

Interactive comment on “A wavelet-based-approach to detect climate change on the coherent and turbulent component of the atmospheric circulation” by D. Faranda and D. Defrance

D. Faranda and D. Defrance

davide.faranda@cea.fr

Received and published: 23 May 2016

REFeree: "Overall quality. This is a good paper, with some limitations as to the broader conclusions. The authors apply new wavelet based metrics on the changes in circulation under a changing climate and the use of these novel diagnostics is the strongest part of this paper. However, the authors have applied this methodology to a coarse resolution atmospheric simulation that may not be adequate to draw all of the conclusions stated in the paper. This flaw can be rectified, however, by reducing the scope of the conclusions for reasons stated below. This paper has three main parts:

C1

1) the use of a wavelet filter to separate the coherent and turbulent components of the 700 hPa wind field; 2) The analysis of these fields using two novel metrics in a simulation of the present day climate; 3) the analysis of the changes in these metrics in future climates simulate using RCP 2.5 and RCP 8.5 warming scenarios. There are questions with respect to the implementation of the first part and the interpretation of the third part. With respect to the implementation of the first part the, filter and separation, the concern is that the turbulent component has a large seasonal cycle contribution; as large as the coherent part of the flow. This appears to be an inadequacy of the filter since one would assume that there should be only a small contribution from seasonal fluctuations in the turbulent component. It would be comforting if the authors at least noted this problem in the paper."

ANSWER: We will comment and discuss this issue in the new version of the manuscript. As visible from figure 1, the seasonal cycle carries indeed a relevant part of the energy spectrum. Our considerations were mostly related to the slope of the spectrum.

REFeree: "Second, the authors interpret the analysis of their results indicating a relative increase in the coherent component versus the turbulent component under the RCP 8.5 scenario as pointing to an increase in predictability. This may be true, however, only for the scales that are well resolved in the IPSLCM5-LR model used; i.e. structures on the synoptic and planetary scales well resolved by a 3.75×1.875 mesh. This says nothing about what may happen to meso-scale and convective scale phenomena that are unresolvable with such a coarse resolution as used here."

ANSWER: The reviewer is right in saying that we have to focus our conclusions on the synoptic and planetary scales resolved by the model. We will understate the results in the new version of the paper.

REFeree: "Technical corrections : Pg 2 line 16 'only change the intensity' should be 'only a change in the intensity' Pg 4 line 4 'an higher' should be 'a higher' Pg 4 line

C2

31 'At the tropics' should be 'In the tropics' Pg 5 line 6 'ibn' should be 'in' Discussion paper Pg 5 line 21 'hilited by an alternance' should be 'highlighted by an alteration' Pg 5 line 29 'of about' should be ' by about'"

ANSWER: The typos will be corrected in the new version of the paper

Interactive comment on Earth Syst. Dynam. Discuss., doi:10.5194/esd-2016-2, 2016.