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Climatology of convective activity, water vapour and longwave radiation over Africa in summer 2006

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We analyse convective activity and its effect on upper troposheric water vapour (UTH) and outgoing longwave radiation (OLR) over Africa in June 2006. Convective activity and UTH are retrieved from observations of the Spinning Enhanced Visible and Infrared Imager (SEVIRI) while OLR is determined from measurements of the Global Earth Radiation Budget (GERB) instrument. Both instruments are onboard Meteosat-8 and perform coordinated observations. A Eulerian and a Lagrangian approach are utilised to investigate convective activity: In the Eulerian approach frequency of occurrence, average values of brightness temperatures (BT), "warm water vapour pixels" (WWV, defined as the difference between BT at 6.2 microns and BT at 10.8 microns) and related diurnal cycles are calculated on pixel basis. For the Lagrangian approach we use a stand-alone and fast algorithm that tracks convective cells which are defined by connected areas with BT$<$230 K (BT at 10.8 microns). The Lagrangian approach allows the identification of merging and splitting events and the estimation of growth rates and temperature gradients of convective cells. Merging and splitting events occur frequently (40-50%) and contribute largely to the cold cloud cover (BT$<$230 K). We present the climatology of the diurnal cycle of convection of non-merged and non-splitted cells: It starts with strong BT gradients (initiation) at around 13:30 LST, shows large correlation between BT and WWV and stops with the dissolving stage (decreasing cold cloud cover) at around 18:30 LST. The diurnal cycles, determined with the Eulerian and the Lagrangian approach, are in close agreement. We find a high spatial correlation between convective activity and orography. However, the correlation decreases with increasing strength of convection, i.e. defined by the minimum BT of cloud tops. Finally, we compare spatial distributions of convective activity, UTH and OLR and analyse their temporal evolution with a Fourier analysis applied on pixel basis.