

Comment on wcd-2021-50

Anonymous Referee #1

Referee comment on "Metrics of the Hadley circulation strength and associated circulation trends" by Matic Pikovnik et al., Weather Clim. Dynam. Discuss.,
<https://doi.org/10.5194/wcd-2021-50-RC1>, 2021

Review of 'Indices of the Hadley circulation strength and associated circulation trends' by
Pikovnik et al.

General comments:

This manuscript compares 8 measures of the HC strength derived from ERA5 and ERA-interim reanalysis datasets. Their main findings are that measures based on a single vertical level are more subject to uncertainty and inhomogeneity while measure based on spatial average or integration are more robust. They concluded that the measure of the average HC strength is best suited for studying variability and trends.

The comparison is interesting and the conclusions are pertinent. However, 7 out of the 8 measures are derived directly or indirectly from the zonal mean streamfunction, which explain the high correlations between measures. The one measure not derived from the streamfunction is deemed inadequate for the purpose of this study and needs further refinement. Perhaps it would have been important to compare independent measures of the HC strength and quantify their relative relevance rather than the 7 measures proposed here as it is intuitive that capturing the HC by taking into account both its meridional and vertical extent would be more robust than from a single location.

Specific comments:

I find it strange to chose 2 versions of the ECMWF reanalysis instead of 2 new generation products such as ERA5 and CFSR for a more independent comparison. It's been reported that ERA5 is an improved version of ERAI with many significant fixed errors therefore the discrepancies found by the authors maybe attributed to those improvements.

Technical corrections:

L46: suggest replace '...are the trend... the pressure level.' by '...the trend... the pressure level are.'

Section 2.2: this should go in the result section, not in the methods section

L177: suggest remove 'also'

L182: what do the authors mean by 'merely showcase'?