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Interactive comment on "A stable Faroe Bank Channel overflow 1995–2015" *by* Bogi Hansen et al.

Anonymous Referee #2

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The manuscript addresses the main question of whether there have been long-term changes in the Faroe Bank Channel (FBC) overflow volume transport or density over the last two decades. In situ measurements from current profiler moorings show that the overflow has been stable in both respects during the period 1995–2015. Because of the role of the overflow as part of the AMOC, and recent attention to the potential weakening of the AMOC, this is an important observation. The short manuscript is well-written and clear, with neat figures, and the topic is interesting and appropriate for this journal. However, I think some improvements could be made to the structure and content of in particular the introduction and discussion sections, before publication.

1. Regarding the structure of the paper: a large part (almost half) of the discussion is dedicated to overflow modification. This is an important topic, and this discussion section (4.3) gives a good overview of literature on the topic. However, the proportion

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of the discussion section that is dedicated to overflow modification is surprising considering that this topic is not even alluded to in for example the paper abstract or title. My suggestions would be to a) update the abstract to mention the discussion on overflow modification b) consider shortening this section of the discussion.

2. As mentioned in section 4.3, water mass transformation occurs mainly downstream of the FBC, that is, downstream of the long-term measurements that are the main focus of this manuscript. Some new observations from the downstream region are presented in section 4.3, namely, eight CTD stations occupied 20-21 May 2016. In view of the known high level of short-term variability (oscillations) in this part of the overflow, briefly mentioned in the manuscript on p. 12, L26-29, how does one confidently interpret 8 profiles taken during 2 days? Are the observations in this snapshot representative? Do these measurements add significantly to the substantial body of work done in this region over decades, which includes repeated CTD sections, moorings, etc.? Personally, I am not convinced that the new downstream CTD profiles add enough new information to motivate their inclusion in the manuscript. I recommend focusing on the truly impressive data sets: the time series from the moorings at the sill, and from the repeated standard CTD sections.

3. Speaking about impressive long-term measurements: Is this the first time the whole 20 year time series is presented except in a technical report (Hansen et al., 2015a)? In that case it is a substantial extension of the data set (a doubling of the 10-year time series from e.g. the important HØ2007 paper), and perhaps that should be stated outright in order to make the contribution of this paper clear. If not, other recent manuscript that use all or most of the 2-decade time series ought to be referenced and pointed out.

4. The early years of the FBC overflow time series gave quite a different impression, namely a reduction in the strength of the overflow (Hansen et al., 2004; cited in this manuscript, but only to describe a simple water mass mixing scheme). Even though the earlier conclusion of decreasing overflow [since 1950] (Hansen et al., 2001; not cited in this manuscript) has already been refuted in e.g. Olsen et al., 2008, these

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earlier papers and conclusions (as well as papers refuting them) - by these authors and others - are part of the history of the FBC overflow time series, and form an important backdrop to the discussion about the overflow stability. This should be included in the introduction and discussion sections.

Minor comments P2, L 24: study the long-term variations

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