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Documentation of cloud characteristics inferred from ground and satellite measurements within West Africa

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Clouds have a major impact on the redistribution of water within the atmosphere and on ground radiation budget. The occurrence of type of clouds in West Africa has only be little documented and quantified. The ARM mobile facility, including vertically pointing 94GHz Doppler radar, micropulse lidar, ceilometer and flux measurements, was implemented in April 2006 at Niamey (Niger), allowing to document for six entire months the characteristics of clouds. Independently, CloudSat and Calipso, launched in April 2006, sample clouds from above using the same instrumentation (Cloud Profiling Radar and CALIOP) passing over West Africa every day around 0200LT (night and day).

A survey of cloud characteristics inferred from ground and satellite measurements is presented focusing on the seasonal evolution and the diurnal cycle of cloud occurrence. In particular, four types of clouds are distinguished: high-level clouds (cirrus or anvils), deep convective clouds, shallow convective clouds and mid-level clouds. This study highlights the frequent occurrence of these latter clouds located at the top of the Saharan Air Layer. High-level clouds are ubiquitous throughout the period whereas shallow convective clouds are mainly present during the core of the monsoon. A particular attention is given to possible instrumental bias as the same statistics may be retrieved independently from each instrument (lidar or radar) or by using the lidar-radar synergy. Combining information from ground and satellite platforms enables to tackle the question of the temporal representativeness of the latitudinal transect sampled twice a day by the satellite. On the other hand, satellite sampling provides the latitudinal variations of these characteristics and enables to place ARM local observations in a larger framework.