



Observed characteristics of low-level clouds in the nocturnal boundary layer over southern West Africa

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During the West African monsoon season low-level stratiform clouds frequently form in the boundary layer over the southern West African continent during the night and persist long into the following day. These clouds cover a large area and affect the surface radiation budget and thus the regional climate. While the existence of the clouds is well documented from satellite images, little is known about the processes controlling their evolution, maintenance and dissipation. Processes spanning all scales from the microscale to the synoptic scale are expected to be relevant. These include depth and strength of the monsoon flow, horizontal advection of cool maritime air from the coast in the monsoon layer, formation of a nocturnal low-level jet and shear-related turbulent mixing. As hardly any high-quality comprehensive observations exist in this area, a large 7-week-long field campaign was conducted in summer 2016 within the framework of the Dynamics-aerosol-chemistry-cloud interactions in West Africa (DACCIWA) project. Besides comprehensive continuous remote sensing and in situ measurements, 15 Intensive observation periods (IOPs) were conducted at a supersite near Save in Benin. During IOPs radiosondes were launched in intervals of 1-1.5 h from the late afternoon until noon the following day. We characterised all IOPs with respect to low-level cloud characteristics as well as dynamic and thermodynamic conditions in the monsoon layer. Out of the 15 IOPs we chose 4 IOPs with different low-level cloud characteristics for a more detailed analysis taking into account the spatio-temporal distribution of low-level clouds from satellite images.