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Diurnal cycle and seasonal evolution of the West African monsoon in the southern coastal region

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The representation of the diurnal cycle is an identified problem for the West African Monsoon forecasts, in particular for the intraseasonal variability : models are known for their poor representation of clouds, which has a strong impact on solar radiation and surface energy balance, and therefore on the diurnal cycle in the atmospheric boundary layer. Since the latter is connected to the triggering of convection, this flaw leads to an unrealistic representation of humidity gradient between the Gulf of Guinea and the Sahel, moisture transport and precipitation. In this study, the Guinean Coastal Rainfall is analysed from the end of the oceanic phase until the beginning of the Sahelian phase of the monsoon in 2008-2015, with reanalyses (ECMWF ERA5) and satellite observations for clouds (MSG), precipitation (TRMM B42) and surface wind (ASCAT). The sea breeze / land breeze alternation and its connection with the low-level wind divergence and surface temperature gradient were found to strongly dominate the diurnal signal. Reanalyses and observations were then compared to better understand the poor representation of precipitation in the model.