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Comparison between airborne remote sensing observations of an extratropical cyclone and short-term forecasts using a hierarchy of models.

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The main goal of the study is to analyze the representation of the Stalactite Cyclone (29 September-2 October 2016) in a hierarchy of models (mesoscale NWP model, global NWP model, climate models). The Stalactite Cyclone is an extratropical cyclone that has been intensively observed during the international field campaign NAWDEX. Its later stage of development is associated with the onset of a low-predictable European block event. Short-term forecasts of all the models are compared with observations made with the RALI platform on board the SAFIRE Falcon. The RALI platform is composed of a Doppler radar RASTA and a three-wavelength backscatter lidar LNG. Two flights of the SAFIRE Falcon have been performed in the ascending and outflow regions of the warm conveyor belt of the cyclone. The comparison between the observations and the model outputs mainly relies on the horizontal wind speed derived from the Doppler radar RASTA, the radar reflectivity and the ice water content retrieved from the RALI observations. The aim of all these observations is to provide indirect information about the diabatic heating rates along the warm conveyor belt and their impact on the dynamics through modification of potential vorticity. The ability of the models to accurately represent the diabatic heating rates, the potential vorticity and the wind within the Stalactite Cyclone and its downstream influence on the blocking formation is assessed.

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