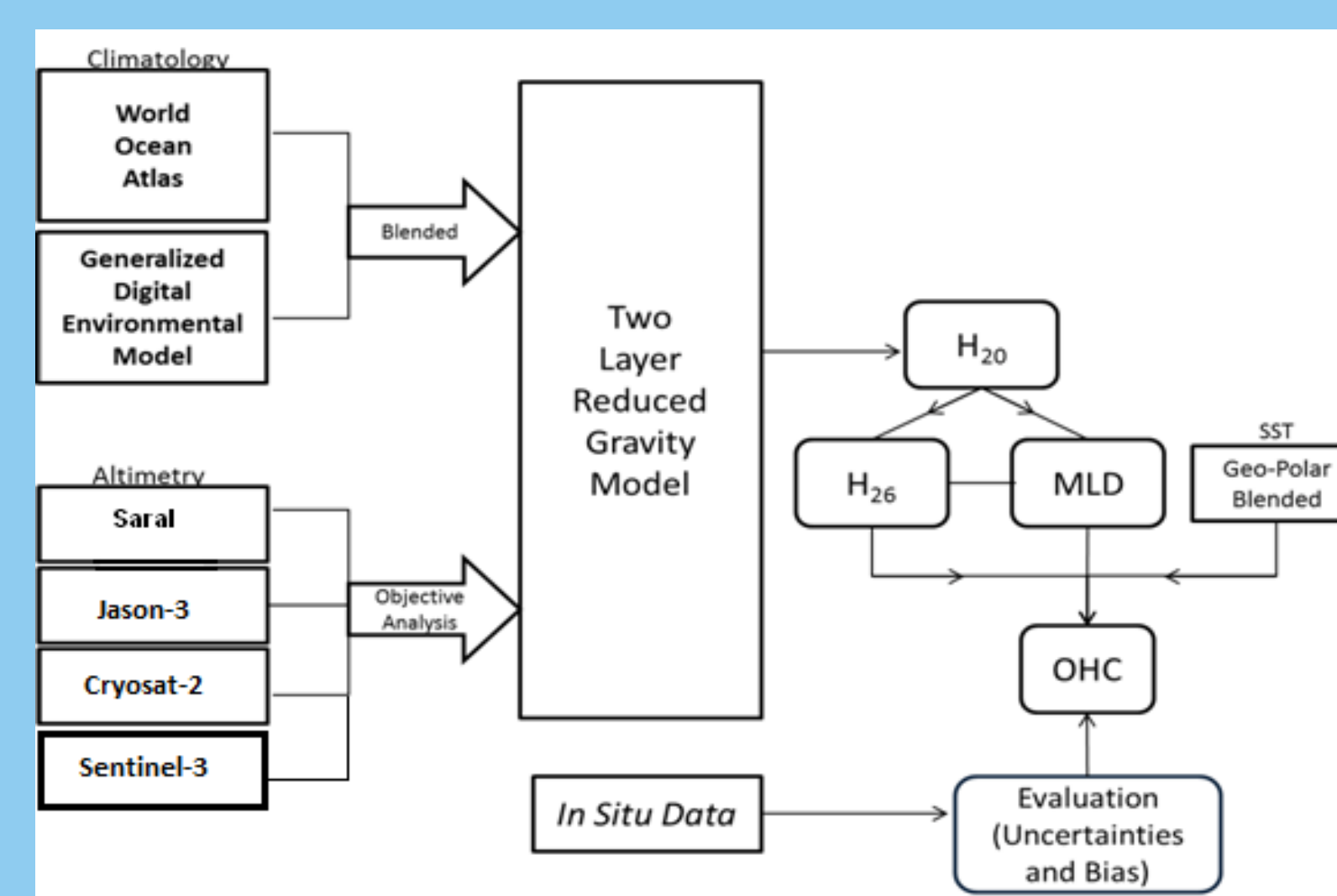


Fig 1. Ocean Heat Content Product Data Flow Diagram

OCEAN BASINS



Fig. 2 The seven tropical cyclone "basins" where