Retrieval of ozone profiles in the Hartley bands from SCIAMACHY limb scatter measurements

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SCIAMACHY limb measurements in the Hartley bands of ozone are used to retrieve ozone concentration profiles at altitudes between 35 and 65 km. The method exploits the absorption of solar radiation at a set of discrete wavelengths. An non-linear Optimal Estimation scheme is used to match measured and modeled radiance profiles. Here the radiative transfer model SCIARAYS is used which is a spherical model considering up to two orders of Rayleigh scattering and analytical derivation of the weighting functions. The retrieval technique as well as sensitivity studies, error statistics, and validation results with HALOE and MIPAS (IMK), are presented. The results show that the retrieval technique provides reliable ozone concentration profiles in the upper stratosphere and lower mesosphere. Furthermore, the global morphology of ozone in the upper stratosphere and lower mesosphere is shown, as well as comprehensive observations of the ozone depletion during the Halloween solar proton storm in October and November 2003.