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

Cassien Diabe Ndiaye^{1,2}, Juliette Mignot², and Elsa Mohino³

¹Cheikh Anta Diop University, LPAOSF, Senegal (cassiendiabendiaye@gmail.com, cassien-diabe.ndiaye@locean.ipsl.fr)

²Sorbonne University, Sciences faculty, LOCEAN, France (juliette.mignot@locean.upmc.fr)

³University Complutense of Madrid (UCM), Spain (emohino@ucm.es)

The semiarid region of the Sahel was marked during the 20th Century by significant modulations of its rainfall regime. Part of these modulations has been associated with the internal variability of the climate system, mediated by changes in oceanic sea surface temperature (SST). We show here that the external forcings, and in particular anthropogenic aerosols, might have played a role more important than previously thought in setting these variations. The study is based on the recent simulations performed for CMIP6 with the IPSL-CM6A-LR coupled model. As in most coupled models, the maximum precipitation is limited to the southern Sahel during boreal summer in the IPSL-CM6A-LR model. 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 Sahel precipitation that correlate significantly at 0.6 with the observed precipitations and that the anthropogenic aerosols explain more than 70% of these modulations. These results confirm recent results of CMIP6 highlighting an important role of aerosol forcing for the decadal climate in and around the North Atlantic ocean.