

We are most grateful for the very careful reviews and the many helpful comments by the two reviewers.

Interactive comment on “Near-ice Hydrographic Data from Seaglider Missions in the Western Greenland Sea in Summer 2014 and 2015” by Katrin Latarius et al.

Anonymous Referee #2

Received and published: 22 January 2019

Specific comments: Overall, the usefulness of the data set to the scientific community should be discussed to a much larger degree. Also, is there other data that this dataset can complement? Are there any references in connection to the project “Variation of freshwater on the western Nordic Seas”?

We are only aware of SST and SSS data, but there have been no hydrographic cruises during the glider missions in the same region.

Our topic was the only component in the DFG research group, which worked in the Nordic Seas.

When describing the glider set up in 3.1 you could mention the pre-deployment tank tests and the sail specifications here.

Done

New text:

Temperature and conductivity sensors have been calibrated by Sea-Bird (www.seabird.com) and the instruments were refurbished before the missions. The refurbishment included trimming and ballasting with tank tests and sea-trials.

Although the different steps in the data processing are thoroughly explained, I suggest looking over the structure of the presentation of the data processing and data quality (3.3 and 3.4). While I can understand the reason for structuring it this way, I found it made me go back and forth between these sections a lot trying to make sense of what happened when.

We leave Section 3.2 to 3.4 as it was.

The idea was to have first (3.2) the motivation for our effort, second (3.3) a preferably general description of the different steps of the data processing and last (3.4) specific details concerning the data sets processed here, concerning problems faced during the processing and decisions made to solve the problems.

We got the feeling that this structure is more clear than putting all information about each step of the processing in one single paragraph.

When reading about the individual corrections (below B.7 in section 3.3) it is not clear to me what this actually included (everything mentioned in the bullet points? or some?), there is some more information in 3.4.3 which might have been useful to know when reading the previous section, but it's still not very clear. What criteria were used to determine which data were erroneous in the different bullet points e.g. regarding outlier profiles, wrong values, large gaps etc.?

We moved information from below B.7 (Section 3.3) to 3.4.3 and added information to clarify the decisions made. We did this to have as little redundant information as possible and follow our idea of the structure as described above.

New text:

3.4.3 Visual inspection of the temperature, conductivity, salinity, density and vertical velocity profiles

(data processing step *individual corrections*)

By visual inspection of all individual profiles at different steps of the processing, several individual faulty values or profiles are detected:

- Spikes in salinity in the depth range of the thermo/halocline. These were removed, if they exceeded 0.1 (see Section 3.4.2)
- Wrong values during the apogee, which were not removed by the criterion $w < 5$ cm/s. These show up as temperature and conductivity values, which are far apart from the continuous profile, although the pressure did not change; they were removed.
- Outlier profiles of conductivity. Profiles, which are considerably separated from the entity of profiles of a mission, were removed.
- Profiles with large gaps in the depth of the largest gradient. If the gaps exceeded a depth range larger than the typical depth range of the thermo /halocline (> 10 dbar) the profiles were removed
- Incomplete profiles. When the dive was aborted by the glider-intrinsic software after an uncommanded change in the bleed counts of the vertical buoyancy device, these profiles were removed.

No individual temperature, conductivity or salinity values were removed, but always complete data lines or even the whole profiles were removed before the interpolation to 2 dbar levels took place. This results in a reduction of the original data sets between 2 % and 5% (Table 4).

Row 334 - have these spikes been clearly flagged so that they can easily be taken into account when someone is using the data set? Or is it likely that they were removed in another processing step after A.6?

We explained our motivation for not removing these profiles with one sentence..

The reasons for not flagging them are described in the reply to reviewer #1:

Although quality flag standards are developed comparable to Argo standards within the EGO community (<https://www.ego-network.org/>), no standard data processing and quality control is established yet. Thus, setting flags would be subjective. The changes made in B.4 allow identification of interpolated values. Additionally, we incorporated an Annex with a list of the profiles with spikes in the thermo/halocline.

New Text:

We decided to leave the decision how to deal with the spikes to the users of the data set. To help identification of affected profiles we list them in the Annex. The spikes will possibly level out during gridding or averaging routines in further processing. For example, Queste et al. (2016) developed a method to deal with glider measurements across sharp gradients. They built composite profiles from the downcasts between the surface and the thermo-/halocline and from the upcasts between maximum depth and thermo-/halocline and combined these in a gridded data set.

B.4

..

In the final data set the variable NOBS gives the number of observations from which 2 dbar-means were calculated. If NOBS is empty for a certain line of data, values for temperature, conductivity, salinity and density were interpolated.

Annex:

List of individual profiles with spikes in the thermo/halocline.

For details see Section 3.4.3.

Glider 127 2014:

Dive no: 10-13, 17, 11, 24, 76, 82, 206-208, 212-214, 220-227, 229-231, 233-234

Glider 558 2014:

Dive-no: 1, 3-13, 15-25, 85-86, 91-93, 101-103, 110-112, 116-121, 125-127, 390

Glider 127 2015:

Dive-no: 2-7, 9-17, 19-32, 34-67, 75-77, 106-107, 109-115, 117-124, 167-226, 230, 233, 329-420.

The dive-no is named *observation number* in PANGAEA.

Rows 337-339 - so why was this method not used here? Because the decision, how to deal with these profiles, depends on the specific interest of the users.

