



An operational system to forecast the plastic density in the Great Pacific Garbage Patch

The Ocean Cleanup develops solutions to rid the oceans of plastic. To efficiently remove the legacy plastic pollution from the Great Pacific Garbage Patch, the cleanup systems need to be directed in the areas where the plastic densities at the ocean surface are the highest. To achieve that goal, an operational system has been developed to make plastic density forecasts by combining historical dispersal models and forecasted wind, waves, and sea-surface currents. The metocean forecasts rely on available data from global sea-surface current, wind, and wave providers such as NOAA, Mercator, and GFS. In turn, the plastic density forecasts are obtained using ADVECT, an in-house Lagrangian dispersal algorithm forced by those previous forecasts. In addition, regional forecasting capabilities have been developed using a ROMS model for the ocean circulation and WW3 for the waves and plastic wave-induced drift. Next to the plastic density forecasts other diagnosis techniques are implemented to infer the local accumulation of floating plastics such as Transient Attracting Profiles and Finite Time Lyapunov Exponents applied to the short-term circulation nowcast and forecasts. Finally, drifters' data, coming from the Global Surface Drifter program, SOFAR ocean and our own Buoy Project Buoys are included in the analysis to qualify the reliability of the forcing conditions. In the current work, we first present the operational setup, then we discuss the validation of the different models employed operationally for waves, wind, sea-surface current and plastic density.

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