# DAILY REAL-TIME, GLOBAL SEA SURFACE TEMPERATURE - High-Resolution Analysis: RTG_SST_HR

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**ABSTRACT**

This note describes changes to the daily real-time, global sea surface temperature analysis (RTG_SST) on a ½ degree latitude, longitude analysis, which was originally implemented on 30 January 2001. The new analysis, designated as RTG_SST_HR, was implemented into operations on 27 September 2005 with an increased horizontal resolution at 1/12 degree. The original RTG_SST analysis continues to run in operations to allow for comparisons by users. Each daily product uses the most recent 24-hours of *in situ* and satellite-derived AVHRR ocean surface temperature data and provides a global SST analysis. The new SST's are further based on the new physical retrievals system developed with the Joint Center for Satellite Data Assimilation (JCSDA). The final part of the analysis system is to run a separate evaluation program that follows the completion of each analysis. The new RTG_SST_HR shows a small consistent improvement over the original RTG_SST in the RMS errors against in-situ data. And there is a reduction of the day to day noise in the analyses, especially in the tropics. But, it is evident that the depiction of smaller scales of the analyses are limited because of the obstruction of clouds.

## 1. Introduction

The daily Real-time Global Sea Surface Temperature analysis (RTG_SST) was implemented on January 30, 2001 (Thiebaux *et al* 2003). The RTG_SST was developed as a daily blended analysis using in-situ and infrared measurement from one NOAA satellite (currently its NOAA-17) from the Advanced Very High Resolution Radiometer (AVHRR) SST data on a ½ degree (latitude, longitude) grid. At that time, atmospheric and ocean forecast modeling systems were being developed at higher-horizontal resolutions, so it was desirable that the sea surface temperature (SST) analyses used as surface boundary conditions should have higher-horizontal resolution. But initially, many of the existing SST analyses were based on coarse horizontal resolution (i.e., on a 1 X 1 degree latitude and longitude rectangular grid) with large time averages (1 week) The present RTG_SST has run reliably over the past six years, and has been used by the regional North American Model (NAM; Black 1994) at the National Centers for Environmental Prediction (NCEP) and by the global forecast model at the European Center for Medium Weather Forecasting (ECMWF).

Several studies have examined the RTG_SST and the results indicate that the higher resolution contributes to a positive improvement over lower resolution analyses. Chelton & Wentz (2005) have shown the RTG_SST depicts gradients of ocean features better than the lower resolution (time & space) Reynolds-Smith SST. In-situ data contributes a slight improvement when compared to another SST analysis at an even higher horizontal resolution, but ingesting only satellite SST. . Kara and Barron (2007) compared the RTG_SST to a similar analysis, the 1/8 Degree Modular Ocean Data Analysis System (MODAS) of the Naval Research Laboratory, using only AVHRR SST data. Their results showed the two SST analyses to be comparable. Unfortunately a common concern in these studies is the limitation of the accuracy of analyses based on AVHRR data because the AVHRR sensor can not see though clouds. So good cloud detection is critical for accurate retrievals, which is not always the case. In addition, the persistence of large areas of cloudiness is common property of weather systems (storms, fronts and hurricanes) over the ocean. The result is that many ocean areas can go long periods without being observed with AVHRR satellite data.

But the RTG_SST analysis has other limitations, due to its resolution (1/2 degree), in resolving the detailed