



## **The impact of Weddell Sea polynyas on the Filchner-Ronne Ice Shelf cavity**

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Open-ocean polynyas in the Weddell Sea are the products of deep convection, which transports Warm Deep Water (WDW) to the surface and melts sea ice. These polynyas occur only rarely in the observational record, but are a near-permanent feature of many climate and ocean model simulations. A question which has not previously been considered is what impact these polynyas have on the nearby Filchner-Ronne Ice Shelf (FRIS) cavity. Here we assess this impact using regional ocean model simulations of the Weddell Sea and FRIS, where deep convection is imposed with varying extent, location, and duration. In these simulations, Weddell Sea polynyas consistently cause an increase in WDW transport onto the continental shelf. This leads to saltier, denser source waters for the FRIS cavity, which then experiences stronger circulation and decreased residence times. The end result of open-ocean polynyas is therefore to increase ice shelf melt rates beneath FRIS.