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Freshwater export from the south-east Greenland shelf into the Irminger Sea and relation to wind events

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Greenland Ice Sheet melt and freshening of the Arctic Ocean lead to increased discharge of freshwater into the East Greenland Current. If this additional freshwater reaches the convective regions of the Subpolar North Atlantic it could weaken deep mixing and affect the strength of the Atlantic Meridional Overturning Circulation. In particular, freshwater exported away from the South-East Greenland shelf could affect deep convection in the Irminger Sea, which has recently been shown to have a key role in the Atlantic overturning circulation. Though export of fresh shelf surface water is well observed west of Greenland, there is still little insight into surface water export from the East Greenland shelf to the Irminger Sea.

The East Greenland Current Drifter Investigation of Freshwater Transport drifter deployment conducted in August 2019 at 65°N on the eastern side of Greenland, resulted in five out of 30 drifters being exported away from the east Greenland shelf, four of which were exported at Cape Farewell. The specific wind regime at Cape Farewell is a potential driving factor for enhanced freshwater export in the area. While persistent south-eastward barrier winds push surface waters to the coast over most of the eastern shelf, Cape Farewell experiences strong eastward wind events such as tip-jets that could cause off-shelf export. Using wind data from the ERA-5 atmospheric reanalysis, we compute Ekman transport along the east Greenland shelf. We find greater probability for off-shelf Ekman transport at Cape Farewell than along the rest of the shelf, confirming that the area is the most likely to contribute to wind-driven freshwater export to the Irminger Sea. Wind and surface velocity data from a high-resolution model (2 km) are used to further investigate and quantify freshwater export at Cape Farewell and how it relates to local wind events.