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The influence of urban emissions on cloud condensation nuclei properties over West Africa

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Southern West Africa (SWA) is a region highly vulnerable to climate change. Emissions of anthropogenic pollution have increased substantially over the past decades in the region and are projected to keep increasing. These aerosols have the potential to act as cloud condensation nuclei (CCN), thereby impacting cloud development, cloud microphysics and precipitation. Precise quantification of the CCN number concentration is crucial for understanding aerosol indirect effects in the region and characterizing these effects in models.
In this work, we present a set of observations of aerosol and CCN properties over southern West Africa (SWA) in the framework of the Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa (DACCIWA) project. An unprecedented field campaign took place in summer 2016 in West Africa. The ATR-42 research aircraft operated by SAFIRE performed twenty flights to sample the local air pollution from maritime traffic and coastal megacities, as well as regional pollution from biomass burning and desert dust. The aircraft was equipped with state of the art in situ instrumentation to measure vertical distributions of CCN and particle number concentrations, size distribution and chemical composition simultaneously. An evaluation of various methods for CCN parameterization for use in models is carried out based on these situ measurements.