

## ***Interactive comment on “The Arctic Front and its variability in the Norwegian Sea” by Roshin P. Raj et al.***

### **Anonymous Referee #2**

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The study looks into the structure and variability of the Arctic front in the Nordic Seas using satellite SST and wind data as well as an ocean reanalysis. There are some interesting aspects in this paper, but the study seems to touch (briefly) upon a number of questions that ones loses track of the main objective. Because of this, I do not recommend this study for publication in its present form. The main issues are listed below.

#### Major and general comments

- The singularity analysis is not well defined and is currently only descriptive without any mathematical formulations.
- It is mentioned that a positive (negative) singularity exponent provides information

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about regularity (irregularity). This does not add much to the understanding of the method unless you thoroughly explain it. Moreover, Figures 4-6 show exponents less than +0.3 in blue colours, but you discuss most of these results as they were strictly negative.

- What is the reason for these three atmospheric modes when the North Atlantic Oscillation is apparently the most important mode? Are the other modes and their explained variance even significant?
- The timescale of interest is not well defined; you show most of your results for summer and winter but the atmospheric indices you base your composite analysis on are in fact on monthly time scales. I cannot therefore reconcile the results presented in this study and this is a major issue.
- Consider showing the significant regions for the composite analysis.
- I do not see the difference between the Arctic Front and the Norwegian Atlantic Front Current? You talk about the former and make a sudden transition to the latter. What is the difference over the Mohn Ridge?
- The SST-wind relationship at the fronts in the Nordic Seas is interesting but rather descriptive and not convincing at this stage. This needs more careful investigation and needs to be mathematically formulated.
- Does the ocean reanalysis also assimilate the same satellite data you are using? If so, are the similarities you find surprising?
- Some of the texts in the results do not simply fit in there and should be removed or moved to the introduction (one of the many examples is in pp. 7, line 2-3 about seabirds. Another example is the discussion about mesoscale eddies, which I do not see how it fits in)
- There is quite some speculation in the first paragraph of page 8, which needs to be made more sound, especially in relation to the reduced gravity model of Orvik (2004).

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This is an important part of the paper.

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