Relationship between meningitis occurrence and atmospheric conditions over the African meningitis belt

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The alternation of seasons over tropical northern Africa is associated with the occurrence of devastating diseases such as meningitis, Lassa fever and malaria. These tropical diseases are associated with specific atmospheric conditions. Thus, meningitis is one of the most endemic diseases observed over this region with a prevalence period up to 7 months (December-June). Previous studies based on the link between atmospheric conditions and the occurrence of meningitis outbreaks have shown that this disease develops under dry and dusty atmospheric conditions which are difficult to represent in numerical weather and climate models. However, the onset, breakup, and sub-seasonal variability of meningitis outbreaks are not well documented. The objective of this study is to identify the local and synoptic drivers favoring the large occurrence of this disease over the meningitis belt in order to improve its predictability by numerical weather and climate models on intra-seasonal and seasonal timescales. This study focuses on two cases studies of meningitis epidemics over Niger in 2009 and 2015. The case study of 2009 started early with a duration of more than eight weeks. The second case study was shorter than the first one. It took three weeks and was observed at the end of the dry season. Based on ERA5 data, surface dust concentration observations and satellite data, a further analysis of the role of climate metrics on the triggering of meningitis epidemics on intra-seasonal timescales at local and large scale atmospheric conditions will be presented.

Keyword: meningitis belt, meningitis epidemic, intra-seasonal, climate