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Interactive comment on "The use of regression for assessing a seasonal forecast model experiment" *by* R. E. Benestad et al.

Anonymous Referee #2

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To disentangle the effect of different experimental settings is clearly an interesting point in understanding model dynamics, so the scope of the paper is of great interest. The method of factorial regression itself is not new but this approach has not been extensively applied in the context of long-range forecasting, so it can be considered as an interesting new approach. However, the presentation of methods and results is not easy to read and to follow.

Major points to consider:

The experimental design:

Model simulations: to investigate seasonal winter forecasts, it is at least uncommon to start in January. After its spin up time the model finds itself in the outgoing winter and transition time to spring. The winter jets in the stratosphere and mesosphere are

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retreating towards calm conditions during the equinox. Sea-ice might be interesting because it is still growing. However, it would be perhaps easier to investigate pure winter conditions (starting in November and considering December/January/February), when the middle atmosphere is most actively involved.

Initial conditions are unclear, especially with regard to the NAO –experiments. Is the Model started from ERA- interim conditions?

Introduced scientific methods:

Factorial regression: personally, I dislike an introduction of a new method by describing it as “well-suited and handy” at the beginning. This is a conclusion which can be reached at the end and after the reader has had a chance to reenact the features of the introduced new method. The explanation given later in the paper should be moved up and be better explained.

Representation and description of the results:

Table 1 is missing, which makes it difficult to remember the abbreviations of the experimental names. Figure 1 shows results for 200 hPa while in the text a structure at 50 hPa is described which I could find nowhere.

Further, when investigating middle atmosphere dynamics the vertical extension of the figures would look more appropriate if the stratospheric levels can be clearly seen, i.e. a logarithmic vertical axis up to 1hPa.

The results given do not really represent the mid-to-high latitudes, since either just 60°N or 200hPa (why?) as slices were chosen, which makes the statistical investigation for the Northern Hemisphere questionable.

The naming convention is not consistent, making it difficult to follow the discussion: e.g. in case of “response-to-error ratio” or “ratio of estimate-to-error”

The description of Figure 2 seems to mix up the panels

Conclusion of the paper:

Robust conclusions cannot be made because of the limited number of ensemble members given the number of sensitivity experiments.

That the stratosphere is giving a strong response is not surprising because of its dynamical structure and features during the course of the (even retreating) winter allowing the planetary waves to propagate upwards and trigger downward coupling. The role of sea-ice might not change that much from January to March, because the ice-extension is already large and any variability arising from ice-growth would be small.

Minor points:

Not being a native english speaker myself I have the impression that past and present tenses are quite mixed, making the reading also difficult. E.g.:

Lines 95-96 “the factorial regression provided” and “this linear expression was”

General remark

The topic presented in text and figures is not well enough explained to be published now. However, if the statistical investigation made here would be more linked to the already existing knowledge of Northern Hemisphere winter conditions, it would help to accept new statistical methods to be used by the climate modelling community.

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