



Precipitation-soil moisture coupling in Sub-Saharan Africa on interannual time scale

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The interannual surface soil moisture-precipitation coupling in Sub-Saharan Africa is analysed using two independent observational datasets. We found significant coupling rates in the Sahel region and part of Guinea coast in the Monsoon season, and eastern equatorial Africa during the short rain season (October-November-December, OND).

In boreal summer, the main component of precipitation variability explained by surface soil moisture is a quasi-uniform spatial distribution in western Africa, suggesting that the local effect is not able to separate the Sahel mode from the coastal mode, typical of the total rainfall variance. In OND, the first principal component shows a clear dipolar pattern with centres of action in eastern equatorial Africa and the southern part of the continent, revealing a strong correlation with the NINO₃ time series. Land-atmosphere coupling turns out, in east Africa, to be the local response to the ENSO large-scale teleconnection. Also, its effect persists for several months, with soil moisture that stores the information carried by ENSO and acts as a buffer, prolonging its effect on rainfall over land. Eastern Africa appears to be a region of long “soil moisture memory”, with relevant potential predictability at the seasonal time scale.