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The surface drifter program for real time and off-line validation of ocean forecasts and reanalyses

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As part of the Global Ocean Observing System, the Global Drifter Program (GDP) is comprised of an array of about 1250 drifting buoys spread over the global ocean, that provide operational, near-real time surface velocity, sea surface temperature (SST) and sea level pressure observations. This information is used mainly used for numerical weather forecasting, research, and in-situ calibration/verification of satellite observations.
Since 2013 the drifting buoy SST measurements are used for near real time assessment of global forecasting systems from Canada, France, UK, USA, Australia in the frame of the GODAE OceanView Intercomparison and Validation Task. For most of these operational systems, these data are not used for assimilation, and offer an independent observation assessment. This approach mimics the validation performed for SST satellite products.
More recently, validation procedures have been proposed in order to assess the surface dynamics of Mercator Océan global and regional forecast and reanalyses. Velocities deduced from drifter trajectories are used in two ways. First, the Eulerian approach where buoy and ocean model velocity values are compared at the position of drifters. Then, from discrepancies, statistics are computed and provide an evaluation of the ocean model's surface dynamics reliability. Second, the Lagrangian approach, where drifting trajectories are simulated at each location of the real drifter trajectory using the ocean model velocity fields. Then, on daily basis, real and simulated drifter trajectories are compared by analyzing the spread after one day, two days etc.... The cumulated statistics on specific geographical boxes are evaluated in term of dispersion properties of the "real ocean" as captured by drifters, and those properties in the ocean model. This approach allows to better evaluate forecasting score for surface dispersion applications, like Search and Rescue, oil spill forecast, drift of other objects or contaminant, larvae dispersion etc...
These Eulerian and Lagrangian validation approach can be applied for real time or offline assessment of ocean velocity products. In real time, the main limitation is our capability to detect drifter drogue's loss, causing erroneous assessment. Several methods, by comparison to wind entrainment effect or other velocity estimates like from satellite altimetry, are used.
These Eulerian and Lagrangian surface velocity validation methods are planned to be adopted by the GODAE OceanView operational community in order to offer independent verification of surface current forecast.