{rokbox title=| A) Estimated debris mass at emission zones, averaged for the period 2014–2021, B) Estimation of the residuals :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-quantifying-sources-floating-jorda-2025-thumb-et-al.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-quantifying-sources-floating-jorda-2025-et-al.jpg{/rokbox}

Jorge Ramos-Alcántara, Javier Soto-Navarro, Elisabet Verger-Miralles, **Gabriel Jordà**, 2025. **Quantifying sources of floating marine debris on the coasts of the Balearic islands** .Marine Environmental Research.November 2025.107480.Volume 212. 10.1016/j.marenvres.2025.107480

Abstract: Identifying the sources of pollutants remains as one of the main challenges in research on marine debris pollution, which mainly consists of what is known as marine litter. In this work, we develop a method to estimate the origin of marine debris found along the coasts of the Balearic Islands during the summers of 2014–2021. We combine detailed records from coastal clean-up campaigns with ocean currents simulations from a high-resolution model to perform a probabilistic tracking of debris motion. We use an inverse modelling approach whereby, starting from where the debris was collected and working backwards, allows us to estimate its origin. In this way, the temporal evolution of marine debris emission from different coastal sections of the archipelago was quantified.Results reveal a predominant transport pattern towards the E-NE-N, in accordance with the dominant circulation in the region. On average, 42.4 % of coastal debris emissions are exported outside the archipelago, 35.9 % remain in the same source zone, and 21.7 % are redistributed to other coastal areas of the islands. Within the inter-coastal transport of debris in the Balearic Islands, high-emission areas include Porto Cristo, Sóller, Alcudia, Ibiza, and Mahón. Northern zones of each island primarily act as receptors, while transport debris out of the archipelago. The results also suggest that the interannual variability in debris transport patterns is low. The methodology proposed here could be applied in other coastal regions where systematic observational records exist and be used to optimize the organization of the cleaning campaigns and improve the management and mitigation of this type of pollution.

Keywords:marine debris sources,marine debris transport,inverse model,cleaning campaigns,lagrangian model,coast,balearic islands.