

## ***Interactive comment on “Can katabatic winds directly force retreat of Greenland outlet glaciers? Hypothesis test on Helheim Glacier in Sermilik Fjord” by Iain Wheel et al.***

### **Anonymous Referee #3**

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The manuscript provides a basic count of strong wind events near a fjord with a tide-water glacier in south-east Greenland. The authors use data from Danish coastal wind stations and a coastal grid point of a data assimilation modeling (ERA5). The manuscript attempts to relate some of these strong wind events to fjord circulation and glacier melting, calving, and retreat. Raw time series of ocean current and temperature profiles and single-point salinity-temperature time series are shown a few days prior, during, and a few days after wind events.

The connection of the wind events to ocean circulation fails, because of an incomplete and uninspired discussion of raw data that are scattered in time (6 events) and space

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(5 locations). There are many wiggles in the many plots, but what stands out is the mismatch of time scales and the confusion of what happens when and where and how this relates to all other events. I know that Drs. Rebecca Jackson and Fiamma Straneo worked on the fjord circulation using the same data with more dynamical insight. In contrast to the present authors Jackson and Straneo organized and synthesized data from different "event-types" more credibly via an ensemble averaging sense that defines a common time zero for each event. These published papers may serve as a model on how to properly process, filter, and average complex ocean data to provide statistical meaning and dynamical understanding.

All ocean data are noisy, that is, they contain high frequency spectral components that are not contained in the wind data. Some features appear to correlate with the wind data while others do not. The scales of all velocity (2 plots), temperature (4 plots), and temperature-salinity (4 plots) are all different from each other for each and all events. It almost feels as if the authors let MatLab do all the analysis via its automatic scale selection. This is very poor form and results in a cluttered and uninformed presentation. Some wind data series are presented more than once to perhaps demonstrate that this and that wiggle relate visually or not or with some lag or without a lag. I would not want my own graduate students to see and "learn" from such confused and chaotic show-and-tell lack-of-analysis.

There are many smaller items and problems that to me indicate a sloppy and rushed submission. Figure-6 refers to 6 events from 2010 that I could not find anywhere else in the manuscript. The use of the color "white" in Fig.-3 could indicate the absence of data (icebergs near surface perhaps?) or the velocity interval of 0.0-0.2 m/s (Fig.-3d) or 0.00-0.15 m/s (Fig.-3b). The author always refers to Fig.-3 (there is Fig.-3a through Fig.-3d) or Fig.-4 (there is a Fig.-4a through Fig.-4h). These are all minor quibbles, there are many more of these.

In summary, I recommend to reject the manuscript, because I could not find credible ocean data analysis or synthesis that adds value to the raw data. The wordy and

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largely speculative manuscript fails to provide quantitative or dynamical understanding or even a unified view of how the many wind force ocean circulation and glacier melting. Reading this manuscript, I find that each wind event triggers a different ocean response. The presentation lacks analysis that would extract the katabatic wind effect from the ocean record. It compares a wiggle here with a wiggle there that may or may not mean much.

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