

2020

What can Hydrography Tell Us About the Strength of the Nordic Seas MOC Over the Last 70 to 100 Years?

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Rossby, T., Chafik, L., & Houpert, L. (2020). What can hydrography tell us about the strength of the Nordic Seas MOC over the last 70 to 100 years?. *Geophysical Research Letters*, 47, e2020GL087456.
<https://doi.org/10.1029/2020GL087456>

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characteristics of Nordic Seas MOC

- An approximately ± 10 – 15% range in mass and heat transport into the Nordic Seas in synchrony with the Atlantic multidecadal variability
- There is no evidence for long-term trend in transport toward the Nordic Seas

Supporting Information:

- Supporting Information S1

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Received 10 FEB 2020

Accepted 22 MAY 2020

Accepted article online 30 MAY 2020

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Abstract The flow of warm water into the Nordic Seas plays an important role for the mild climate of central and northern Europe. Here we estimate the stability of this flow thanks to the extensive hydrographic record that dates back to the early 1900s. Using all casts in two areas with little mean flow just south and north of the Greenland-Scotland Ridge that bracket the two main inflow branches, we find a well-defined approximately ± 0.5 Sv volume transport (and a corresponding ± 30 TW heat flux) variation in synchrony with the Atlantic multidecadal variability that peaked most recently around 2010 and is now trending down. No evidence is found for a long-term trend in transport over the last 70 to 100 years.

Plain Language Summary Society has been much concerned about the possibility of the slow-down of what is popularly known as the Gulf Stream and its transport of warm water to high latitudes of the North Atlantic. Were this to happen it is generally understood that the climate of central and northern Europe would turn distinctly colder. Direct measurements of the warm water flow toward the Nordic Seas and cold water flowing back into the deep North Atlantic show no change over the last couple of decades. To reach further back in time we have considerable information about the hydrographic state of the North Atlantic and Nordic Seas since the early 1900s. By examining the difference in sea level between the North Atlantic and Norwegian Sea we find a ~ 70 -year variation in volume and heat transport that is clearly associated with the Atlantic multidecadal variation. It peaked most recently around 2010 and is now trending down. We note that the Atlantic multidecadal variation accounts for the observed variations so well we find no evidence for a longer-term increase or decrease in transport.

1. Introduction