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The teleconnection mechanism between the West African monsoon onset and the Indian monsoon onset: Observations and AGCM nudged simulations

Emmanouil Flaounas (1), Serge Janicot (2), Sophie Bastin (1), Rémy Roca (3), Elsa Mohino (2,4)

(1) UPMC, CNRS, LATMOS, PARIS, France (flaounas@aero.jussieu.fr), (2) LOCEAN/IPSL, IRD, Université Pierre et Marie Curie, Paris, France, (3) LMD/IPSL, CNRS, Université Pierre et Marie Curie, Paris, France, (4) Universidad de Sevilla, Sevilla, Spain

In spring the inland penetration of the West African Monsoon (WAM) is weak and the associated rainband is located over the Guinean coast. Then, within a few days deep convection weakens considerably and the rainband reappears about twenty days after over the Sahel. This is known as the WAM onset and it signalizes the begining of the summer rainy season. The rainband remains over the Sahel until late September, when it gradually migrates to the south.

Over the period 1989-2008 a teleconnection mechanism induced by the Indian monsoon onset is shown to have a significant impact on the WAM onset by performing composite analyses on both observational data sets and atmospheric general circulation model simulations ensembles (performed by the LMDz model) where the model is nudged to observations over the Indian monsoon sector.

The results show that the initiation of convective activity over the Indian subcontinent, north of 15°N, at the time of the Indian monsoon onset results in a westward propagating Rossby wave establishing over North Africa seven to fifteen days after. A back-trajectory analysis shows that during this period, dry air originating from the westerly subtropical jet entrance is driven to subside and move southward over West Africa inhibiting convection there. At the same time, the low-level pressure field over West Africa reinforces the moisture transport inland. After the passage of the wave, the dry air intrusions weaken drastically. Hence, twenty days after the Indian monsoon onset, convection is released over the Sahel where thermodynamic conditions are more favourable. This scenario is very similar in the observations and in the nudged simulations, meaning that the Indian monsoon onset is instrumental in the WAM onset and its predictability at intraseasonal scale.