

EGU2020-463

<https://doi.org/10.5194/egusphere-egu2020-463>

EGU General Assembly 2020

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Cross-Slope Observations in the Bellingshausen Sea, Southern Ocean

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The Bellingshausen Sea, located between the West Antarctic Peninsula and the Amundsen Sea, is poorly observed, compared with its neighbours. The Antarctic Slope Front (ASF), that rings the continental slope of Antarctica, supports a westward current (the Antarctic Slope Current). The structure and variability of this current affect exchange processes close to Antarctica such as the transport of warm Circumpolar Deep Water onto the Antarctic continental shelf. This water mass is responsible for the transport of heat across the shelf and therefore the basal melting of ice shelves. Due to the lack of observations, it is still unclear if the ASF even exists in the Bellingshausen Sea or if there are other processes moderating the transport of warm water onto the shelf.

We present ship-based and glider-based CTD data collected in 2007 and 2019, which in total provide 7 cross-slope sections in the Bellingshausen Sea. Geostrophic velocities are referenced to lowered ADCP data, shipboard ADCP data and the Dive Average Current. Cumulative transports show remarkable differences between the years 2007 and 2019. The sections of 2007 provide cumulative transports of up to 3.5 Sv eastward. In contrast, the sections in 2019 have cumulative transports up to 2 Sv westward. The sections from 2007 and 2019 are in very similar locations, indicating a temporal change rather than a spatial change.

We compare the cross-slope sections from the observations with sections from the NEMO 1/12 ° model output. A time series of cumulative transports from the model, covering the years from 2000 to 2010, allows us to identify seasonality and interannual variability in this current system.