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Observations of Diurnal Cycles in West Africa during the AMMA field campaign

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West Africa is a major continental region in the Tropics where the diurnal cycle is an important mode of variability. Indeed, during the monsoon season, the diurnal modulation of the atmospheric low levels play a key role on the monsoon circulation as well as the development of deep convection.

AMMA (African Monsoon Multi-disciplinary Analysis) campaign provided a rich set of measurements (i.e. turbulent and radiative fluxes, high frequency radiosoundings) carried out simultaneously at different sites along a meridional transect going from the Guinean Coast to the Northern Sahel and hence, sampling very contrasted atmospheric regimes.

This study takes advantage of these measurements to document and characterise the climatology of the different diurnal cycles along the West African meridional transect. The nocturnal and daytime convective boundary layers are studied via diagnostics of boundary-layer heights and mean properties like wind, humidity, potential temperature. The results show and quantify contrasted diurnal cycles along the meridional transect and also as the season changes. It reveals surprisingly well-mixed nocturnal boundary layers at Agadez and Niamey prior to the monsoon onset. The links between vertical structures and low-level properties are investigated as well as the surface, atmosphere and cloud interactions. These results highlight the different diurnal cycle regimes encountered over West Africa under dry, moist and wet conditions.