Validation and assimilation of satellite sea surface temperature to characterize sub-mesoscale features in assimilative ocean and coupled earth system prediction models

New data assimilation approaches seek to improve the observation benefit the high-resolution Sea Surface Temperature (SST) information from satellites for assimilation into and validation of ocean and coupled earth system prediction systems. Present approaches that use the SST observing network in constraining the large-scale ocean circulation make inadequate use of information on finer space and time scales. Aggregate statistics based on matchups between individual SST retrievals and independent in situ samples do not convey the sub-mesoscale information evident in cloud-cleared portions of the observed fields. Matchup comparisons and derivation of super-observations over shorter space and time scales offer approaches that are more relevant for the fidelity of sub-mesoscale features. Matchup comparisons from overlapping orbits provides an additional metric for evaluation of the cycles of diurnal warming and cooling. Present SST assimilation on global scales makes limited use of the spatial detail available from satellite observations; a multi-scale assimilation approach is being evaluated as an efficient method to utilize the higher resolution SST fidelity in basin or global ocean model applications. We show preliminary results in regional models on a 1-km grid. Future plans anticipate applying these approaches in the US Navy high resolution global coupled earth system prediction capability.

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