

Sea ice production variability in the Antarctic coastal polynyas

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The sinking of dense water in the polar oceans plays a key role in global thermohaline circulation, leading to heat and material exchange between the atmosphere and deep ocean. High ice production in Antarctic coastal polynyas is responsible for the dense water formation, leading to Antarctic Bottom Water (AABW) formation. Our past studies gave the mapping of sea ice production in the Southern Ocean, based on heat-flux calculation with ice thickness data derived from satellite data. This study presents the interannual and seasonal variability of sea ice production in the 13 major coastal polynyas from 1992 to 2013. In general, the interannual variability of sea ice production shows a good correlation with polynya extent rather than surface air temperature. The Ross Ice Shelf polynya experienced large ice production reduction events in 2000 and 2002 due to the effects of the giant icebergs B-15 and C-19, which calved from the Ross Ice Shelf, and the ice production later recovered to the same level as that in the 1990s. The Mertz Glacier polynya also experienced a large ice production reduction event in 2010 due to the calving of the Mertz Glacier Tongue, and new minimum ice production records have been set every year since.

Keywords: sea ice production, coastal polynya, interannual variability, Antarctica, remote sensing