

Review of “The Sun's Role for Decadal Climate Predictability in the North Atlantic” revised by Drews et al. for publication in ACP

I'd like to thank the authors for considering my earlier comments and the effort they put into providing additional material. In my view, the paper has improved significantly. There are however still some issues which I'd like to see considered.

Page numbers refer to the version with highlighted changes.

I'm still a bit at odds with the partly inconsistent comparison to the study by Chiodo et al. (2019; C19 hereafter). In L193 the authors speak of similar correlations but different conclusions in comparison to C19. In L193 they say the C19 study “revealed” insignificant responses. Should this refer to the analysis of observations or simulations? If the latter the word “reveal” seems to be at conflict with the above statement. Furthermore, later the authors list many reasons for differences between the simulations of this study and Chiodo et al. As the aim is to “partly rebut the conclusions” of C19 it would be important to be very clear. Are the simulation results really different? Or is it just a different interpretation of similar results.

I'm also confused by the new statement “seemingly discrepant results could be due to the analysis of DJF means in most studies, which likely are not sensitive enough to capture the signal reliably”. Does this refer to the papers cited in the bracket above “(Gray et al. ...)”? Why do they show signals if they used the not sensitive enough DJF means? If this refers to other studies, please cite.

L61 The authors contrast forced signals in the extratropical North Atlantic by saying that “up to 25% of decadal variance” is explained by the solar cycle and “this region shows low potential predictability due to other forcings. While this is not wrong it sounds like the solar influence is large compared to other forcings, which is not true. Averaging over this region by eye, I'd suggest that other forcings are still more important even in this region. It would be good to rephrase these sentences in order to avoid misinterpretation.

L80 “Consequently, solar variability and an adequate representation of its impact on climate is key to exploit the solar-induced potential predictability for decadal climate predictions.” This sentence sounds odd. Of course solar variability is key to exploit the predictability potential created by itself, and how could it be done in models if the representation of its impact was inadequate.

L117 “This shows that the response to the solar cycle is highly non-linear and not necessarily proportional to the forcing.” Isn't “non-linear: and “not proportional” the same? Why then the very different characterizations (“highly” vs. “not necessarily”?). I would agree with the latter but not the first statement. To show that the response is non-linear one would need to show that the response of the strong epoch scaled to the weak-epoch forcing is statistically significant different from the weak-epoch response.

L158 “the correlations reach statistical significances of 90% in the model, and in observations with a lag of two years “ Although the different lags are mentioned in the preceding sentence, this sentence on its own can easily be misunderstood. The different-lag issue should be picked up again. Besides, I don't think that one more line (as kindly produced

in the response to my earlier review would make the figure too busy. So please include it. Furthermore, The correlations reach barely outside the 90% range. And, leaving aside autocorrelation issues, wouldn't one expect 10% of the values to be outside this range accidentally?

L163 "organization and synchronization of internal variability" Is organization different to synchronization? Please explain. And I'd say the NAO index is synchronized, internal variability remains internal variability.

L193 The meaning of the "hence" is not clear to me.

L207 "The NAO in turn is organized and synchronized by the solar cycle. "
Not sure why "in turn". Besides there is again the issue of organization and synchronization.