storms occur on a regular basis

INDIAN OCEAN

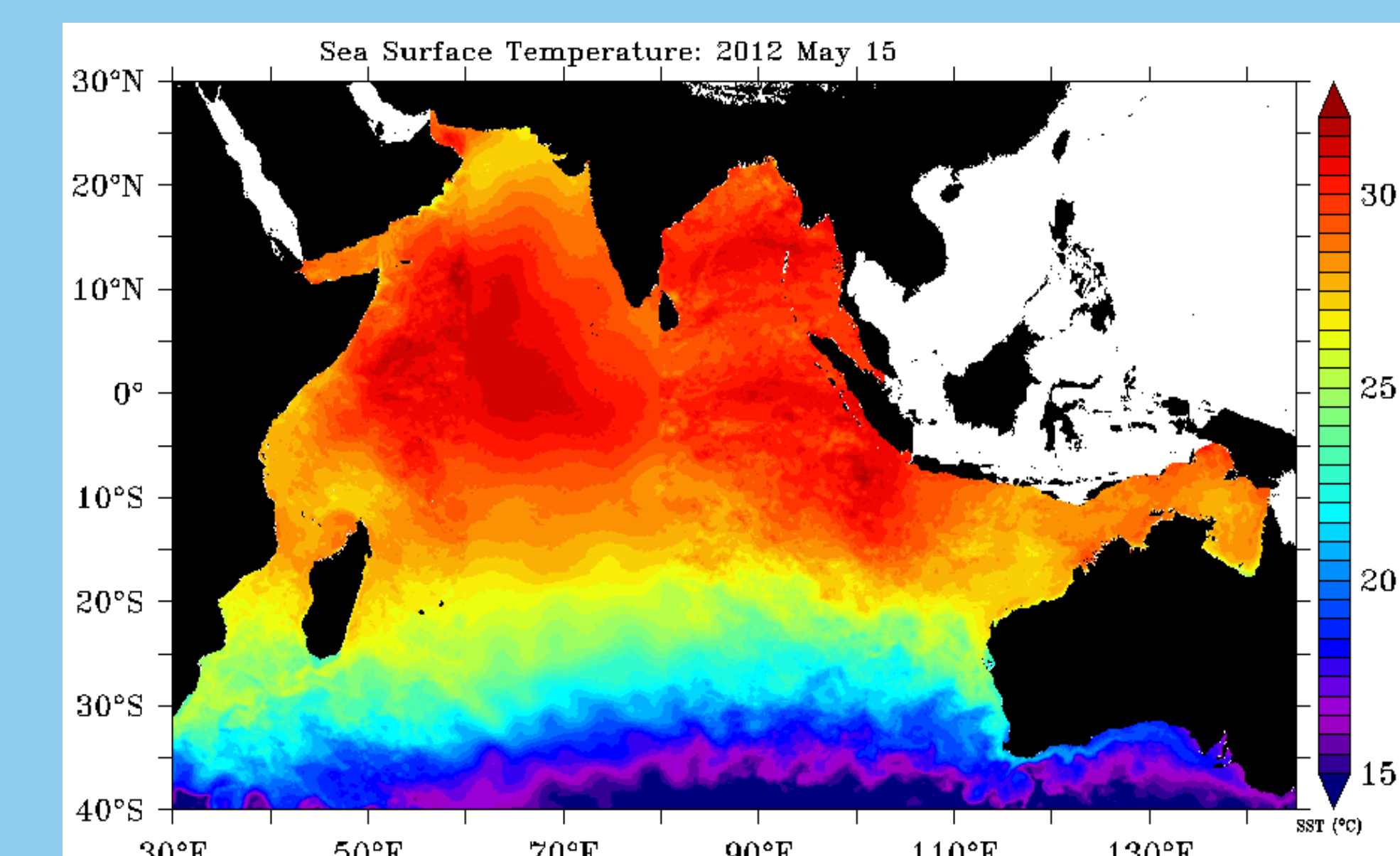


Fig. 3 Geo-Polar Sea Surface Temperature for the Indian Ocean