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A geodetic approach to Mapping and Parametrization of Argo Temperature and Salinity Profiles

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This study addresses mapping of Argo temperature and salinity profiles onto arbitrary positions using physically advanced statistical information from model fields, and their subsequent parametrization as function of depth. Argo suffers from spatio-temporal sampling problems, and some signals are not well captured, e.g. in the deeper ocean below 2000m, around the boundary currents, in the Arctic or in the shelf/coastal regions which are not frequently visited by floats. Mapping of Argo data into sparsely sampled areas would greatly benefit from additional physical information of coherent T/S behavior in form of covariance functions. Outputs from global general ocean circulation model FESOM1.4 provide covariance information for least squares collocation and also complement the spatially undersampled Argo data in high latitudes and in deep ocean. Additionally, model covariances are used to identify areas of strong correlation with interpolation points, so that only Argo measurements inside these areas are included in the mapping procedure. Parametrization of T/S profiles is performed with b-splines where the choice of knot locations is a trade-off between accuracy and overfitting. Proposed methodology is tested in South Atlantic, but can be extended to other regions.