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Non-negligible impact of Stokes drift and wave-driven Eulerian currents on simulated surface particle dispersal in the Mediterranean Sea

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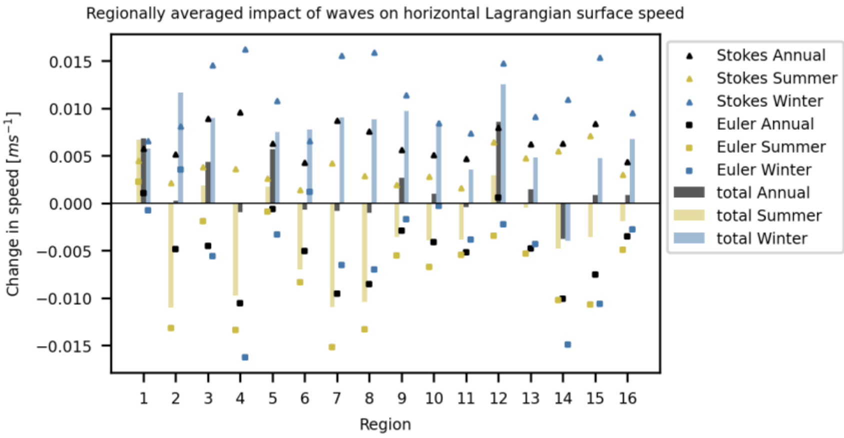

Figure S1: **Regionally averaged impact of the representation of surface waves on simulated horizontal Lagrangian surface speed.** Shown are the total impact of the representation of waves (bars), as well as the individual contributions of Stokes drift (triangle markers) and changes in Eulerian currents (square markers) for annual (black), summer (yellow) and winter (blue) mean speeds. Averages were calculated over the following regions depicted in Fig. 4a of the main manuscript: (1) Alboran Sea, (2) South West Med 1 (western part), (3) North West Med, (4) South West Med 2 (eastern part), (5) Tyrrhenian Sea 2 (southern part), (6) Tyrrhenian Sea (northern part), (7) Ionian Sea 1 (western part), (8) Ionian Sea 2 (south-eastern part), (9) Ionian Sea 3 (north-eastern part), (10) Adriatic Sea 2 (southern part), (11) Adriatic Sea 1 (northern part), (12) Levantine Sea 1 (western part), (13) Aegean Sea, (14) Levantine Sea 2 (central-northern part), (15) Levantine Sea 3 (central southern part), (16) Levantine Sea 4 (eastern part).

