
Forced modulations of Sahel rainfall at decadal timescale over the 20th Century.

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Abstract

The semiarid region of the Sahel was marked during the 20th century by significant modulations of its rainfall regime at the decadal timescale. Part of these modulations has been associated with the internal variability of the climate system, linked to changes in oceanic sea surface temperature in particular, or more recently with external forcings via direct atmospheric or again ocean-mediated response. We show here that the external forcings, and in particular anthropogenic aerosols, might play an important role in setting these variations, consistent with recent studies. The analysis is based on the recent simulations performed for CMIP6 with the IPSL-CM6A-LR coupled model. As in most coupled models, the maximum precipitation during boreal summer in the Sahel region is shifted to the south as compared to observations. A novel definition of the Sahel precipitation region is proposed in order to take this bias into account. Our results show that external forcings induce decadal modulations of the Sahel precipitation in summer that correlate significantly at 0.6 with the observed precipitation and that the anthropogenic aerosols explain more than 60% of these modulations. Our results support that part of this forcing is SST-mediated (i.e indirect).

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