

Interactive comment on “Ocean properties, ice–ocean interactions, and calving front morphology at two major west Greenland glaciers” by N. Chauché et al.

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This manuscript describes synoptic surveys of hydrography inside two major glacial fjords in West Greenland and an analysis of circulation inferred from the measurements. The observations are a very nice addition to the rapidly-evolving literature on ice-ocean interactions in Greenland, and confirm the presence of warm Atlantic waters at depth in two previously unsurveyed fjords. My major reservation is that the authors have probably over-interpreted what are basically snapshot measurements collected a year or so apart. One of the key findings from existing studies of other fjords in Greenland is the importance of being able to characterize variability at a range of timescales

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(weeks to years) before inferring detailed circulation properties. Two short surveys (5-10 days) carried out in August 2009 and August 2010 are an insufficient basis for examining seasonal or interannual variability, which is necessary before being able to say anything useful about modes of circulation. On the other hand, the authors have a unique data set of surface melt conditions and fjord structure, so it might be worth emphasizing this link. There is plenty of worthwhile information to warrant publication, so I recommend that the authors revise the manuscript to focus on more descriptive aspects of their data and the observed spatial variability between the two fjords.

When preparing their revisions, I urge the authors to adopt a more conventional naming convention for the inferred water masses. SPMW is more commonly referred to as Atlantic Water (AW) and I think BEW is analogous to polar water (PW) in other papers. Sticking with conventional names will avoid confusion and make it a lot easier for readers to place the new paper in a wider context.

The paper is concise and mostly well-written although, as other comments have pointed out, some of the figures could be improved. I have a few additional comments that should be addressed, but am otherwise looking forward to seeing a revised version of the manuscript.

P5580 L8: “contact with warmer water” is a bit vague. You need to quantify “warmer”.

P5580 L9: Not obvious to me why the presence of 2.8C water “indicates” the particular types of melting that are mentioned.

P5581 L1: confusing sentence (“...glacier-ocean interaction significantly affects ice-ocean interaction...”)

P5581 L8: if the heat source is “largely undetermined”, how can you also say it is “massive”?

P5582 L16: lower-case “summer” and “winter” (and elsewhere in the text)

P5582 L25: lower-case “brine”

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P5582 L29: "glacier" singular.

P5583 L2: where does the bathymetric information come from? Did you survey bathymetry yourselves? If not, provide a citation.

P5583 L17: lower-case potential temperature, practical salinity unit, nephelometric, etc.

P5583 L21: "Turbidity estimates are..."

P5585 L29: "dynamics" plural.

P5586 L2: "distributions" plural.

P5586 L10: "Runoff also varies greatly..." is kind of unnecessary.

P5586 L14: Rewrite for tense and clarity, "The results are then...using the Bamber and Aspinall (2013) elevation and land/ice/sea mask."

P5586 L20: Need to provide additional details about the time lapse photography (e.g., temporal sampling interval, URL for Extreme Ice Survey data).

P5586 L21: lower-case "north" and "south"

P5587 L20: "...was not directly observed..."

P5587 L22: change "providing measurement" to "collecting observations"

P5588 L1: what is your basis for assuming that subglacial discharge variability is due to variations in surface melting? It could also be due to variations in storage/release at the glacier bed, or changes in subglacial plumbing (cavities might retard discharge compared to tunnels).

P5588 L11: "extremely spatially variable" is awkward. How about "has high spatial variability"?

P5590 L4: comment in parentheses is unnecessary, delete.

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P5590 L7: Your comment about the lack of observed plumes at Rink Isbrae in 2009 is surprising, and also contradicted by other studies using EIS time-lapse photographs (Schild et al., 2013, AGU abstract # C33B-0731).

P5590 L21: delete comma.

P5593 L10: "photos" should be "photographs"

P5594 L15: "dynamics"??

P5594 L16: not clear what "behavior" you are observing in the photograph. Do you mean terminus position? Or flow speed? Also, see Schild and Hamilton (2013, J. Glac., vol. 59, no. 216) for a high-resolution terminus position time series for Rink (2001-2010).

P5595 L10: the importance of topography and bathymetry for calving front dynamics is also discussed by McFadden et al. (2011, J. Geophys. Res., 116, F2) and Schild and Hamilton (2013).

P5595 L13: "plumes" plural.

P5595 L15: "localised" should be "locally"

P5595 L16: awkward phrasing, rewrite "...may overpower the large-scale ubiquitous melt..."

General: Some references in the text are cited alphabetically and others chronologically. Please be consistent.

Interactive comment on The Cryosphere Discuss., 7, 5579, 2013.

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