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Sahelian albedo variability from in situ and MODIS data.

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Sahelian albedo has long been pointed as an important factor of the West African monsoon variability. Changes in ecosytem structure and function as well as and land use changes are potentially associated with changes in albedo. Surprinsingly, few studies have addressed albedo variability with in situ and satellite data on a multi-site multi-year basis, leaving therefore significant uncertainties in the real-world drivers of albedo. In this study, we used albedo from two automatic met stations (2002-2006) to validate MODIS white-sky albedo, and then we analyzed both in situ and MODIS data (2000-2006) over a network of long term ecosystem monitoring in the Gourma (Mali). Short term albedo variability was caused by soil wetness (a rather short 1 day effect poorly related to soil moisture at 5cm depth). Albedo was sensitive to changes in the spectral composition of incident radiation. Such changes are caused by aerosol loadings and water vapour and well traced by the PAR/SW ratio. Bush fire was found to cause a 10 day decrease of albedo, whereas strong winter storms was found to increase albedo over one month. Seasonal variability was due to vegetation growth as well as progressive disappearance of straw/litter in the dry season. Grazing was found to increase albedo after peak biomass. Flooding was found to decrease albedo (especially NIR), but seasonally flooded areas are prone to high grazing pressure, which causes albedo to increase rapidly towards bare soil values after soil drying. Since vegetation growth in the sahel is highly variable from one year to the other, green vegetation and straw/litter effects lead to significant inter-annual variability. Dry season albedo was found to reflect the preceeding rain season. Last, albedo variability was analyzed over the Gourma meso-site through EOF. We will present a synthesis of albedo variability in the context of feedbacks between the monsoon system and land surface.