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Dispersion of passive tracers in model flows: effects of the parametrization of small-scale processes

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Abstract. A set of numerical experiments is presented, in which we study the dynamics of passive particles advected by given two-dimensional velocity fields and perturbed by a non-white noise with a characteristic time <tau>. Data and model results have shown that this kind of random perturbation is able to represent subgridscale processes for upper ocean mesoscale turbulence for regions of the world ocean where turbulence can be assumed to be homogeneous. Extensive computations in different fields characterized by cell-like structure, both stationary and time-dependent, representing very idealized geophysical flow situations, show that the presence of a finite correlation time scale does lead to enhanced or arrested dispersion, depending on the considered flow; however, it does not seem to affect the gross qualitative behaviour of the dispersion processes, which is primarily affected by the large-scale velocity field.