

Exploring and Quantifying Uncertainties for Extended Reconstructed Sea Surface Temperature (ERSST) Version 4

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The uncertainty in Extended Reconstructed SST (ERSST) version 4 (v4) is reassessed based upon i) reconstruction uncertainties and ii) an extended exploration of parametric uncertainties. The reconstruction uncertainty (U_r) results from using a truncated (130) set of Empirical Orthogonal Teleconnection functions (EOTs) which yields an inevitable loss of information content, primarily at a local level. The U_r is assessed based upon 32 ensemble ERSST.v4 analyses with the spatially complete monthly Optimum Interpolation SST product. The parametric uncertainty (U_p) results from using different parameter values in quality control, bias adjustments, and EOT definition etc. The U_p is assessed using a 1000-member ensemble ERSST.v4 analysis with different combinations of plausible settings of 24 identified internal parameter values. At an individual gridbox scale, the SST uncertainty varies between 0.3°C and 0.7°C and arises from both U_r and U_p . On the global scale, the SST uncertainty is substantially smaller (0.03°-0.14°C) and predominantly arises from U_p . The SST uncertainties are greatest in periods and locales of data sparseness in the 19th Century and relatively small after the 1950s. The global uncertainty estimates in ERSST.v4 are broadly consistent with independent estimates arising from Hadley SST version 3 (HadSST3) and Centennial Observation-Based Estimates of SST version 2 (COBE-SST2). The uncertainty in the internal parameter values in quality control and bias adjustments can impact the SST trends in both the long-term (1901-2014) and “Hiatus” (2000-2014) periods.

Oral

- **Quantification and estimation of uncertainty**