Project: **1082**

Project title: **TRANSPORTED**

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Report period: **2019-07-01 to 2020-06-30**

The project TRANSPORTED is funded by the Deutsche Forschungsgemeinschaft (DGF) within the priority program “International Ocean Discovery Program” (IODP). Within this modelling project the scientific disciplines of sedimentology and oceanography are being linked in order to investigate past, present and future states of the Western Boundary Undercurrent (WBUC), a crucial supplier to the lower branch of the Atlantic Meridional Overturning Circulation (AMOC).

Sedimentologists have intensively investigated sediment cores of the Eirik Drift, a contourite drift body running along the continental slope at the Southern tip of Greenland where the WBUC is understood to affect sedimentary processes. They suggest a link between deepwater formation in the Nordic Seas and observed changes in strength and pathways of sediment supply throughout the past millions of years of altering climatological and topographic conditions (Uenzelmann et Gruetzner, 2018).

In this study, we aim to contribute to a better understanding of the linking processes by setting up a coupled ice-ocean-sediment-model of the wider arctic-subarctic region and conducting sensitivity experiments regarding climate and topography, possibly being able to translate our results to paleo states of the ocean-sediment system. To our knowledge, an application like this has merely been used in the context of the deep ocean and for the purpose of investigating the influence of deep currents on contourite drifts and vice versa.

Throughout the past stages of the project, we were constantly investigating and improving the crucial skill of our model - also in regard to important issues mentioned in the review of our previous resource request. Unrolling the entire picture here would clearly be beyond the scope of this report but we would like to share an impression of the deep water volume transport circulation pattern achieved within our model showing the distinction of major pathways across the Greenland-Iceland-Scotland-Ridge including important recirculation behaviour (see attached figure). Since we want to investigate whether and if so, how differences in the deepwater supply from the Nordic Seas across the ridge can influence the sedimentary processes at the Eirik Drift, e.g., enhancing or weakening the fractions of different water masses in the WBUC, we are confident that the achieved model deep water circulation behaviour sufficiently typifies the main features necessary for this purpose.

At this point, we have completed the climate sensitivity experiments and are currently assembling a publication on our findings. Furthermore, we have already laid out the upcoming topographic experiments for which we request most of the computational resources for the next period.

Reference:

Uenzelmann-Neben, G. and Gruetzner, J. (2018): Chronology of Greenland Scotland Ridge overflow: What do we really know? , Marine Geology, 406 , pp. 109-118 . doi: 10.1016/j.margeo. 2018.09.008

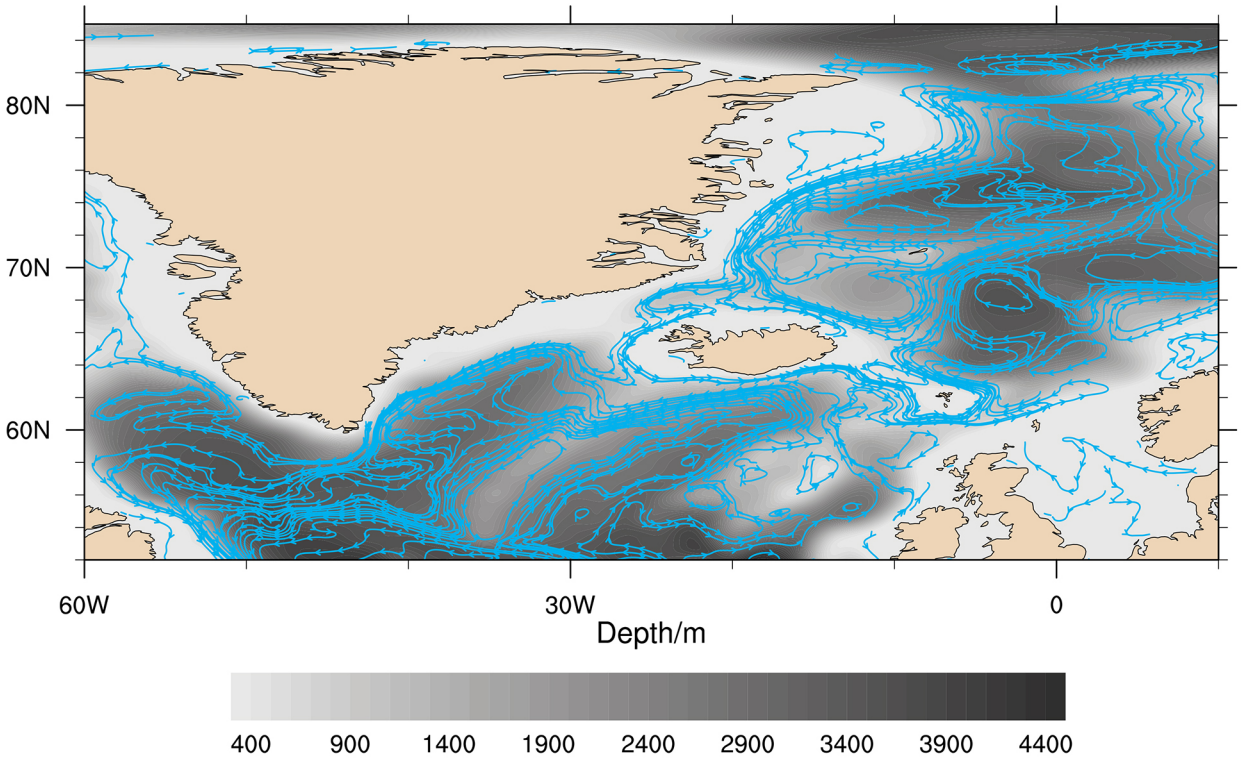

Figure:

Vertically integrated volume transport of deep waters (> 27.8 kg m^{-3} and < 2°C) in the Nordic Seas and across the Greenland-Iceland-Scotland-Ridge averaged over 20 climatological modelling years simulated from a spun up equilibrium state.