



Relative impact of insolation changes, fresh water fluxes and ice sheet on African and Asian monsoon characteristics

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It is now widely recognized that the slow variations of the Earth's orbital parameters have driven long term monsoon fluctuations. However, the orbital forcing is amplified by various feedbacks from the ocean, the cryosphere and the vegetation that are not yet fully understood. Using the IPSL_CM4 climate models we derived a set of past climate experiments allowing us to analyze how different forcings affect the characteristics of the African and Asian monsoon. The comparison of simulations for different climatic periods across the Eemian and the Holocene shows that changes in seasonality induced by the Earth's parameters alter differently the Indian and the African monsoon systems. We also considered the melting of the northern hemisphere ice sheet for different climatic periods, including warm periods (Holocene, Eemian and future) and last glacial maximum, as well as the presence of a remnant ice-sheet in the early Holocene. Sensitivity experiments in glacial conditions allow distinguishing which pattern of sea surface temperature is more effective in triggering changes over India. As for the insolation forcing, the results suggest different responses of the African and Indian monsoon to the fresh water flux and ice-sheet forcing. The analyses will focus on the teleconnection between the perturbations in the northern Atlantic and the African and Indian monsoons, and on their dependence with the mean climatic state. These regional differences need to be considered to fully understand the sensitivity of the hydrological cycle in the tropical regions.