

## **Ship-based observations of clouds and precipitation in the trades and their link to mesoscale patterns using AI approach**

During the EUREC4A campaign, a synergy of ship-based remote sensing instruments deployed onboard the research vessel (RV) Maria S. Merian collected high-resolution observations of clouds, precipitation, and atmospheric boundary layer (ABL).

In this work, we exploit ship-based observations to statistically characterize clouds and precipitation properties by looking at specific observables collected during the campaign. We derive the W-band radar moments statistics (CFADs), the rain rate, and virga reflectivity profiles. We investigate temperature and humidity patterns in the ABL during rain and virga conditions. We also display the relation between the W-band radar reflectivity and the radar skewness, revealing insights into the precipitation onset.

We then connect the ship-based observations to recent machine learning (ML) self-supervised approaches used to analyze the cloud organization in the trades. With ship-based observations, we aim to describe the transition phase from one mesoscale organization to another, as identified in the multidimensional space of output provided by the ML computational model.