Abstract for Copernicus Marine Week

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The SOSSTA project: enhancing the skin SST representation in ocean analyses and forecasting systems

The diurnal cycle of sea surface temperature (SST) is a fundamental signal of the climate system. Although the first depth level in ocean general circulation models has been reduced to about one meter, most models do not properly resolve near-surface thermo-dynamical processes. In low wind and/or high insolation conditions, the diurnal cycle in skin SST can be large, thus degrading the accuracy of the ocean surface analysis and prediction. Furthermore, this also presents challenges for the assimilation of satellite SST observations, because infrared sensors (e.g. AVHRR, SEVIRI) measure the skin SST (approximately 10 μm depth) and microwave sensors (e.g. AMSR-2) measure a sub-skin temperature (about 1 mm depth). There is therefore a need for a dynamically-based observation operator for the assimilation of SST observations that can account for near-surface thermo-dynamical processes.
In this poster, we present results from the CMEMS Service Evolution SOSSTA project, which aims at diagnosing the diurnal cycle amplitude of skin SST given the oceanic and the atmospheric states, mostly for assimilation purposes. Statistical relationships between the skin or subskin SST and the water temperature at depth are derived by means of a high-resolution one-dimensional turbulence model (GOTM). The main modes of correlations are extracted through canonical correlation analysis from GOTM outputs, conditioned to the atmospheric state. Thus, an observation operator that projects ocean model temperature profile from an ocean general circulation model onto skin and subskin SST equivalents is built and tested in operational configurations of analysis and forecasting models in the Mediterranean Sea.