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Changes in the seasonality of tropical precipitation in response to greenhouse gases.

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When forced with increasing greenhouse gases, all of the CMIP3 models project a delay of the annual cycle of global precipitation and SST.

First, we present evidence that this global shift has important ramifications for the regional monsoon: we focus in particular on the African Sahel, for which the models project a robust delay in the beginning of the rainy season and a longer dry season, but we also document the effect the delay in the tropical Americas and in Asia.

Next, we investigate the mechanisms behind the global delay in SST and rainfall. We hypothesize that changes in tropical precipitation are a consequence of changes in SST, especially in the Tropics, and that the SST changes originate at high latitude. Thus, we investigate the role of changes in sea ice cover in forcing anomalies in the seasonal evolution of extra-tropical surface temperature and the role of atmospheric circulation in communicating the high-latitude signal to the low-latitude ocean and, through that, to tropical precipitation.