Sensibility and Error assessment of aerosol extinction coefficients profile retrieval using multi angle simulated data (MISR configuration)


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Abstract: The aim of this preliminary work is to understand the effectiveness of the aerosol extinction coefficients profile retrieval, considering multi angle imaging satellite. The sensibility analysis is made by means of Optimal Estimation Method. The simulation measurements and analytical weighting functions are determined from a Linearized Discrete Ordinate Radiative Transfer code (LIDORT). The Averaging Kernels are computed for Maritime tropospheric aerosol and for Volcanic stratospheric aerosol. For error assessment analysis the measurement noise and smoothing error are computed. The aerosol extinction coefficient profile retrieval is made using an iterative inversion scheme based on Gauss-Newton method.

FORWARD MODEL

The Forward Model developed is based on LIDORT (Linearized Discrete Ordinate Radiative Transfer) [Sparrow, 2001] model. LIDORT is based on the discrete ordinate approach [Chandrasekhar, 1960] for the solution of the radiative transfer equation. The main characteristic of LIDORT is the ability to generate analytical weighting functions (linearization, denote the process of differentiation) and simulated measurements at the same time with only just one call. It is well known that the traditionally weighting function determination is based on finite difference estimation (see for example SCATHAR, Buche, 1988); this procedure need repeated calls that produce a very expensive computer resource. Another problem is the computation accuracy, due to the arbitrary discretization. LIDORT is based on the discrete ordinate approach [Chandrasekhar, 1940] for the solution of the spherical albedo problem in case of a single scattering medium.

Effect of the Forward Model non-linearity and implementation of Levenberg-Marquardt iterative process.

FUTURE WORKS, INSTRUMENT AND ANALYSIS IMPROVEMENTS

Sensibility study for different aerosol optical classes, considering also absorbing aerosol, and for different aerosol profiles.

Effect of the Forward Model non-linearity and implementation of Levenberg-Marquardt iterative process,

Additional of more wavelengths (see for the IMI spectral region),

Use of O2 A-band.

References


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