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How do interactions with the physical environment affect the distribution of Antarctic krill?

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Antarctic krill *Euphausia superba* are a relatively large (60+ mm), long-lived (∼6 years) crustacean with a patchy distribution in the Southern Ocean. In addition to being a key food source for many of the higher marine predators of the Southern Ocean, Antarctic krill is also the target of a commercial fishery. This increases the importance of understanding what drives the observed heterogeneous distribution of krill. In this study we use a coupled physical-biological model to examine the role of physical forcing in generating the observed distribution. By incorporating aspects of the life cycle of krill into a particle tracking model (using output from the OCCAM ocean model), we can identify key stages at which interaction with the environment determines the dispersal or retention of the local krill populations. For example, sea ice is an important habitat for young krill and our results suggest that in places the association of the krill with the sea ice can create opposing population connections to those due solely to ocean circulation. A long time series of output from the ORCA ocean model allows us to investigate the variability in some of these population connections and suggests that trends in the environmental forcing, as observed for example with the Southern Annular Mode, are likely to impact the Southern Ocean ecosystem.