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Ocean Science Discussions

# *Interactive comment on* "Stability and forcing of the Iceland-Faroe inflow of water, heat, and salt to the Arctic" *by* B. Hansen et al.

**B. Hansen et al.**

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The review of Anonymous Referee #2 was helpful and we have addressed all the comments as detailed in the following:

Referee comment: 1) In eqn 1, is the inclusion of p_1 and p_2 redundant (doesn't rho*g*z_1 already represent p_1 and the potential energy at location 1; same with rho*g*z_2 for p_2)?

Author response: This question seems to stem from confusing nomenclature in that the referee apparently has interpreted z to indicate depth of a water parcel below the sea surface. Our intention was to let z represent the height (positive upwards) of the parcel above a geopotential surface. The sum gz+p then can represent energy change



from vertical movement of the parcel as well as from changes in sea surface height (Gill, 1982, page 82), and the two terms will cancel when the sea surface height does not change, as seen in Eq. (A1). To make this more clear, we have modified Figure 6 and its caption.

Referee comment: 2) p 1263 lines 11-13: "Temperature and salinity increased during the period but variability in the volume transport precludes determination of any significant trends in heat or salt transports". There is a clear overall trend over the decade towards elevated delivery of both heat and salt across the Ridge, isn't there?

Author response: Yes, that is probably the case, but, as detailed in the last paragraph of section 3 (page 1252, lines 8-18), our time series of salt and relative heat transport do not have statistically significant positive trends. In fact, the salt transport series had a negative trend, although not significant. This may, however, well be due to the inadequacy of the data and we agree with the referee that there is no reason to emphasize this in the Conclusion. In the revised text, the sentence has been changed to: "Temperature and salinity in the core of the IF-inflow increased during the period."

Referee comment: 3) In the Conclusion you write that "We conclude that the relative stability of the IF-inflow derives from the processes that generate outflow from the Nordic Seas, especially the thermohaline processes that generate overflow". This is a succinct and powerful conclusion. It should be incorporated more clearly in the Abstract.

Author response: We agree. In the revised text, we have modified the abstract to emphasize this more clearly.

Referee comment: a) p 1247 line 8: By its transport -> Through its transport or With its transport

Author response: The text has been modified accordingly.

Referee comment: b) p 1248 line 18: which most of it -> most of which

Author response: The text has been modified accordingly.

Referee comment: c) p 1248 line 20: but since then, this has been NG. -> when NG was placed further north.

Author response: The text has been modified to: ”after which this mooring was moved farther south and renamed NG.”

Referee comment: d) p 1249 line 10: measurements, alone -> measurements alone,

Author response: The text has been modified accordingly.

Referee comment: e) p 1250 line 23: on the average -> on average

Author response: The text has been modified accordingly.

Referee comment: f) p 1252 line 10: For a non-closed system... You may want to refer here to a discussion of budgets in non-closed systems: Problems with estimation and interpretation of oceanic heat transport - conceptual remarks for the case of Fram Strait in the Arctic Ocean, Schauer and Beszczynska-Möller, Ocean Science 2009, doi 10.5194/os-5- 487-2009.

Author response: A good suggestion. Has been done.

Referee comment: g) p 1253 line 2: surface-near -> near-surface

Author response: The text has been modified accordingly.

Referee comment: h) Eqn 2: has the parameter B been introduced (I see that it is in the appendix, but perhaps not in the main text)?

Author response: The text has been modified accordingly.

Referee comment: i) p 1255 line 11: mainly easterly. Probably better to describe as "eastward" rather than "easterly", since an easterly wind is a westward-blowing wind.

Author response: Definitely correct. The text has been modified accordingly.



Referee comment: j) p 1255 line 19: leads with a month -> leads by a month

Author response: The text has been modified accordingly.

Referee comment: k) p 1256 line 17: value for of... is an alpha missing here?

Author response: Yes. The text has been modified accordingly.

Referee comment: l) p 1257 line 10: 30 h -> 30 hours

Author response: The text has been modified accordingly.

Referee comment: m) p 1258 line 14: to apply and it implies -> to apply, implying

Author response: The text has been modified accordingly.

Referee comment: n) p 1264 line 18: 1/2 B*D -> 1m/2 B*D (and please review and correct any other equations where dimensional units may be incomplete).

Author response: The text and Eq. (A4) have been modified, although in a slightly different way than suggested. Figure 8 and its caption have also been modified to be consistent with this.

Referee comment: o) Table 1: should the reference be to Eq. 2 rather than Eq. 1?

Author response: Yes. The text has been modified accordingly.

Referee comment:p) fig 9: North, East -> Northward, Eastward

Author response: The text has been modified accordingly.

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Interactive comment on Ocean Sci. Discuss., 7, 1245, 2010.