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The role of desert dust in the development of the Tropical Storm Rose

Guillaume Feger, Thibaut Dauhut, and Jean-Pierre Chaboureau
Laboratoire d'Aérologie, Université de Toulouse, CNRS, UPS, Toulouse, France

Tropical storms, especially when they develop into hurricanes, are among the most destructive natural disasters. They are the subject of numerous studies, in particular to better understand their dynamics on meteorological scales in order to better predict them and reduce their impacts. We have been able to understand the role of African easterly waves in the formation of tropical storms in the Cape Verde region. However, the role of desert dust originating from the Sahara remains poorly understood due to their multiple and antagonistic effects in stabilizing the atmosphere by heating and reinvigorating convection through cloud icing as well as the lack of observation and limited simulation capabilities.

The CADDIWA (Clouds-Atmospheric Dynamics-Dust Interactions in West Africa) project aims to better understand the effects of desert dust on the atmospheric circulation off Senegal. The CADDIWA airborne campaign, took place from September 5 to 23, 2021 operating the SAFIRE Falcon 20 in the tropical environment of the Cape Verde Islands. During the campaign, the tropical storm Rose was observed on September 18 and 19, 2021. The goal of this PhD project is to exploit current very high resolution modeling capabilities combined with new observations to understand the dynamical and microphysical processes responsible for the development of Tropical Storm Rose. The first results of a large-eddy simulation of Tropical Storm Rose will be presented as well as its evaluation by comparison with available airborne and satellite observations.