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New developments in spatial interpolation methods of Sea-Level Anomalies in the Mediterranean Sea

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The gridding of along-track Sea-Level Anomalies (SLA) measured by a constellation of satellites has numerous applications in oceanography, such as model validation, data assimilation or eddy tracking. Optimal Interpolation (OI) is often the preferred method for this task, as it leads to the lowest expected error and provides an error field associated to the analysed field. However, the numerical cost of the method may limit its utilization in situations where the number of data points is significant. Furthermore, the separation of non-adjacent regions with OI requires adaptation of the code, leading to a further increase of the numerical cost.

To solve these issues, the Data-Interpolating Variational Analysis (DIVA), a technique designed to produce gridded from sparse in situ measurements, is applied on SLA data in the Mediterranean Sea. DIVA and OI have been shown to be equivalent (provided some assumptions on the covariances are made). The main difference lies in the covariance function, which is not explicitly formulated in DIVA.

The particular spatial and temporal distributions of measurements required adaptation in the Software tool (data format, parameter determinations, ...). These adaptation are presented in the poster.

The daily analysed and error fields obtained with this technique are compared with available products such as the gridded field from the Archiving, Validation and Interpretation of Satellite Oceanographic data (AVISO) data server. The comparison reveals an overall good agreement between the products. The time evolution of the mean error field evidences the need of a large number of simultaneous altimetry satellites: in period during which 4 satellites are available, the mean error is on the order of 17.5%, while when only 2 satellites are available, the error exceeds 25%.

Finally, we propose the use sea currents to improve the results of the interpolation, especially in the coastal area. These currents can be constructed from the bathymetry or extracted from a HF radar located in the Balearic Sea.