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Influence of dry-season vegetation variability on Sahelian dust during 2002–2015

Laurent Kergoat (1), Francoise Guichard (2), Caroline Pierre (1), and Camille Vassal (1)

(1) CNRS, Geoscience Environnement Toulouse, France (laurent.kergoat@get.omp.eu), (2) CNRS, CNRM, Toulouse, France (francoise.guichard@gmail.com)

North Africa is the largest dust source on Earth. However, the drivers of dust emission interannual variability in this region are still debated. Early studies outlined the role of previous-season rainfall and vegetation growth, while some recent studies emphasize the role of wind variability. Here we use a newly developed estimation of dry-season nonphotosynthetic vegetation cover in the Sahel to address this question. This estimation is based on data from the Moderate Resolution Imaging Spectroradiometer (MODIS) short-wave infrared bands and covers the 2002–2015 period. Firstly, we showed that the annual vegetation growth anomalies caused by variability of rainfall in June–September (rainy season) translate into anomalies of dry vegetation cover that persist throughout the dry season until May, i.e. until the very end of it. Secondly, we showed that these vegetation anomalies explain 43% (50%) of the year-to-year variance in Sahelian-mean dry-season aerosol optical depth (AOD) as derived from MODIS Deep Blue (or AERONET Sun photometers). Similar explained variance is found with 10 m wind speed and dust uplift potential from the ECMWF. Wind and dry-season vegetation anomalies are not correlated and are further combined in a linear two-variable model. The central Sahel proves more important than the western Sahel for dry-season AOD variability, but no relationship to Land Use was found. Dry-season vegetation, for which we now have large-scale observations, is being implemented in models.