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A match-up database for satellite-borne ocean salinity validation

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Since its launch on November 2, 2009, the Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) onboard the Soil Moisture and Ocean Salinity (SMOS) mission is acquiring unprecedented measurements of Earth emissivity at L-band on a global scale. Over oceanic areas, an essential step in validating the inferred surface salinity is the systematic comparison with available in-situ observations. A match-up database is an efficient tool to select remote and in-situ observations acquired within the same temporal and spatial intervals which may be used either for validation of SMOS along-track data (level 2) or spatio-temporally averaged (Level 3/4) fields.
Such a tool has been developed at the SMOS Barcelona Expert Center (BEC) using different types of in-situ data downloaded from open-access Oceanographic databases. The match-up contains the recent Array for Real-time Geostrophic Oceanography (ARGO) dataset downloaded from the CORIOLIS Global Data Archiving Centre (GDAC) facility, thermosalinograph measurements onboard research vessels or Voluntary Observing Ships (VOS) from the Global Ocean Surface Underway Data (GOSUD) program, as well as observations from various mooring arrays (the Tropical Atmosphere Ocean - TAO, the Prediction and Research Moored Array in the Atlantic -PIRATA- and The Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction -RAMA) and surface drifters equipped with CTD sensors. Apart from the surface drifter observations available from external databases, a set of drifters equipped with temperature and salinity sensors has been developed as part of the SMOS-BEC activities. The deployment of the drifters is underway and additional releases are planned for the near future.
The combination of the various datasets allows the resulting database to benefit from the sampling properties of each individual source providing some important statistical characteristics: global coverage of the deep ocean through ARGO, long-term time series at fixed locations from the moorings, and one-dimensional spatial view along ship tracks.
An essential task is the qualification and selection of the in-situ data. This has benefited from the multi-year experience within the BEC team in instrumentation development, acquisition of measurements at sea and data analysis. Quality Control and Assurance (QA/QC) activities of the information in the database will include automatic consistency checks, outlier detection and classification, and systematic failure tests.
A standard database server is used for data indexation which provides 1) flexibility in the choice of the spatial search radius and temporal window between matched-up data, as well as 2) modularity to allow the enrichment of the match-up with any other external geophysical data source.