



Ozone vertical profile retrieval from nadir pointing UV-VIS instruments during ozone hole conditions

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The Dutch-Finnish Ozone Monitoring Instrument (OMI) aboard the NASA EOS-AURA platform measures backscattered Earth radiance in the 270-500 nm wavelength range with global coverage since October 2004. From the measured spectra ozone vertical profiles are derived with a spatial resolution of 13x48 km² in nadir and with a vertical resolution of roughly 6 - 8 km. This performance enables monitoring of intricate details of the global ozone layer. The retrieval method used is Optimal Estimation (Rodgers) using the Labow-McPeters-Logan climatology for the a-priori profile. Initially Gauss-Newton iteration was used which converges in 4-8 iteration steps except for ozone hole conditions where the a-priori profile often differs strongly from the actual profile. Simulations show that Gauss-Newton iteration does converge under ozone hole conditions, but only after 50 - 100 iteration steps, which is unacceptable for operational use. Therefore we use a modified Levenberg-Marquardt method to reach convergence in 4 - 8 iteration steps under ozone hole conditions. This eliminates the need for pre-analysis of the measured radiances and subsequent adjustment of the ozone profile. Results of simulations showing the performance of the modified Levenberg- Marquardt method will be presented as well as ozone vertical profiles derived from OMI measurements retrieved inside the 2005 ozone hole. In addition, we present a first validation by comparisons with profiles obtained from the Microwave Limb Sounder (also aboard AURA), showing very good agreement between the results obtained by these very different satellite remote sensing systems.