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Structure, pathways and dynamics of the East Greenland Current in eddy-resolving global ocean models and observations

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The fresh and cold East Greenland Current (EGC) transports Polar waters from the Arctic Ocean southward in the Nordic Seas and the North Atlantic, affecting deep convection in the Nordic and Labrador Seas with potential impacts on the meridional overturning circulation. The pathways of the EGC in Fram Strait and south of it are well documented by observations and model simulations. However, neither the EGC's pathways upstream of Fram Strait nor its sources in the central Arctic Ocean are known sufficiently well to attribute variability of the Arctic outflow to atmospheric or oceanic mechanisms.

A set of eddy-permitting and eddy-resolving global Ocean General Circulation Models (OGCMs) run with dye tracers and observational data have been used to examine the structure and dynamics of the EGC. The Montgomery function on pseudo-neutral surfaces has been applied to the model results to investigate dynamics of the current and its inter-annual variability. The sources of the EGC and the covariance of Arctic fresh water sinks via Fram Strait and the Canadian Arctic Archipelago are investigated. The model results are compared with observations, and mechanisms driving the EGC are suggested.