Southeast Atlantic Cloud Properties in a Multivariate Statistical Model - How Relevant is Air Mass History for Local Cloud Properties?

Julia Fuchs, Jan Cermak, and Hendrik Andersen
Karlsruhe Institute of Technology, Germany (julia.fuchs@kit.edu)

This study aims at untangling the impacts of external dynamics and local conditions on cloud properties in the Southeast Atlantic (SEA) by combining satellite and reanalysis data using multivariate statistics.

The understanding of clouds and their determinants at different scales is important for constraining the Earth's radiative budget, and thus prominent in climate-system research. In this study, SEA stratocumulus cloud properties are observed not only as the result of local environmental conditions but also as affected by external dynamics and spatial origins of air masses entering the study area.

In order to assess to what extent cloud properties are impacted by aerosol concentration, air mass history, and meteorology, a multivariate approach is conducted using satellite observations of aerosol and cloud properties (MODIS, SEVIRI), information on aerosol species composition (MACC) and meteorological context (ERA-Interim reanalysis). To account for the often-neglected but important role of air mass origin, information on air mass history based on HYSPLIT modeling is included in the statistical model. This multivariate approach is intended to lead to a better understanding of the physical processes behind observed stratocumulus cloud properties in the SEA.