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Relative diffusion and dispersion at the Antarctic Peninsula: observations of pairs and triplets of drifters

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Forty surface drifters were deployed in 2007 at the tip of the Antarctic Peninsula as part of the ADELIE research project to map the near surface currents around the tip of the Antarctic Peninsula and to determine the role of these currents in the retention or dispersion of krill.

Here we use the ADELIE drifters, together with 55 historical drifters that pass close to the Antarctic Peninsula, to evaluate the strength of advection and diffusion in this region. Relative eddy dispersion and diffusivities have been calculated using drifter pairs and triplets. The relative eddy diffusivity along and across isobaths is presented for various areas around the peninsula based on current paths and data availability. Combined together, the ADELIE and historical drifters provide a data set of up to 148 pairs for which we use a maximum initial separation varying between 15 and 60 km and a temporal resolution of 30 days. The triplets, although limited in number, allow the anisotropy of the diffusivity to be quantified. They provide insight into the stretching and straining deformations of krill or tracer patches.

The results are compared with a previous analysis of the same data set using single drifters (Thompson et al. 2009, J. Phys. Oceanogr.). Data from ARGO floats deployed in the region will also be used to bring additional information about the flow structure in the vicinity of the Antarctic Peninsula.