

## The role of upper-level subtropical troughs in early season rainfall in Namibia

Except at the hyper-arid coast, southernmost Namibia (austral winter rains), and the Caprivi strip (earlier onset), the rainy season in Namibia usually starts in early November. However, first rainy spells, especially over the central plateaus and mountains, are observed several weeks before the onset, like in October 2025. The latter month is a good example in that the rains were apparently related to the arrival of upper-level subtropical troughs from the west that, as it is hypothesized here, (a) provided the lifting and (b) temporarily enhanced westerly moisture transport from the Indian Ocean towards Namibia. Surprisingly, little is known from previous studies on the climatological role of these upper-level troughs (can also be cut-offs) for early season rains (leading to a potentially a false rainy season onset) and also for the rainy season onset.

In the Master thesis, existing software (to be amended) will be applied to identify the troughs and cut-offs. They shall be related to rainfall patterns from station data and satellite rainfall estimates. Furthermore, dynamical precursors of these upper-level features in the upstream mid-latitudes over the Atlantic Ocean will be sought. A final major aspect is to explain how the upper-level troughs can trigger the thundery rainfall by looking at moisture transports, omega-forcing, and vertical stability.

The thesis is embedded into the Co-HYDIM-SA project (<https://cohydinsa.imk-tro.kit.edu>) and the results have the potential for getting published.

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