

Saharan dust over the Eastern Mediterranean in spring 2006: Model sensitivity

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Saharan mineral dust is a significant seasonal atmospheric phenomenon in the Eastern Mediterranean region, which periodically dominates weather conditions in the region. It is one of the main natural air pollutants affecting air quality and human health. A long-range dust transport from the Sahara desert into the Eastern Mediterranean is generated and carried out by intensive cyclones. 3D-dust distributions for such dust events are daily predicted by the Tel Aviv University Weather Research Center and displayed at the web-site: <http://wind.tau.ac.il/dust/dust.html>.

This study is aimed at validating of 3D-dust distributions predicted by dust models. Two different dust prediction systems are used to perform a sensitivity experiment and to compare accuracy of the models. The first one is the original DREAM model with four dust particle size classes: 0.7, 6.1, 18.0 and 38.0 microns. Another model is the modified DREAM with more detailed set of dust particle size classes between 0.1 and 10 microns (0.15, 0.25, 0.45, 0.78, 1.3, 2.2, 3.8, and 7.1 microns), which are mainly responsible for the long-range dust transport. A comparison of routine model-based forecasts of dust fields against PM10 and AERONET measurements is made in order to better understand the model's capabilities for providing reliable dust forecasts. Provided by the Israeli Ministry of Environment, the PM10 measurements for three different sites in Israel (Beer-Sheva (34.8N, 31.4E), Tel-Aviv University (34.8N, 32.1E) and Carmiel (35.3N, 32.9E)) are used for model validation. The period under investigation is that of maximum dust activity in the Eastern Mediterranean, from February to May 2006. In addition, the model-simulated dust vertical distributions are compared with onboard measurements of the top boundary of dust layers, randomly taken by airplanes over Israel and its vicinity.