

Characterization of patterns of maritime shallow convection

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Uncertainty in the response of clouds to warming is the leading source of uncertainty in projections of future warming. To a large fraction the frequently occurring shallow cumulus clouds in the trade wind region contribute to this uncertainty. In symbiosis with thin clouds of stratiform extent they often create various cloud patterns.

These cloud patterns are detected with a neural network, that is applied to polarorbiting and geostationary satellite imagery to put eight years of ground-based measurements of the Barbados Cloud Observatory into the context of mesoscale organization. Further, it allows us to identify the mesoscale organization globally and connect their appearance with the atmospheric environmental conditions.

By using back-trajectories data, we show that the environmental conditions are not only distinguishable at the time of pronounced mesoscale organization, but already days ahead in atmospheric stability, wind speed and sea-surface temperature.

Author: SCHULZ, Hauke (Max Planck Institute for Meteorology)

Co-authors: Mr EASTMAN, Ryan (University of Washington); RASP, Stephan (Technical University of Munich); STEVENS, Bjorn (Max Planck Institute for Meteorology)

Presenter: SCHULZ, Hauke (Max Planck Institute for Meteorology)

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