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Numerical modelling of the Filchner overflow

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Ice Shelf Water (ISW) plume flowing into the Weddell Sea over the Filchner Trough is a source of Antarctic Bottom Water that drives the Thermohaline Circulation.The Filchner overflow over a realistic bathymetry is simulated using a hydrostatic, primitive equation three-dimensional ocean model. The ISW plume is modeled through imposing an influx of -2.05°C water over the Filchner sill at -74° Lat. After entering the domain the ISW plume undergoes instability and then propagates in the form of subplumes and domes. The plume first moves north over a plateau, and then turns west, along-slope of the continental shelf break. The along-slope motion of the plume is accompanied by breaking away of some subplumes that move downslope.Other subplumes run into the eastern submarine ridge and propagate along the ridge downslope in a chaotic manner. The next, western ridge is crossed by the plume through several migrating paths. Despite a number of discrepancies with observational data, the model qualitatively reproduces many attributes of the flow. In particular, we argue that the temporal variability shown by the observations is mainly due to the unstable structure of the flow, where the temperature fluctuations are determined by the motion of the domes past the moorings.