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## **ROTOR - Constraining the role of warm rain processes for cloud amount and cloud organization in the trades**

*Thursday 20 March 2025 16:45 (15 minutes)*

Warm rain processes like rain evaporation, downdrafts, and cold pools play an important but poorly understood role in controlling cloud amount and organization in the trade-wind regions. Evaporatively-driven cold pools both enhance cloudiness by triggering arcs of new clouds at the gust front, and reduce cloudiness inside the cloud arcs by suppressing surface-forced convection. Likewise, cold pools were shown to both organize and disorganize shallow convection in high-resolution modelling studies. Unfortunately, we don't know which of the contrasting effects of cold pools on cloud amount and organization dominates. Here we argue that these knowledge gaps are tightly linked to a lack of robust longterm rain process observations and the fact that we don't know if state-of-the art models with their crude microphysical parameterizations have skill in simulating the rain processes.

In the ERC starting grant project ROTOR (Rain and cloud Organization in the Trades using ObseRvations and models) we aim to overcome these problems by (1) creating a multi-year dataset of rain evaporation, downdrafts and cold pools by applying new remote sensing techniques to observations from the Barbados Cloud Observatory and the EUREC4A and ORCESTRA field campaigns, and (2) by performing & evaluating large-eddy simulations on O(100 km) domains using Lagrangian Superdroplet microphysics. In this talk, we present our strategy and discuss initial results of the role of microphysical complexity in controlling rain evaporation rates in an observationally-constrained 1D rainshaft model.

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**Session**

Enhancing Process Understanding: New observations for modeling and parameterization development

**Preferred Contribution Type**

Oral Presentation

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