RESULTS FROM THE SOSSTA PROJECT ON DEVELOPING A STATISTICAL-DYNAMICAL OBSERVATION OPERATOR FOR SST DATA ASSIMILATION

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We present results from the completed CMEMS funded SOSSTA project. This project developed a dynamical-statistical observation operator for satellite SST observations that accounts for the diurnal variability of the skin and sub-skin SST layers. We present an overview of the main achievements of the project. This includes (1) a modelled data set of fine-scale diurnal SSTs for the Mediterranean Sea, (2) the use of canonical correlation analysis (CCA) to develop a highly-efficient observation operator to parametrize the diurnal cycle, and (3) the implementation of this observation operator into an ocean data assimilation system. Specifically, we have used an ocean column model (GOTM) to simulate diurnal SST variability across the Mediterranean Sea with fine vertical resolution. This allows us to contrast skin SST, sub-skin SST, SST at depth, and foundation SST. We present results showing the number of intense diurnal warming events and highlight the non-uniform cool-skin effect, as well as compare the influence of various solar absorption parameterizations on the modelled near-surface temperatures. The GOTM data, validated against SEVIRI observations, is used as a training set for performing a canonical correlation analysis. The CCA extracts the maximally correlated modes of variability between temperatures at depth and skin/sub-skin SST, conditioned on atmospheric state (insolation and wind speed) and time of day. These canonical correlations are then used to formulate an observation operator that is designed to project OGCM temperature profiles onto a skin or sub-skin SST for computing the innovation in the assimilation of satellite SST data. The statistical-dynamical observation operator was implemented for testing in the POSEIDON model forecasting system (Aegean Sea).