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Long-term observations of aerosol and cloud condensation nuclei concentrations in Barbados

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Long-term observation of atmospheric aerosol and cloud condensation nuclei (CCN) concentrations has been conducted at the Ragged Point site in Barbados since August 2016. Ragged Point is a well-established station to monitor the transatlantic transport of Saharan dust outbreaks [1]. In the absence of dust plumes, it represents an ideal site to analyze the maritime boundary layer aerosol that is transported with the trade winds over the Atlantic towards Barbados [2,3]. Broad aerosol size distribution (10 nm to 10 μm) as well as size-resolved CCN measurements at 10 different supersaturations from 0.05 % to 0.84 % have been conducted. The continuous online analyses are supplemented by intensive sampling periods to probe specific aerosol properties with various offline techniques (i.e. microscopy and spectroscopy).

Aerosol key properties from our measurements are compared with the continuous and in depth observation of cloud properties at Deebles Point, which is in close neighborhood to the Ragged Point site [2]. Moreover, our activities have been synchronized with the HALO-NARVAL-2 aircraft campaign in August 2016 that added further detailed information on shallow cumulus clouds, which are characteristic for the Atlantic trade winds and represent a crucial factor in the Earth climate system.

Our measurements have the following two focal points: (i) We aim to obtain a detailed CCN climatology for the alternation of maritime and dust-impacted episodes at this unique coastal location. This study will complement our recent in-depth analysis for the long-term CCN variability at a remote rain forest location [4]. (ii) Furthermore, we aim to collect detailed information on the role of different aerosol populations on the properties of the climatically important shallow cumulus clouds.

References:
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