

Interactive comment on “Stratospheric influence on marine cold air outbreaks in the Barents Sea” by Hilla Afargan-Gerstman et al.

Anonymous Referee #3

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The motivation for the article is worthwhile and will be interesting to readers once a few issues are addressed. In its current form, there are a few gaps in the analysis that need to be filled before publication. I share some concerns with the other two reviewers.

- The first major issues centers on using the top tercile of events as the focus the analysis results. By subsetting of the SSWs into the top tercile of MCAO response, the readers only sees cases that fit one storyline. Fig 2 shows that this MCAO storyline is not always consistent across all SSWs. Since the authors suggest their analysis would inform decision makers that use S2S forecasts, one way to address this issue is by adding analysis of SSW events with non/weak MCAO responses for comparison. Such a solution could involve a corresponding analysis of the bottom tercile events. In such an analysis broader questions could be answered, e.g., are there mechanisms

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of troposphere-stratosphere coupling that occur in the post-SSW period that favor the enhanced/suppressed MCAO response? Such an analysis would provide readers with needed context for the interpretation of the extreme MCAO response.

- Adding an analysis along these lines to the article would also get at addressing a second major issue, the connection between the stratosphere and the large-scale tropospheric flow is assumed and not shown as part of this work in its present form. Is there a stratospheric flow metric that would provide an indication of the likelihood of whether or not the 30-day period after the SSW would have a bottom or top tercile event or is it not possible to determine at the SSW onset date? With the addition of such an analysis, the authors could potentially provide insight into the type/evolution of SSW events required for the high-impact MCAO response.

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