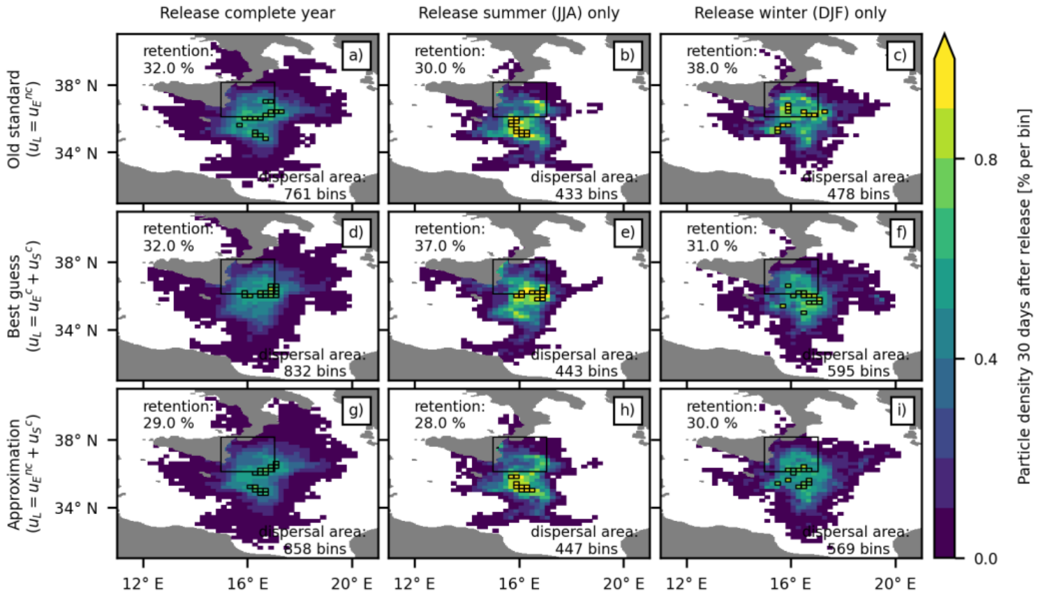

Figure S2: Simulated dispersal pattern of particles released in the Ionian Sea (release 1, neutral type region) 30 days after their release. Shown is the particle density per 0.2° x 0.2° bin at the end of the integration period of 30 days (color shading); the area with the highest particle density, encompassing in total 10 % of the particle, is highlighted in red. For better comparability, values of the retention rate (percentage of particles that remain within or have returned to the region's release area, indicated by the black frame, until the end of the integration period) and the overall dispersal area (total number of bins occupied with particles) are printed.

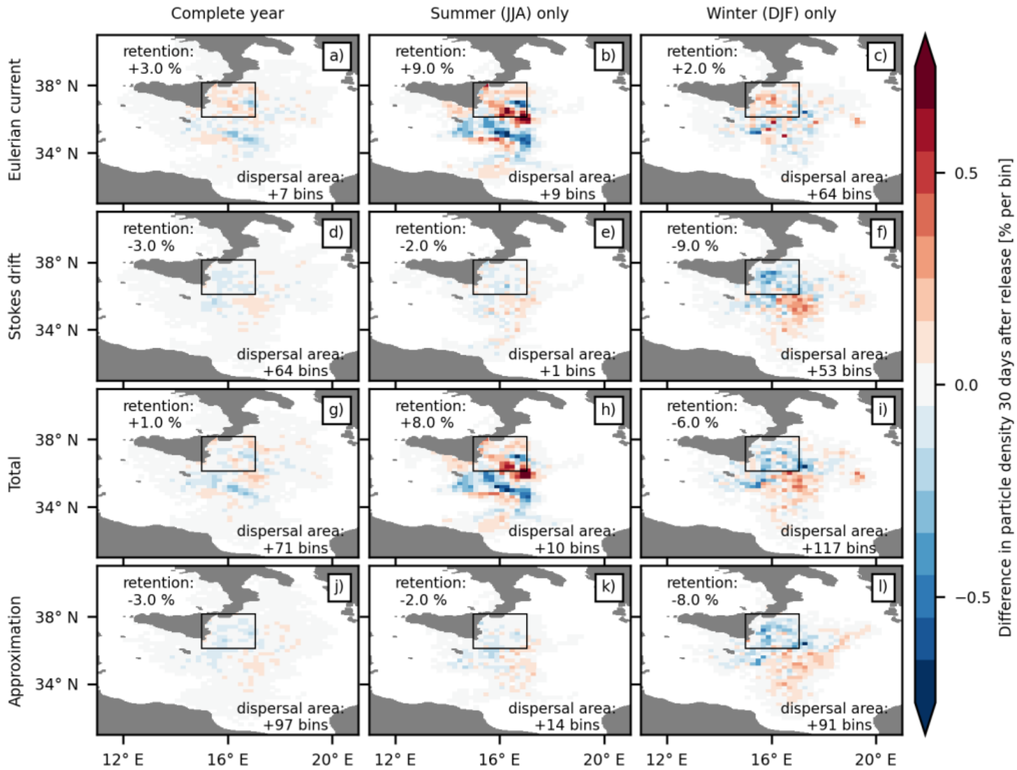

Figure S3: Impact of surface waves on simulated dispersal pattern of particles released in the Ionian Sea (release 1, neutral type region) 30 days after their release. Individual impacts of **(a)-(c)** wave-driven Eulerian currents, obtained as the changes in the particle density of the sensitivity simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c$) compared to the old standard simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^{nc}$) and **(d)-(f)** Stokes drift, obtained as the changes of the best guess simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c + \boldsymbol{u}_S^c$) compared to the sensitivity simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c$); along with **(g-l)** the total wave impact and the impact of the approximation (identical to Figure 6d-i of the main manuscript). Values of the change in retention rate (percentage of particles that remain within or have returned to the region's release area, indicated by the large black frame, until the end of the integration period) and the overall dispersal area (total number of bins occupied with particles) are printed.

