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Impacts of strong surface winds on Antarctic Polynya

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This study investigates the impacts of strong wind events on the sea ice concentration within polynya regions, with a focus on the Ross Sea Polynya (RSP). In particular, this work quantifies the sensitivity of sea ice concentrations to surface winds and whether there are threshold wind speeds required for regions of the polynya to open up with subsequent impacts on air-sea heat fluxes. To analyse these processes, we examine version 3.1 of the Bootstrap sea ice concentration (SIC) satellite data set derived from SSM/I brightness temperatures and how they are connected to the surface winds from the ERA5 reanalysis over the period 1979 to 2018. While we examine these relationships around the entire Antarctic continent, we focus on the RSP and low-level jets in the Ross Sea. In particular, we examine how strong wind events which impact SIC in the RSP are linked to Ross Ice Shelf Air Stream events (strong low-level jets in the region). The hypothesis that the increase in Ross Ice Shelf Air Stream events, associated with a strengthening of the Amundsen Sea Low, has contributed to trends in sea ice production in this region is examined.