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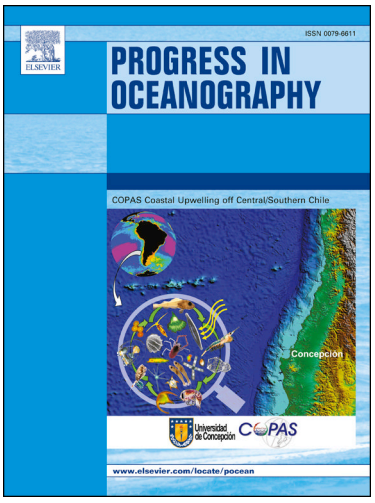

A biologically relevant method for considering patterns of oceanic retention in the Southern Ocean

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A biologically relevant method for considering patterns of oceanic retention in the Southern Ocean

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Abstract

Many marine species have planktonic forms – either during a larval stage or throughout their lifecycle – that move passively or are strongly influenced by ocean currents. Understanding these patterns of movement is important for informing marine ecosystem management and for understanding ecological processes generally. Retention of biological particles in a particular area due to ocean currents has received less attention than transport pathways, particularly for the Southern Ocean. We present a method for modelling retention time, based on the half-life for particles in a particular region, that is relevant for biological processes. This method uses geostrophic velocities at the ocean surface, derived from 23 years of satellite altimetry data (1993-2016), to simulate the advection of passive particles during the Southern Hemisphere summer season (from December to March). We assess spatial patterns in the retention time of passive particles and evaluate the processes affecting these patterns for the Indian sector of the Southern Ocean. Our results indicate that the distribution of retention time is related to bathymetric features and the resulting ocean dynamics. Our analysis also reveals a moderate level of consistency between spatial patterns of retention time and observations of Antarctic krill (*Euphausia superba*) distribution.

Keywords: retention time, Southern Ocean, particle advection, ecosystem

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