We added an explanation. See last reply.

I would suggest a paragraph at the end of section 3 where the authors summarize and discuss the quality of their processed data and how the data could be used (or should not be used).

Please add a conclusion at the end of section 4.

At the end of section 4 some conclusions are added, which also relate to section 3.4.

New Text:

The presented distributions of temperature and salinity, measured along sections from the inner GS to the EGC during summer 2014 and summer 2015, show signs of freshwater intrusions close to the surface. The development within a single summer as well as the interannual differences are demonstrated. The freshwater intrusions are not masked by the inaccuracies of the measurements, as we described in detail in Section 3, as the absolute difference between the Polar Surface Water and the Arctic Intermediate Waters is of order 4-6 K for temperature and 2-4 for salinity. For further analyses, one has to take into account that in opposite to ship-based CTD sections, glider sections are never "quasi-synoptic". Thus, the combination of low time resolution and high spatial resolution provided by glider measurements must be considered, when deriving quantitative conclusions from the observed distributions.

In the online data product: I suggest not changing the Operation number to NA in the "drift"-files. I understand that it is because there is no hydrography parameters available for that dive, however I suggest adding another column instead to flag this.

PANGAEA was requested to change it that every observation has an operation number.

The number of dives for glider 127 in 2014 seems to be 258 in the online file, but is listed as having 220 dives in Table 1.

For "dive" 221 to 258 only position and drift data available. We add this information to table 1.

Part of table 1:

2014/08/21 voltage-cutoff; surface drift until recovery; position and drift data for "dive" 221-258 are available		
---	--	--

Technical comments:

Row 55 should have commas around "both liquid and frozen"

Done

Row 58 should be "low salinities were frequently observed"

Done

Row 105 and 107 "is flowing" should probably rather be "flows"

Done

Row 122 and 123 "his" should be "its"

Done

Row 130 "support the realization"?

Changed to “support the steering of the glider”

Row 135 too many “the”?
one “the” deleted

Row 153-156 wrong line spacing
Changed

Row 184 “have been” should be “were”
Changed

Row 185 “already beginning of” should be “already in the beginning of”
Done

Row 194 “the maps base on” should be “the maps are based on”
Done

Row 208-209 – perhaps swap the two URLs to give better line break? Looks odd now
Done

Row 213 and 214 “data of” should perhaps be “data from”?
Done

Row 218 “track or” should be “track, or”
Done

Row 226 Title needs rewording
Changed to” 3.2 Glider data processing”

Row 229 “follows basically” should be “basically follows”
Changed

Row 231 “miss-alignment” should be “misalignment”
Done

Row 239 “byt” should be “by”
Done

Row 257 “sampling rate information” should be “sampling rate, information”
Done

Row 259 “cell but” should probably be “cell; instead” or similar
Done

Row 281 “It was also analyzed if” should be “An analysis was also made to determine if”
Done

Row 281 “show” should be “showed”
Done

Row 282 “if they can be used both or not” should be something like “if both could be used or not”, or perhaps “which of them, if any, could be used” or something similar.
Done

Row 289 – “divice” should be “device”
Done

Row 291 Insert blank line On page 14-15, the “individual steps of table 2”
Done

(there are no row numbers here)
because it is formatted as a table

In B.4 “interested to analyze” should be “interested in analyzing”

Done

In B.5 “iterative” should be “iteratively”

Done

In B.5 “This is other than” should be “This is different from” or “This works differently than”

Done

In B.6 “Fortunately for none of the missions reported here, systematic differences between down and up-casts were visible.” should be something like “Fortunately, no systematic differences between down and up-casts were visible for any of the missions reported here”

Done

Row 322 “if conductivity lagged temperature” should be “if conductivity lagged behind temperature”

Done

Row 325 “not successful at whole” should be, depending on what the intended meaning is, be something like “not successful overall” or “not successful at all times” or possibly something else.

Done

Row 333 “hereupon” should probably be “therefore”

Done

Row 391 “the criteria of stable density was applied” should be “the criteria of stable density were applied”

Changed to criterion

Row 394 “exemplarily” means “In an exemplary manner; ideally, admirably” – so “again exemplarily for glider 127 during the mission 2015” should be changed to something like “where again glider 127 during the mission 2015 is used as an example”

Changed

Row 408 “and thus demonstrate” should be “and thus demonstrates”

Done

Rows 445-462 – here you change between present and past tense back and forth several times, which is confusing. Pick one – preferably past tense – and apply it consistently to this section.

We switched to past tense. But there are some statements that should be present.

Row 469 – as on row 394, the word “exemplarily” can’t be used like this – rephrase

Done

Row 470 “In the right column map extracts” should be “In the right column, map extracts”

Done

Row 471 “For 2014 also the ice edge at the arrival time of the glider at the edge is included in the map” should be “For 2014, the ice edge at the arrival time of the glider at the edge is also included in the map”

Done

Rows 490, 510 and 526 “toke place” should be “took place”

Done

Row 520 “upper 55m” should be “upper 55 m”

Done

Row 537 “making public available the UAE toolbox” should be “making the UAE toolbox publicly available”

Done

Row 542 "Harald Rohr,OPTIMARE" should be "Harald Rohr, OPTIMARE" (missing a space after the comma)

Done

Row 545 "We like to thank" should be "We would like to thank"

Done