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Mesoscale modeling of combined aerosol and photo-oxidant processes in the Eastern Mediterranean

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Abstract. Particulate matter and photo-oxidant processes in the Eastern Mediterranean have been studied using the UAM-AERO mesoscale air quality model in conjunction with the NILU-CTM regional model. Meteorological data were obtained from the RAMS prognostic meteorological model. The modeling domain includes the eastern Mediterranean area between the Greek mainland and the island of Crete. The modeling system is applied to study the atmospheric processes in three periods, i.e. 13–16 July 2000, 26–30 July 2000 and 7–14 January 2001. The spatial and temporal distributions of both gaseous and particulate matter pollutants have been extensively studied together with the identification of major emission sources in the area. The modeling results were compared with field data obtained in the same period. The objective of the current modeling work was mainly to apply the UAM-AERO mesoscale model in the eastern Mediterranean in order to assess the performed field campaigns and determine that the applied mesoscale model is fit for this purpose. Comparison of the modeling results with measured data was performed for a number of gaseous and aerosol species. The UAM-AERO model underestimates the PM₁₀ measured concentrations during summer and winter campaigns. Discrepancies between modeled and measured data are attributed to unresolved particulate matter emissions. Particulate matter in the area is mainly composed by sulphate, sea salt and crustal materials, and with significant amounts of nitrate, ammonium and organics. During winter the particulate matter and oxidant concentrations were lower than the summer values.

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