Increasing heat and salt transports in the main Atlantic inflow branch to the Nordic Seas 1993-2013

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Atlantic water on monitoring section
Weekly averaged volume transport 1997-2013 based on in-situ observations

No statistically significant trend
Atlantic water temperature and salinity

- Temperature \( T_{\text{Atl}} \)
- Salinity \( S_{\text{Atl}} \)
- 1°C
- 0.1 psu
- 3-year mean
- SPG-shrinkage
- ± standard error
The effect of SPG shrinkage
(Hakkinen & Rhines, 2004; Hátún et al., 2005)

Warmer and more saline

Before 1995

After 1995

Warmer and more saline
Relative heat transport from individual CTD cruises

Hansen et al., 2010
Weekly averaged volume transport 1997-2013 based on in-situ observations

Sea level difference across the flow
Combining altimetry and in-situ obs.

Using long-term ADCP and CTD records to calibrate altimetry, we can generate daily estimates of the velocity field every day since 1\textsuperscript{st} January 1993.

Using altimetry + seasonal variation + long-term Atlantic water temperature we can generate daily estimates of the temperature field.
Explained variance ($R^2$) of temperature field for 78 observed CTD cruises

$\langle R^2 \rangle = 0.61$
Explained variance ($R^2$) of salinity field

$\langle R^2 \rangle = 0.48$
Monthly averaged volume transport of Atlantic water 1993 - 2013

Average volume transport of Atlantic water: $3.8 \pm 0.5$ Sv
Volume transport of Atlantic water

20 year trend: 8 ± 8% (95% confidence)

Annual mean

± standard error

3-year mean
Heat transport relative to 0°C

20 year trend: 18±8%
Salt transport relative to 34.95
(≈ FBC-overflow salinity)

20 year trend: 130±30%
Does increasing salt import accelerate overflow?

Glessmer et al., 2014
Eldevik et al., 2009
Volume transport of Faroe Bank Channel overflow (10 July – 14 May)

20 year trend: 9±13%

Annual mean

3-year mean
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