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## Space-borne measurements of mesospheric magnesium species – a retrieval algorithm and preliminary profiles

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**Abstract.** We present a joint retrieval as well as first results for mesospheric air density and mesospheric Magnesium species (Mg and Mg<sup>+</sup>) using limb data from the SCIAMACHY instrument on board the European ENVISAT satellite. These species feature

Metallic species like neutral Mg, ionized Mg<sup>+</sup> and others (Fe, Si, Li, etc.) ablate from meteoric dust, enter the gas phase and occur at high altitudes (≥70 km). Emissions from these species are clearly observed in the SCIAMACHY limb measurements. These emissions are used to retrieve total and thermospheric column densities as well as preliminary profiles of metallic species in the altitude range of 70–92 km. In this paper, neutral Magnesium as well as its ionized counterpart Mg<sup>+</sup> is considered. These species feature resonance fluorescence in the wavelength range 279 and 285 nm and thus have a rather simple excitation process.

A radiative transfer model (RTM) for the mesosphere has been developed and validated. Based on a ray tracing kernel, radiances in a large wavelength range from 240–300 nm covering limb as well as nadir geometry can be calculated. The forward model has been validated and shows good agreement with established models in the given wavelength range and a large altitude range.

The RTM has been coupled to a retrieval based on Optimal Estimation. Air density is retrieved from Rayleigh backscattered light. Mesospheric Mg and Mg<sup>+</sup> number densities are retrieved from their emission signals observed in the limb scans of SCIAMACHY. Other species like iron, silicon, OH and NO can be investigated in principle with the same algorithm. Based on the retrieval presented here, SCIAMACHY offers the opportunity to investigate mesospheric species on a global scale and with good vertical resolution for the first time.

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