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Geoscientific Model Development Discussions

Interactive comment on "Atmospheric River Tracking Method Intercomparison Project (ARTMIP): Project Goals and Experimental Design" *by* Christine A. Shields et al.

Anonymous Referee #1

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Review of Shields et al.: Atmospheric river tracking method intercomparison project (ARTMIP): Project goals and experimental design

The paper of Shields et al. introduces the atmospheric river (AR) intercomparison project to the the community. The project aims at comparing different methods of identifying so called atmospheric rivers which are essential for moisture transport from the tropics to high latitudes. It uses different methods which have been used used so far in literature to identify atmospheric rivers, which are associated to cyclones in the extratropics.

The central goals of the project are to provide a neutral framework for comparisons of

ARs and to identify and quantify differences resulting from different AR methods, these are important to estimate humidity transport changes in a future changes. The basic quantities which are used are integrated water vapor transport (IWT) and integrate water vapor (IWV). Reanalysis data from ERA Interim, ERA-5 JRA-55 , NCEP-NCAR and CFSR are planned to be included in the comparison. For climate model studies CAM5 C20C+ in resolutions from 25 - 200 km in the historical period are used as well as the CMIP5 catalogue.

For a proof of concept one months test case will be analyzed (February 2017) and it is planned to extend the methods to larger sets of simulations.

I think the attempt to compare and synthesize different methods and metrics for the identification of ARs is indeed a very valuable and important effort. I wondered if and how systematic model related properties are treated for the evaluation, e.g which role plays horizontal and vertical , temporal resolution for the results and the applicability of the metrics? Is it possible to add a global (or at least northern hemispheric) view for the test period? Atmospheric rivers also do appear away from the continents and it would be interesting to see, how the algorithms identify these events on a hemispheric view.

I therefore recommend the paper after the following points have been addressed.

General points: Though the comparison of methods is essential and required to judge results of larger model simulations I missed the link to observations. How do the algorithms do compare with observations of atmospheric water vapor columns e.g. from satellite observations? Wouldn't it be useful to define criteria (or refine the definition of) ARs on the basis of satellite observations to allow to estimate the capability of algorithms and methods to identify the structures? Is it planned to give recommendations of methods to be used to identify ARs? How will region specific methods (i.e. only applicable to the Western U.S.) implemented for global analyses?

Technical: Figures: Why are captions placed above the Figures? This is confusing.

Fig.5a) and Fig.5b) (also Fig.6): Please label the color bar with units in both cases. Caption Fig.5b): Clarify text: "Same as Fig.5a) ..."

Please mention in the caption that the number of cases is different in Fig.5a) and Fig.5b) (also 6) due to the regional constraint of the respective definitions.

p.23, l.23: Why do not all algorithms participate in the 1-month test case?

Table 1: instead of using symbols (+,^) for footnotes I suggest to use capital letters, which facilitates reading. Similarly explanations of *ZN and AR_coeff: Which methods refer to these quantities and what is the meaning of AR_coeff? Why is it 0.3 and is this a general number?

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