

EGU22-8861

<https://doi.org/10.5194/egusphere-egu22-8861>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Relative dispersion and relative diffusivities of model-runs in the North Sea

Luciana Villa Castrillon¹, Marcel Ricker¹, Jens Meyerjürgens², Sebastian Grayek¹, and Joanna Staneva¹

¹Institute of Coastal Systems Analysis and Modeling, Helmholtz-Zentrum Hereon, Geesthacht, Germany

²Institute for Chemistry and Biology of the Marine Environment, University of Oldenburg, Oldenburg, Germany,

We examined the relative dispersion and relative diffusivities of model-runs in the North Sea for the period Oct-Dec 2018 and Jan 2019. The role of the different wave-induced processes is investigated using a fully coupled (NEMO-WAM) model analysis together with simulations from a particle-drift model (OpenDrift). Coupled model parameterisations account for the feedback between the upper ocean and the waves. The processes that are introduced into the hydrodynamical model are sea state dependent momentum flux, sea state-dependent energy flux and wave-induced mixing. The results are assessed using surface drifter observations and in situ measurements. The analyses of the model skills reveal that the Eulerian currents, produced by coupling wind waves and ocean circulation model and introducing wave-induced parameterisations are essential for improving the particle transport. Further, experiments based on the drifter clusters obtained on the RV Heincke excursion are performed. Experiment 1 contains the initial positions and time taken from the surface drifters. Experiment 2 is the average of the positions in Experiment 1. In addition, diffusivity was considered in OpenDrift to observe its impact on the relative dispersion and relative diffusivity. The results show how turning on the diffusion in OpenDrift makes the curve smoother. There, the Richardson regime, which describes a dispersion following $D^2(t) \sim t^3$, and the exponential growth regime were observed.