Historical High-Resolution Daily SST Analysis (COBE-SST3) with Consistency to Monthly Land Surface Air Temperature

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We present COBE-SST3, a high-resolution sea surface temperature (SST) analysis that captures variability from daily to centennial timescales. The SSTs were constructed by performing analyses for low-frequency components, interannual variations, and daily changes with statistical methods using in-situ and satellite observations.
The biases for each observation type were objectively estimated, and the result was a reconfirmation that the types are not properly categorized in the international database. By introducing a correction to the global mean nighttime marine air temperature observations which is used for the bias detection, moderate changes in global mean SSTs around World War II were obtained in COBE-SST3.
SST and land surface air temperature (LSAT) fields were simultaneously analyzed on a monthly time scale for consistency between SST and LSAT. The LSAT observations acted as low-quality SST observations, and could produce SST variations to an eye-opening degree. The simultaneous analysis suggested that SST and LSAT observations were complementary and of satisfactory quality.
Two types of daily SST analyses on a 0.25° grid were produced: one is a blend of multiple satellite and in-situ observations, and the other is a reconstruction with in-situ observations only. The two analyses were highly correlated with a counterpart provided by the National Oceanic and Atmospheric Administration of the USA.
Uncertainties in low-frequency components, interannual variations, daily changes were separately estimated. These uncertainty estimates were then used to construct daily perturbed SST fields that are random, normally distributed, and continuous in both space and time, making them suitable for applications such as historical ocean subsurface reanalysis and AGCM studies.