

Synoptic factors affecting the structural evolution and predictability of Hurricane Alex (2016) in the midlatitudes

Juan Jesús González-Alemán (1), Jenni L. Evans (2) and Alex M. Kowaleski (2)

(1) Environmental Sciences Institute, University of Castilla-La Mancha

*(2) Department of Meteorology and Atmospheric Science,
The Pennsylvania State University, University Park PA*

In January 2016, an extratropical low-pressure system that formed over the western North Atlantic underwent tropical transition after moving to the eastern North Atlantic. The cyclone then became Hurricane Alex, an extremely rare hurricane event and the first Atlantic hurricane to form in January since 1938. Alex subsequently underwent extratropical transition (ET) just north of the Azores Islands.

We examine herein the factors affecting Alex's structural evolution and the predictability of that evolution. Fifty-one ensemble members from the European Centre for Medium-Range Weather Forecasts Ensemble Prediction System (ECMWF-EPS) are clustered using a regression mixture model, based on the storm's trajectory through Cyclone Phase Space. This clustering provides various possible scenarios of structural development of Alex. Using composite maps constructed from these clusters, we investigate the role of the synoptic scale on the evolving structure of Hurricane Alex as it interacted with the midlatitude flow. It can be inferred from the analysis that the behavior of a large extratropical cyclone and its associated cold front upstream of Alex was the crucial factor affecting the evolution of Alex. This methodology also provides an improved analysis of the ensemble forecast variability, and therefore could help forecasters to analyze the predictability of future complex tropical-midlatitude interactions.