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Impact of Mesoscale Convective Systems on GPS measurements in West Africa : statistical analysis of phase residuals

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Six permanent GPS stations have been deployed in West Africa within the framework of the African Monsoon Multidisciplinary Analysis (AMMA) project in order to monitor precipitable water vapor (PWV) estimates. This quantity turns out to be relevant for computing water budgets to study atmospheric processes associated with the monsoon precipitations. 90% of annual rainfalls in Sahel are produced by Mesoscale Convective Systems (MCSs). During these extreme meteorological conditions, the residuals of GPS phase measurements show strong variations that are spatially and temporally correlated with the passages of the MCSs. Using in-situ observations of pressure, temperature and humidity, brightness temperatures from Meteosat and measurements of reflectivity from MIT C-band Doppler radar, we analysed the cases of MCS over Niamey (Niger) during the whole rainy season of 2006. We found some signals in GPS phase residuals in connection with the structure of MCS. These signals could be used to better understand and classify these extreme meteorological events.