

Interactive comment on “Extratropical cyclone statistics during the last millennium and the 21st century” by Christoph C. Raible et al.

Anonymous Referee #4

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I have reviewed this manuscript cp-2018-58 entitled "Extratropical cyclone statistics during the last millennium and the 21st century" by Christoph C. Raible et al. In this manuscript, the authors studied the extratropical cyclones and their changes in the 20th and 21st centuries using a unique CESM1 simulation from 850-2100 with high temporal output. They found that the variations of the cyclones over the North Atlantic and Europe sector before industrialization are mainly related to the internal variability, not directly related to either volcanic or solar forcing (nature forcing). Towards the 21st century, two of the cyclone metrics show significant trends. They also show that the Clausius-Clapeyron relation is not always followed by the changes of the cyclones and the global mean temperature. I found this manuscript is very interesting and worth to be published subject to some minor revision.

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Comments:

1. the authors using a 30-year running correlation to show whether changes of solar forcing will affect the cyclone activity and found there is no relationship. Since one of the major solar cycle is 11-years, with a 30-year running window, it will not show the effect of solar forcing on the cyclone activities. The authors could do a spectrum analysis for the cyclone activities and check with the solar forcing cycles (11-year or other cycles). This could give a better sense on whether solar activity would or would not affect the cyclones. 2. Line 351, "The former is due to polar amplification, induced by a strong sea ice reduction and the reduced heat capacity of the land surface compared to the ocean", in this sentence, it is not clear to me why the heat capacity of land reduces? it is because the ocean heat capacity increases? or something else. It would be nice that the authors could explain this a bit better or add some references. 3. Overall, it seems that the physical explanations are a bit weak in this manuscript.

Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2018-58>, 2018.

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