Popular science summary of the PhD thesis

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Title of the PhD thesis	Changing oceanographic conditions in East Greenland
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Science summary

Changing oceanographic conditions in East Greenland
East Greenland is a crucial region for the planet's climate and ecosystems. Located at the intersection of the Arctic, North Atlantic, and the Greenland Ice Sheet, East Greenland has become a looking glass for climate change. In this PhD thesis, I investigate how and why key oceanographic features of East Greenland have changed in the context of the past thirty to forty years. I focus on the features that underpin essential physical and biological processes in the region. These are the vertical stratification, oceanographic fronts, and freshwater export from the central Arctic Ocean.

Vertical stratification sets the pace for biological productivity at the base of the food web, exchange of oxygen and carbon between the atmosphere and ocean, and the production of dense water masses that feed into the global ocean circulation. An analysis of stratification in East Greenland and adjacent seas reveals that the strength of stratification has been remarkably stable, but the relative contributions of temperature and salinity have changed drastically, with an increased role of temperature in determining stratification in the Greenland Sea. These changes have potential implications for local sea-ice formation and marine ecology. We further document significant hydrographic changes on the Northeast Greenland shelf and fjords, leading to an overall decrease in stratification which implies that marine heat and nutrients have become more accessible on the shelf.

Oceanic fronts are another feature of ecological importance in East Greenland. The major frontal feature in East Greenland runs along the continental shelf break coincident with where the majority of the regional fisheries take place. We find that the intensity of this front is regulated by regional scale changes in the offshore circulation patterns and that changes in the position of the front is related to changes in sea-ice cover. We further show that variability in this frontal system is reflected in the Southeast Greenland ecosystem via altered primary production patterns.

Finally, we consider the freshwater that exits the central Arctic Ocean along East Greenland. Taking advantage of the unique optical properties of these waters, we trace the origins and fate of the fresh outflow of the Arctic. This reveals a direct pathway by which carbon and freshwater from Siberian Rivers enters the deep global ocean.

Jointly the work in this PhD thesis advances our understanding of how the oceanographic environment in East Greenland has changed in an ecologically meaningful manner, and highlights East Greenland as a region in which local changes may have far-reaching implications.