The Role of East-Mediterranean Synoptic Systems in Controlling the Rainfall in Israel

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The inter-annual variations and the spatial distribution of the rainfall in Israel are analyzed with respect to the variations in the occurrence of the synoptic types of the Eastern Mediterranean. The synoptic analysis is based on the daily, semi-objective synoptic classification (Alpert et al., 2004). The study covers the months November-March, in which 90% of the annual rainfall, mostly resulting from Cyprus Lows, is obtained. The study area covers the northern half of the country, having Mediterranean and semi-arid climate (Cs and BS, according to Köppen classification), down to the 300 mm isohyet and excludes the arid southern half.

It was found that the inter-annual variation of the rainfall is highly correlated with the number of days in which Cyprus Low prevails. The correlation varies around +0.7 and decreases toward the south, dropping to +0.55 in the semi-arid part. Similar analysis, including only the deep lows, shows the same spatial trend, but the north - south gradient is considerably sharper.

The location of the cyclone relative to Israel and its depth determine the spatial distribution of the rain it produces. The cyclones located east of the country were found productive mainly in the south part of the study region, while those located to the west and north of Israel - to the northern part of the country. This is explained by the differences in the moisture transport.

A deep low was found to produce considerably more daily rainfall, especially in the mountain regions. The latter may be explained by the stronger winds it causes, which enhance the orographic effect.

In spite of the drying trend that has been observed in the central and western Mediterranean, no significant trend was found in the annual rainfall in Israel. This can be explained by the absence of a significant trend in the occurrence of Cyprus Lows.