Understanding Fog in a Coastal Desert: The Namib Fog Life Cycle Analysis (NaFoLiCA) Project

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This contribution introduces insights gained on fog in a coastal desert obtained from a combination of in-situ observations, satellite observations and numerical modeling.

The Namib desert is one of the driest regions on Earth. Fog is suspected to play an important role in the hydrological cycle of the area. However, existing observations are sparse in space and time, and address only selected aspects of fog. The Namib Fog Life Cycle Analysis (NaFoLiCA project) is a three-year coordinated effort to improve the understanding of fog in the region, with a particular focus on the life cycle of fog. In particular, the aim is to understand how, when and by what pathways fog develops, what its properties are, and how, when and where it dissipates.

An Intensive Observation Period (IOP) took place in September 2017, during which we were able to comprehensively characterize several fog events with respect to their duration, extent, radiative effects, vertical stratification and water deposition. The systematic analysis of these individual cases helps us understand processes occuring in Namib fog. This in turn, is a requirement for the improvement of numerical weather prediction models in the region. The PAFOG fog model is being integrated into the COSMO weather model to adequately represent fog conditions in the region. This effort profits from the intensive observations for evaluation, but also from the process insights gained. The spatial extent of fog modeled is in turn compared to satellite observation. With a newly developed 24-hour robust fog detection algorithm on geostationary satellite data, we have been able to track the development of fog events, but also to study its climatological patterns, and relate them to the atmospheric dynamics of the wider region.

Results from all parts of the project, and how they combine to paint a coherent picture of fog in the Namib, are presented in this contribution.