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Formation of Cyprus Lows within Red-Sea Trough

Adi Etkin¹, Baruch Ziv², Hadas Saaroni¹, and Tzvi Harpaz²

¹Porter School of the Environment, Tel Aviv University, Tel Aviv, Israel (adietkin13@gmail.com; saaroni@tauex.tau.ac.il)

²Department of Natural Sciences, The Open University of Israel, Raanana, Israel (zivbaruchana@gmail.com; hatzvika@outlook.com)

The Red-Sea Trough (RST) is a lower-level trough extending from the tropical low-pressure to the Levant. Its annual occurrence is 20%, between October and May, producing mostly dry weather, but occasionally active and causing local showers and floods. During winter the dominant synoptic system over the Levant is the Cyprus low (CL). Previous studies showed that some CLs form within pre-existing RSTs, through a tropical-extratropical interaction.

This study is the first comprehensive climatological framework of such formation events, analyzing occurrence, seasonality and the resulting rainfall in Israel. The study looked at events of new CLs formed within the domain 31°-35°N, 30°-36°E while a RST was detected within 24 hours before the event. We used the 6-hourly ERA-Interim database, with 0.75°×0.75° resolution, during 1979-2017, and identified 104 formation events, which constitute 10% of the CLs. Most events occurred during fall and early winter, as the case for the RST. Eighty-four percent of them formed during the evening or the night, and almost two thirds of the CLs disappeared temporarily at noon and regenerated afterwards. This is attributed to the sea/land diurnal oscillation. Most of the CLs that formed were found shallow with little rain, but occasionally became major storms, like "Alexa", which caused extreme snowing in Jerusalem, in December 2013.

The evolution scenarios leading to formation events were divided into four clusters, according to the synoptic situation at the 500-hPa geopotential height. The first one is characterized by a closed cyclone approaching from the southwest, often connected to active RSTs, such as the event that occurred in 2-4 November 1994. In the second, a trough is deepening from the northern sector, possibly a polar intrusion, like the "Alexa" storm. In the third, the most populated cluster, a trough is approaching from the west. A separate cluster contains four events with no upper-level support.