The role of the synoptic conditions in the NOx pollution over the metropolitan area of Tel-Aviv, Israel

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Abstract

This study evaluates the role of the synoptic conditions in NOx pollution in the metropolitan area of Tel-Aviv, Israel. The analysis is based on 7 monitoring stations, for 1998-2004, using the synoptic classification of Alpert et al. (2004). In 19% of the days the NOx concentration exceeded the Israeli standard at least in one station, 85% of them in the winter months. The Red-Sea trough is the synoptic system that contributed 51% of the exceeding days, while highs, although being more frequent, contributed only 35%. The 'pollution potential', defined as the probability of exceedence under a certain synoptic system, was the highest for the Red Sea Trough, though being cyclonic. A significant negative trend, of 10%/year, in the occurrence of exceeding days is explained by a decrease in the occurrence of synoptic systems having high pollution potential. Pollution events are associated with above normal temperatures, stable atmospheric conditions and weak offshore flow, while the immediate coastal region is subject to a daytime sea breeze. The marine cool air produces inversion which enhances the pollution potential over the coastal region, including Tel-Aviv. Our study shows that the importance of the synoptic background is in the meso-scale conditions it induces.