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Title: Comparing onset definitions for the West African Monsoon -- An approach towards a concise definition
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Abstract:
The annual northwards progression of the West African Monsoon (WAM) system into the Sahel is a vital process for millions of people within this region of Africa. The monsoon onset marks a key date for local and regional stakeholders, particularly in the areas of agriculture and water resource management. However, although much has been published on the WAM onset, there is no clear consensus on how to define this date. This leads to complications and confusions in research on the potential triggers and climatological factors that affect the WAM onset, calling for a systematic evaluation of differences between different onset definitions used in the literature.
Regional onset definitions generally consider the abrupt shift of the Intertropical Convergence Zone (ITCZ) and associated change in precipitation levels or outgoing longwave radiation (OLR) values within the zonally-averaged monsoon region (10°W - 10°E), reflecting large-scale shifts in regional climate dynamics. Local onset definitions instead consider impacts of this shift (precipitation amounts, frequency of rainy days etc.) at individual data cells. It is therefore possible that local and regional onset dates vary in a given year and show different interannual variability.
In this study, we contrast three local and three regional definitions of monsoon onset for the time period 1998-2012 using the ERA-Interim (2.5° x 2.5° resolution), GPCP (1° x 1° resolution) and the TRMM precipitation datasets (0.25° x 0.25° resolution) as well as OLR data from the NOAA satellite (2.5° x 2.5° resolution). Regional definitions can have an interannual variability of over 30 days with some disagreement between datasets. Furthermore local onset dates can precede regional onset by more than 30 days with conflicting interannual patterns and a dependency on dataset in certain years. Key examples of interannual, spatial and temporal variability will be presented.

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