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# An anomalously wet year in Sahel during 2010: Consequences on surface conditions and fluxes.

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Since the late 60s, precipitation recorded in the Sahel region of West-Africa was below the long term mean with the largest negative anomalies in the early 80s. Precipitation has partly recovered since the mid-90s but remained globally below the long term average. Particularly, every year of the last 10 years was in deficit in the Sahel. Such a persistent drought has had important consequences on vegetation cover and resources as revealed by field survey (e.g. Hiernaux et al., 2009) and regional observations made with satellite sensors through the analysis of the Normalized Difference Vegetation Index (e.g. Hermann et al., 2005). Changes in precipitation and therefore on surface conditions (vegetation and soil moisture) have largely affected surface albedo, energy budget and fluxes (e.g Samain et al., 2008; Timouk et al., 2009). Paradoxically, and concomitant to the decrease of rainfall, an evidence was found for a large increase of the extent of surface water in the Sahel (e.g. Gardelle et al., 2010).
In contrast to the previous decade (2000-2009), 2010 was an anomalously wet year in Sahel. Consequences on surface conditions (vegetation, soil moisture), water surfaces and fluxes are illustrated from observations recorded at the northernmost site of the AMMA-CATCH Observatory (14.5 – 17.5°N; 1 – 2 °W) in the Gourma region of Mali. Observations made in 2010 are compared to data recorded during the recent years (e.g the last 25 years for vegetation biomass). Similarly to the large positive precipitation anomaly, observations show extreme in biomass production particularly at the northern edge of the AMMA site located above the Niger River where vegetation consists of short cycle annual herbs and sparsely distributed perennial tussocks. 2010 is characterized by an exceptionally long growing period which allowed a high biomass to be produced at least on sandy soils and rocky erosion surfaces.
In accordance with the high vegetation cover observed at the end of the growing season, the albedo reaches very low values around 0.2 similar to that observed for the 2005 and 2006 seasons which were also characterized by a high vegetation development. As well, energy, water and CO2 fluxes show very high values during the whole rainy season thanks to high soil moisture contents reached during the whole rainy season.
In addition, the total water surface extent within the AMMA super-site near the city of Hombori (15.3°N) is also exceptional and reaches the highest values observed during the last decade.