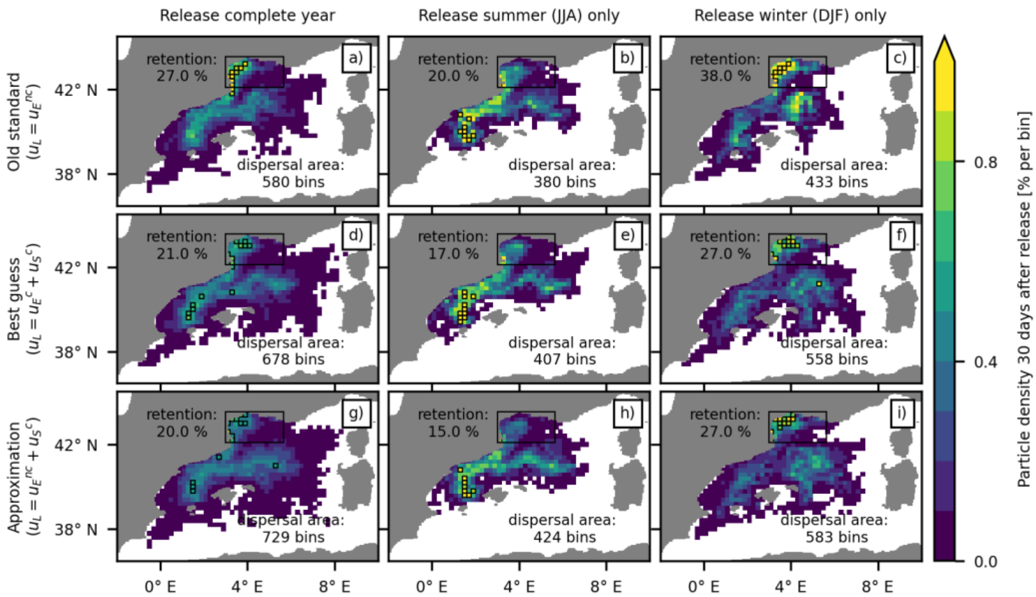

Figure S4: Simulated dispersal pattern of particles released in the Gulf of Lion (release 2, winter type region) 30 days after their release. Shown is the particle density per 0.2° x 0.2° bin at the end of the integration period of 30 days (color shading); the area with the highest particle density, encompassing in total 10 % of the particle, is highlighted in red. For better comparability, values of the retention rate (percentage of particles that remain within or have returned to the region's release area, indicated by the black frame, until the end of the integration period) and the overall dispersal area (total number of bins occupied with particles) are printed.

