Building a Cloud in the South-East Atlantic

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The processes determining cloud formation and dissipation are relevant for estimating the cloud radiative effect on a global scale. This study focuses on four subregions of the atmospherically stable South-East Atlantic to identify relevant mechanisms controlling cloud fraction and cloud droplet effective radius.

The role of specific cloud-relevant determinants is investigated based on a machine learning technique, the gradient boosting regression trees (GBRT), using a combination of MODIS and ERA-Interim reanalysis data. The usage of GBRT allows to analyze potential dependencies between important drivers with respect to the predictand. To account for the role of air mass origin, information on air mass history based on HYSPLIT modeling is included in the statistical model.

Results show that large-scale dynamics and aerosols are more important for changes of cloud droplet effective radius in the southwestern than in the northeastern subregion. This multivariate approach is intended to lead to a better understanding of the physical processes observed in the South-East Atlantic on a subregional scale accounting for meteorology and aerosols at the same time.