

Dust over the Eastern Mediterranean and its relation to synoptic-scale circulations

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The Middle East deserts and among them the northern Negev desert margin are subjected often to dust, which reduces horizontal visibility to 5 km, and sometimes even to < 1 km. The present study examines the annual and interannual occurrences of dust events based on 37 years of 3-hours visibility observations from Hazerim (Beer Sheva) highly correlated with Total Suspended Particulates (TSP). The visibility data was converted to TSP, using concurrent data for 3 years from Hazerim. We then analyze visibility/TSP linkage to synoptic- and to global-scale weather systems.

The monthly data indicate that the dust season starts at October and ends in May, with a maximum in March. More than 85% of the total annual dust is recorded between December and May, the 'high dust season'. The annual totals vary considerably from year to year (between $2,500 \mu\text{m}^{-3}$ in 1990/91 and $31,500 \mu\text{m}^{-3}$ in 1968/69).

The synoptic system that produces the majority of the dust over the northern Negev is the Cyprus Low, contributing 2/3 of both the total yearly TSP and of the number of dust observations. This suggests that a positive relationship exists between the dust in the Negev and rainfall in north Israel, both of which are generated by Cyprus Lows. Indeed, a significant (at 0.05 level) correlation of +0.28 was found between the two. Correlation maps evidence that in dust-rich years the cyclonic activity along the entire Mediterranean is abnormally high and that the reverse holds for poor-dust years. A highly significant negative correlation (-0.66) was found between TSP and the intensity of the North Atlantic Oscillation (NAO), which modulates the cyclonic activity over Europe and the northern Mediterranean. This may also imply that the dust accumulated as loess in the northern Negev may indicate such past climatic condition over Europe, North Africa, and the Mediterranean.