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Small-Scale and Short-Term Variability of Sea Surface Temperature and Their Role in the Error of Gridded Data Sets

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Variability in nature exists on all spatial and temporal scales, including those smaller than the resolution of model and observational data sets. Imperfect parametrization of this small-scale and short-term variability in models and its incomplete sampling by observational systems creates model and observational error on the resolved scales of variability. Advent of satellite data sets, especially for sea surface temperatures (SST), made it possible to compute and map statistics of variability on scales smaller and shorter than what is traditionally resolved in the global climate data sets of observations or in the global model fields. Such estimates, presented for the satellite era using data sets from the Group for High Resolution SST (GHRSST), allow the improvement of observational error estimates both for the satellite data and for the in situ data from International Comprehensive Ocean-Atmosphere Data Set (ICOADS). The new error models are used to predict the magnitude of the difference between satellite and in situ SST data sets; its comparison with the actual differences demonstrates a largely good skill of the error model. Improved models for the in situ data error have a potential to carry the gains of the satellite period data coverage into the SST analyses of the pre-satellite period.