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# Variable Antarctic ice flux linked to ocean forcing, bed topography and ice shelf buttressing

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It has been widely reported that ice flux from the Antarctic Ice Sheet has increased over the preceding decades. The vast majority of these increases can be attributed to the ongoing destabilization of the Amundsen Sea sector in West Antarctica, with a much more limited change in East Antarctica. However, much less attention has been focussed on the temporal and spatial variations of ice flux in Antarctica over the observational period.

In this study we combine existing velocity products (ITS_LIVE and MEaSUREs) to create 12 timestamped velocity mosaics between 1999 and 2018 to investigate both overall trends in ice flux and the temporal and spatial variability across our observational period. At an ice sheet scale we report a 45 GT $yr^{-1}$ increase in ice discharge in West Antarctica and no overall change in East Antarctica. However, at an individual catchment scale we observe considerable temporal and spatial variability. For West Antarctica, despite the overall increase in discharge clear periods of deceleration are observed in most individual catchments. In East Antarctica, despite overall consistency, 3-10% variations in ice discharge are observed at several major outlet glaciers (e.g. Denman, Totten, Frost, Cook, Matusevitch, Rennick). These variations can be linked to regional oceanic variability along with highly localised differences in bed topography and ice shelf calving. In some cases, this can result in neighbouring catchments simultaneously undergoing opposing trends. Improving our understanding the processes driving these short-term variations will be important in improving the accuracy of future sea level contributions from Antarctica.