Seasonality of Freshwater in the East Greenland Current System

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INTRODUCTION

Southeast of Greenland, freshwater of Arctic and Greenlandic origin enters the subpolar North Atlantic, flowing southward alongside warm, salty water of subtropical origin offshore. The water mass properties at the boundary are thought to propagate into the interior of the Irminger and Labrador Seas1, where they can impact deep convection and the overturning circulation. The initial two years of OSNAP2 mooring data (2014-2016) provided the first glimpse into the seasonality of freshwater in the complete East Greenland Current system.

MEAN STATE

Time mean sections at OSNAP Cape Farewell moored array. Two distinct velocity cores are apparent: The coastal current (EGCC) on the shelf, measured by CF1-CF2, and the slope current (EGIC) offshore, from CF2-M1. Water on the shelf is very fresh and cold, and there is a wedge of high salinity, warmer water offshore. The water column is salinity stratified on the shelf and temperature stratified offshore.

WIND FORCING

ERA-Interim daily wind stress data3 shows along-coast wind picking up in the fall and maximum wind stress curl over the Irminger Sea in winter.

CONCLUSIONS

- The EGCC system carries 70% of the freshwater transport across OSNAP-East in two current cores.
- The freshwater transports in the two currents have staggered seasonality due to distinct dynamics.
- The slope southeast of Greenland is freshest in winter, when deep convection occurs offshore.
- The coastal current is controlled primarily by along-coast wind stress on the shelf which causes downwelling that steepens isopycnals.
- The slope current is likely driven by wind stress curl over the Irminger basin.

SEASONALITY AND TRANSPORTS

Transports are comparable to past estimates3, though we underestimate EGCC transports in summer. The peaks in freshwater flux in the EGCC and EGIC are staggered, peaking in late fall and winter respectively. The freshwater transport of the IC, opposing the EGCC’s, the EGCC is fastest when the water is saltiest offshore.

REFERENCES