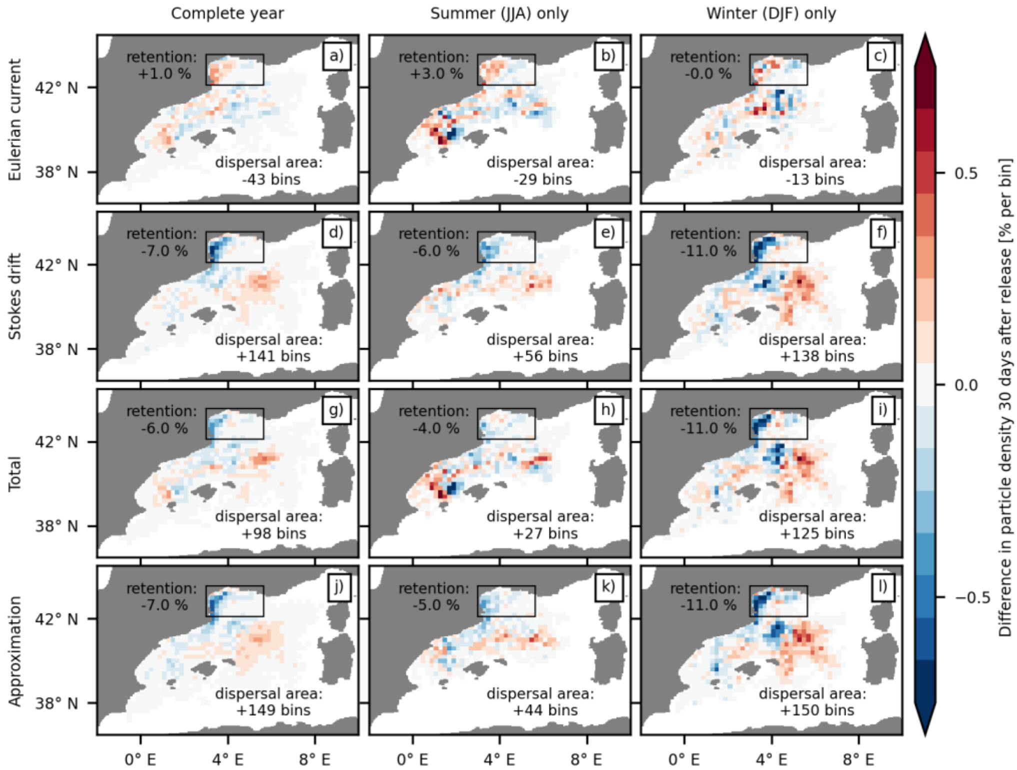

Figure S5: Impact of surface waves on simulated dispersal pattern of particles released in the Gulf of Lion (release 2, winter type region) 30 days after their release. Individual impacts of **(a)-(c)** wave-driven Eulerian currents, obtained as the changes in the particle density of the sensitivity simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c$) compared to the old standard simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^{nc}$) and **(d)-(f)** Stokes drift, obtained as the changes of the best guess simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c + \boldsymbol{u}_S^c$) compared to the sensitivity simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c$); along with **(g-l)** the total wave impact and the impact of the approximation (identical to Figure 8d-i of the main manuscript). Values of the change in retention rate (percentage of particles that remain within or have returned to the region's release area, indicated by the large black frame, until the end of the integration period) and the overall dispersal area (total number of bins occupied with particles) are printed.

