



## **Land surface in AMMA : Extending ecosystem, energy and water balance studies in space and time is sometimes surprising**

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Land surface processes are recognized as “amplifiers” of the West African monsoon variability, from the daily to the decadal multi-timescale. It has been suggested that land surface changes play a key role in the 1970 to the present dry period.

Surface/atmosphere exchanges have been scrutinized with unprecedented effort during AMMA, by means of a network of instruments sampling the ocean-to-desert latitude transect, aiming at up-scaling the local landscape scale variability to the regional scale in the Benin, Niger and Mali supersites. We will present insights into the short-wave and long wave surface budget, the turbulent fluxes and the controls that vegetation canopies exert on these exchanges, including inter-annual memory effects.

Second, we will present the long term changes that land surface underwent during the 1950-2006 period, based on remote sensing, aerial pictures, and ground base data. These changes reveal that crop area has extended in the Niger and Benin supersites, but not in the Mali supersite. A Sahelian ‘paradox’, showing increased runoff, river flow and elevated water table in the recent dry 30-year period has been identified (Favraut et Leduc, Mahé and col.) and associated to these changes. We will show however that even without extension of cropping area in the Mali site, runoff has increased and turned seasonal ponds into perennial ponds. Moreover, tree cover in the Mali supersite apparently increased from the wet decades in the 50’ to the present dry period, whereas there is a general greening of Sahel from 1980 to the present.

We will discuss these different findings and show how the AMMA experiment may reconcile some of these paradoxal phenomena.