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Numerical models for Marine Litter distribution in the North-Western Mediterranean Sea, towards a seasonal characterization of concentration.

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Numerical models for Marine Litter (ML) distribution have been mainly employed: 1) to evaluate large scale distributions, at global or enclosed basin scales, as in the Mediterranean sea (van Sebille et al., 2015; Lebreton et al., 2012; Mansui et al., 2015;); 2) to understand long period trends; 3) for forward/backtracking analysis in order to find connections between sources of ML and accumulation areas (Liubarsteva et a., 2016; Aliani et al., 2017).
This approach shows limits, particularly in the case of debris transported by surface currents, as for example the circulation in the Mediterranean basin shows high seasonal or sub-seasonal variability. Moreover, surface debris distribution can significantly overlap with feeding areas of important marine species, since they have similar dynamic features with similar temporal variability.
Therefore, the proposal of numerical models able to estimate the ML concentration for short time scales, days or weeks, becomes very important. Since initial conditions are unknown and observations are insufficient to represent processes with such large spatial and temporal variability, this task is particularly difficult.
In this work, a novel approach, published in Fossi et al. (2017), is extended to a larger dataset. The marine area considered is in the North-Western Mediterranean Sea, and corresponds to the Pelagos Sanctuary.
Concentrations computed by numerical models are statistically compared with observations, and some significant correlations are found.
In particular, the inclusion of pollution sources (rivers, ports, ship lanes) within a concentration model is especially crucial to obtain better correlations between observed/measured data near coastal areas, where some of the highest concentrations are found. This enables the development of better estimation methods for floating litter concentrations that in turn provide qualitatively and also quantitatively more correct interpretation on the observed ML distribution.