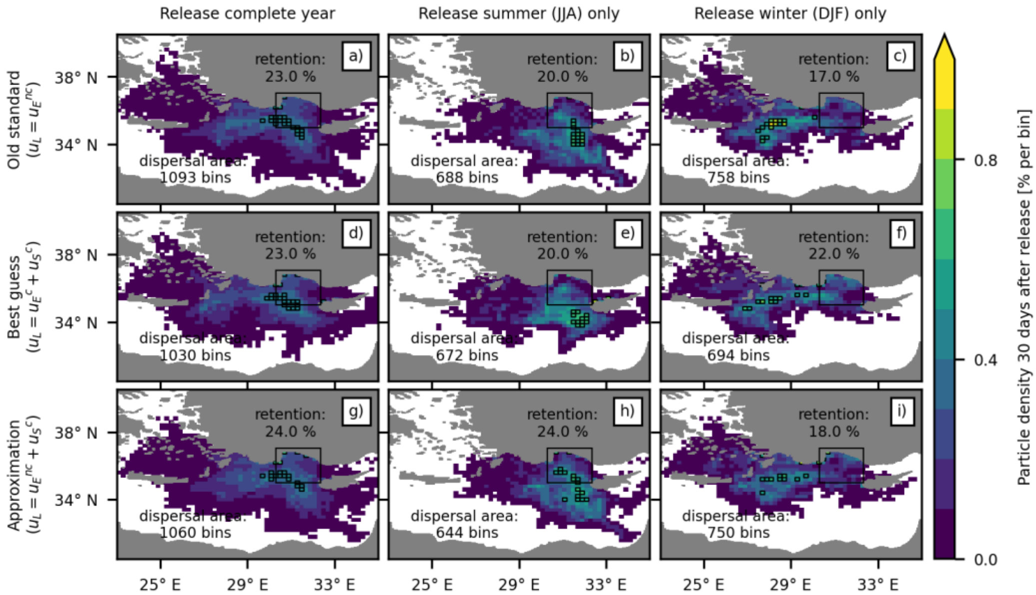

Figure S6: Simulated dispersal pattern of particles released in the Gulf of Antalya (release 3, summer type region) 30 days after their release. Shown is the particle density per 0.2° x 0.2° bin at the end of the integration period of 30 days (color shading); the area with the highest particle density, encompassing in total 10 % of the particle, is highlighted in red. For better comparability, values of the retention rate (percentage of particles that remain within or have returned to the region's release area, indicated by the black frame, until the end of the integration period) and the overall dispersal area (total number of bins occupied with particles) are printed.

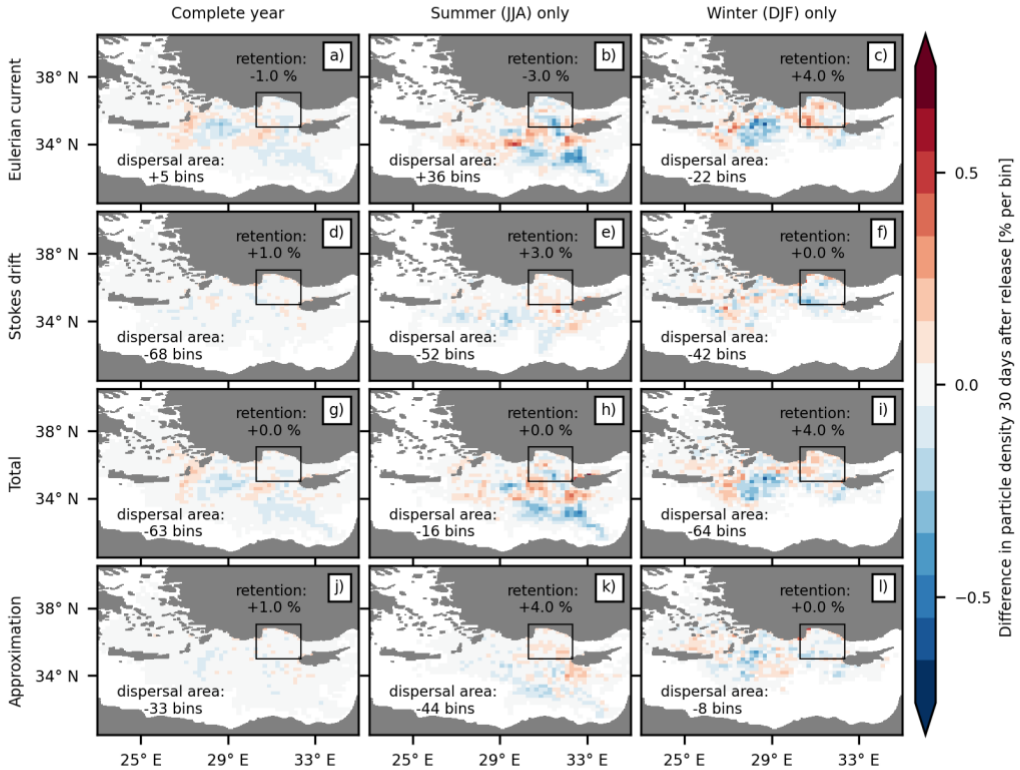

Figure S7: Impact of surface waves on simulated dispersal pattern of particles released in the Gulf of Antalya (release 3, summer type region) 30 days after their release. Individual impacts of **(a)-(c)** wave-driven Eulerian currents, obtained as the changes in the particle density of the sensitivity simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c$) compared to the old standard simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^{nc}$) and **(d)-(f)** Stokes drift, obtained as the changes of the best guess simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c + \boldsymbol{u}_S^c$) compared to the sensitivity simulation ($\boldsymbol{u}_L = \boldsymbol{u}_E^c$); along with **(g-l)** the total wave impact and the impact of the approximation (identical to Figure 10d-i of the main manuscript). Values of the change in retention rate (percentage of particles that remain within or have returned to the region's release area, indicated by the large black frame, until the end of the integration period) and the overall dispersal area (total number of bins occupied with particles) are printed.