

TRANSBOUNDARY TRANSPORT OF PHOTOCHEMICAL AIR POLLUTANTS BETWEEN ISRAEL AND ITS NEIGHBORS

D. Pedersen, E. Tas, E. Weinroth, V. Matveev, M. Peleg, M. Luria

Institute of Earth Sciences, Hebrew University of Jerusalem, Jerusalem, Israel

Photochemical air pollutants are a regional problem with detrimental effects on quality of life and public health. These pollutants were measured in gaseous and particulate phases during 2003 at rural sites in the north and center of Israel and at a background site in southern Israel. Research objectives were to establish baselines for photochemical species on the eastern shore of the Mediterranean, to evaluate the relative importance of local, regional, and distant emission sources, and to quantify the transboundary transport of pollutants in the region. Special attention was paid to the measurement of NO₂ by Differential Optical Absorbance Spectroscopy (DOAS), yielding accurate measurements of NO_x. Three major influences on the air quality of the region were identified: (1) long range transport of pollutants, primarily from central Europe and Northern Africa, (2) local emission sources within Israel including transportation and industry, and (3) under certain circumstances, emission sources in Israel, which were transported west over the Mediterranean and then transported back onshore a few days later. The central site exhibited higher concentrations of nitrogen oxides and the influence of the Tel Aviv metropolitan area, while the northern site exhibited higher concentrations of ozone and sulfur dioxide, indicating the influence of the industrial area in the Haifa bay. The photochemical age of the pollutants (the ratio of NO_z/NO_y) represented well-aged air masses with transport times greater than one day for the majority of the pollution, indicating that local sources contribute only a portion of the pollution transported out of the country.