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Cloud occurrence and humidity flux over West Sahara in summer and associated anomalies in regional and large scale circulation

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West Sahara region is a deserted and mountainous area dynamically connected to the Atlantic to the west, the Mediterranean to the north, and West Africa to the south. In boreal summer, desert surface heating leads to the development of a near surface thermal low pressure, called the Saharan Heat Low (SHL), which contrasts an anticyclonic circulation in the mid troposphere. The SHL activity is connected with the West African Monsoon and the Mid-latitude circulation, with a prominent role of dust concentration and water vapour transport in modulating its variability. In this context, the role of clouds over West Sahara still remains to be investigated. In this study, we focus on two questions: Which are the main characteristics of cloud cover over West Sahara? Is the occurrence of clouds accompanied by changes in the humidity fluxes over the region and the mean regional and large scale dynamical features? To characterize cloud cover over West Sahara, we use the multi-spectral capabilities of the Spinning Enhanced Visible and Infrared Imager (SEVIRI) on board the Meteosat Second Generation (MSG) geostationary satellite, with a resolution of 3km2 (1km2 for the High Resolution Visible channel) and 15' repeat cycle, which allow large improvements in cloud detection and cloud property retrieval compared to the first generation Meteosat satellite period. Moreover, the retrieval method developed in the frame of SAFNWC (Satellite Application Facility for Now Casting) gives access to observations of cloud type occurrence. We used these observations to determine the occurrence frequency of clouds and their vertical distribution over central West Sahara and Hoggar mountains for summer months (June to September) in the 2008-2014 period. We document the variability of cloud occurrence at diurnal, daily, intra-seasonal and inter-annual scale. From daily frequencies of cloud occurrence, cloudy and non-cloudy days are selected. For the two regions, ERAI reanalysis are used to quantify the differences in the humidity budget between cloudy and non-cloudy days. From vertical profiles of horizontal and vertical winds and humidity along meridional and zonal transects, the changes in regional and large scale circulation associated with humidity fluxes and cloud occurrence are discussed.