

The manuscript presents time series of 15 years of meridional fluxes in the two branches of the Norwegian Atlantic Current (NAC). Geostrophic flow is obtained from satellite derived surface topography and hydrographic observations. The spatial structure and the seasonal and longterm variability are presented and their relation to upstream estimates of the NAC and to estimates of one of the branches at the same location, both derived from independent measurements, are discussed. A last somewhat independent chapter suggests the impact of flow and stratification variability to the ecosystem.

The paper contains a lot of material that is worth to be published. With the remote sensing data the outer branch of the NAC is estimated with an independent method for the first time. Would the authors suggest this method could replace in future the (expensive) current meter mooring array? There is however no presentation of the changes of the hydrography which seem to impact the ecosystem as is discussed in the last chapter. Instead heat and fresh water fluxes are presented but not really discussed, and furthermore the heat flux estimates are at least doubtful. Altogether I have concerns about the focus of the paper. Furthermore, the writing is unclear to a degree which makes it difficult at large parts to find out what the authors want to say. Therefore, I suggest the paper to be published only after very intensive revision. If the authors submit a revised version it should be reviewed again.

I am strongly concerned about the heat flux that is aimed to be derived. Since heat transport can be only obtained over a closed volume with zero net transports I wonder what the presented numbers mean. The authors mention briefly (p. 2362, line 9) an “outflow temperature” without telling what is meant here by outflow. The title talks about fluxes toward the Arctic (?? The Arctic *Ocean* is way north of the Svinoy section) but then a reference is made to Osterhus et al. 2005, so that the reader might guess that by outflow the authors might mean the overflow over the Greenland–Shetland Ridges. But Osterhus et al. are by no means a suitable reference for overflow temperatures since they don’t address them. Hence, if the authors want to present the *variability* of the heat transport they must take into account the variability of the overflow temperature as well. Otherwise they prescribe a priori that all the variability of the inflow strength and temperature will change the Arctic Ocean and Nordic Seas temperature and/or be compensated by changing heat flux to the atmosphere. The outflow across the ridges has to compensate interannual flow changes of up to 50% (Fig. 6) all at a constant temperature of 0°C? This is a strong statement. It might well be the case but this would be rather a result of a proper heat transport estimate than an implication that should be made a priori.

But I don’t see the need to strain heat fluxes here anyway. The paper would be very valuable if it presented variability of temperature of AW together with the volume transports, or the volume transports of different temperature classes. This would be even more appreciated as the implications for the ecosystem in the last chapter seem to rely on stratification and not on heat. Stratification relation to flow strength is mentioned only in half a sentence. Is the stratification due to temperature or to salinity or to both? Heat transport on the other hand is an important component of the climate system and one should be careful not to present doubtful numbers.

As said before the paper is at parts hard to read and needs considerably clarification. Someone should take care of the grammar; e.g. throughout the paper, plural case nouns and singular case verbs and vice versa are mixed and hardly any distinction is made between adjectives and adverbs.

Line 2: A current cannot be part of water.
Line 5: Probably this is “surface” topography.
Line 8: “Compared with ... are comparable...” ??
Line 10: Probably skip “of” and “that” to make sense?
Line 17: should be “area occupied by AW”

Page 2359

Line 19: “... the forcing ...shows links to local and large scale wind.” What is meant by “forcing” here?

Page 2360

Line 18: “the” section... Which section?
Line 22: Axes of which graph? There is no y in the equations but instead a z which is not explained.

Page 2361

Line 13: Entirely unclear. How can a *vertical* integration be both vertical and over an area which makes a volume integration in the end?

Page 2362

Line 9ff: What is meant by “The surface ... data were interpolated ... to fit with sub surface data.” My understanding would be that the surface topography would give absolute velocities and that the subsurface profiles were shifted so their near-surface values match the surface velocities? But maybe I misunderstood this whole story.

Page 2363

Line 9: I don’t understand how an intercept with the slope can extend as a wedge??
Line 12ff: Associated with what? Are the westward increasing changes positive or negative? If the changes increase to west, then why mention an “opposite decreasing trend”, which is identical?
Line 14: Density depends on temperature and salinity (and pressure). Hence density changes are always related to T/S changes although the effects can compensate each other. Do the authors mean that the TS changes are associated with homogenous density in winter? I fail to see this in Fig. 4.
Line 19: The seasonal changes during winter ... Is this referring to Fig. 9? Why is this mentioned here?
Line 23 ff: I fail to understand the following paragraph. A depth integrated flux is something with the units $Sv \cdot m$. What physical property would that be? Since Fig. 5 is not readable it does not help. I am sorry I cannot review this part of the paper. It seems to deal with some spatial distribution.

Page 2365

Line 4ff: Why would smoothing lead to higher current values? Are “structures with the NwASC” structures “of” ...? What does “this” refer to?
Line 10: Over what parameter is the area integrated?
Line 13: Units of depth integrated parameters should be “...*km” instead of “.../km”

Page 2366:

Line 2 “The ... inflow ... illustrates ... branches...”??
Line 19: It would be helpful to have station 6 or the longitude in Fig. 2 or 6.

Page 2367

Line 9ff: Variability of what? Isn't the NwAFC in the AW area by definition?

The sentence starting with "using" is somehow odd, there seems a noun missing?

Page 2368

line 22 says that the individual branches show *no* significant relation to the wind stress curl.

Page 2369, line 9 says that the interannual variability for (better: of) the NwAFC is *strongly* influenced by the WScurl. Which is highly contradictory!?

Table 1: "... instruments ... are measurements"??

Table 2: "Mean flux ... for total flux (for both total and AW)". Please??

"The error estimates are ... error estimates ...". We hope so.

Fig 1: Legend is not readable.

Fig. 2: A depth profile at the bottom might be helpful.

Fig. 3: Mean *and* seasonal? This is probably *sea surface* topography?

Fig. 5: Not readable.

Fig. 6: Again wrong units. Sv/km would be a transport density rather than a depth integral.

Fig. 8: Please clarify caption. Line is ..., triangles are ..., stars are ...

Fig. 11: Is the stability averaged over the whole section? Why is the volume flux leading the stratification? All this should be presented a bit more detailed in the text.

Page 2363 line 7, Page 2364 line 22 are captions and need not to be repeated in the text.

Osterhus et al. (2008) is missing in the ref list. I did not check the whole list.