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Modelling distribution of formation of surface patches of Antarctic krill

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Antarctic krill (*Euphausia superba*) is a key species in the Southern Ocean foodweb system, with wide horizontal and vertical distributions relating to their life cycle. Antarctic krill is known to form surface patches (i.e. high density clusters of krill) during spring-summer season across the entire Southern Ocean based on historical ship based observations conducted from 1930s. Although long time has passed since the first observations of surface krill patches, and surface krill patches have been observed to be composed of young krill that play an important role in the recruitment system and fishery management, the mechanisms of formation of surface krill patches are poorly understood. As one of the assumptions for surface krill patch formation and distribution process, surface krill patches are passively formed by young krill released from sea ice edge from spring to summer season. We present a method for modelling distribution of surface krill patches assuming that juveniles are passively transported by ocean currents after they are released from sea ice edge zone in spring/summer seasons. We use this model to (i) investigate sources of in situ observed surface patches using modelled distribution data and (ii) test the hypothesis that south ward shift of surface krill patches occur by southern shift of sea ice using historical in situ observed surface krill patch dataset. This method uses daily altimetry geostrophic velocity fields and sea ice concentration data from 1993 to present covering whole circumpolar region to define the release locations of juveniles and advect particles. Our preliminary result indicate formation of surface krill patches are strongly affected by sea ice distribution and supportive of evidence of southern shift of distributions of surface krill patches. Our method is also effective to predict dispersal of other planktonic species and chemical particles released from sea ice.