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Role of the NO₃ radicals in oxidation processes in the eastern Mediterranean troposphere during the MINOS campaign

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Abstract. During the MINOS campaign (28 July-18 August 2001) the nitrate (NO₃) radical was measured at Finokalia station, on the north coast of Crete in South-East Europe using a long path (10.4 km) Differential Optical Absorption Spectroscopy instrument (DOAS). Hydroxyl (OH) radical was also measured by a Chemical Ionization Mass-Spectrometer (Berresheim et al., 2003). These datasets represent the first simultaneous measurements of OH and NO₃ radicals in the area. NO₃ radical concentrations ranged from less than 3×10⁷ up to 9×10⁸ radicals·cm⁻³ with an average nighttime value of 1.1×10⁸ radicals·cm⁻³.

The observed NO₃ mixing ratios are analyzed on the basis of the corresponding meteorological data and the volatile organic compound (VOC) observations which were measured simultaneously at Finokalia station. The importance of the NO₃ radical chemistry relatively to that of OH in the dimethylsulfide (DMS) and nitrate cycles is also investigated. The observed NO₃ levels regulate the nighttime variation of DMS. The loss of DMS by NO₃ during night is about 75% of that by OH radical during day. NO₃ and nitrogen pentoxide (N₂O₅) reactions account for about 21% of the total nitrate (HNO_{3(g)}+NO_{3(g)}⁻) production.

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