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A Global Ocean Observing System for Measuring Sea Level Atmospheric Pressure: Effects and Impacts on Numerical Weather Prediction

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The Global Drifter Program is the principal component of the Global Surface Drifting Buoy Array, a branch of NOAA's Global Ocean Observing System and a scientific project of the Data Buoy Cooperation Panel (DBCP). The Global Drifter Program maintains an array of over 1,250 Lagrangian drifters, reporting in near real-time and designed measure 15 m depth Lagrangian currents and sea surface temperature (SST). About 50% of the drifters in the array are equipped with accurate barometers to measure sea level atmospheric pressure (SLP) to fulfill the needs of short to medium-range weather forecastin. The barometer drifters are deployed primarily in the extra-tropical regions of the world's oceans. This talk quantifies and discusses the effect and the impact of in situ sea-level atmospheric pressure (SLP) data from the global drifter array on numerical weather prediction using observing system experiments and forecast sensitivity observation impact studies. The in-situ drifter SLP observations are extremely effective in anchoring the global surface pressure field and significantly contribute to accurate marine weather forecasts, especially in regions where no other in situ observations are available, like, for example, in the Southern Ocean. Furthermore, the forecast sensitivity observation impact analysis indicates that The SLP drifter data is the most valuable per-observation contributor from the Global Observing System (GOS). It will also be shown that SLP data from drifters are also beneficial for improving the forecast of fast developing storms, like the ones that occur in the North Atlantic. All these results give evidence that surface pressure observations from drifting buoys are essential ingredients of the GOS and their quantity, quality and distribution should be preserved as much as possible in order to avoid any analysis and forecast degradations. The barometer upgrade program, under which GDP funded drifters can be equipped with partner-funded accurate air pressure sensors, is a practical example of how the DBCP collaboration is executed.
New emerging drifter technologies of interest to the weather forecasting community are also discussed.