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An investigation of fog and low cloud life cycles and their interaction with biomass burning aerosols in the Namib

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In this contribution, a statistical model and several satellite products (SEVIRI, CALIPSO) are used to study the potential semi-direct effects of biomass burning aerosols (BBA) on the persistence of fog and low clouds (FLC) in the Namib during the biomass burning season.

Fog, which is the most relevant non-rainfall water source for plants and animals in the coastal parts of the Namib Desert, may become increasingly important for local ecosystems as regional climate simulations predict a warmer and drier climate for southern Africa in the future. Previous studies showed the role of BBA on cloud development over the ocean off the Namibian coast. The same processes are likely to influence Namib-region FLC formation and persistence as well. However, the potential effects of aerosols on FLC in the Namib Desert have yet to be investigated.

Using reanalysis products in combination with satellite data, a statistical model is built to predict FLC dissipation times in high and low BBA loading days. It is found that during this season, FLC dissipation times are positively correlated to BBA loading (higher aerosol loading coinciding with later FLC dissipation). By analyzing the contribution of the different predictors to the output of the statistical model, it is found that the positive correlation is mostly explained by the synoptic scale meteorology. Nevertheless, the synoptic scale circulation and aerosol loading are highly correlated in the region, thus some of the results could still be attributed to aerosol semi-direct effects. To definitively contrast aerosol effects from meteorology, modeling of aerosol-cloud interactions in the region could be promising.