Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07889, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07889
EGU General Assembly 2008

A semianalytic Monte Carlo approach to evaluate the lidar signal returns due to aerosol and cloud particles

E. Palazzi (1)

(1) ISAC-CNR, Institute for Atmospheric Sciences and Climate, National Research Council, Italy

The development of techniques for modelling lidar measurements is needed to evaluate the effects of various environmental variables and scenarios as well as of different measurement geometries and instrumental characteristics. A Monte Carlo simulation model can provide an excellent answer to these important requirements.

The LIDES (LIDar Experiment Simulation) code is a semianalytic Monte Carlo radiative transfer model designed for realistic investigations of lidar system measurements in the Earth's atmosphere. In this model, random numbers are used and combined with the general rules of scattering and absorbing processes to simulate the real propagation of photons (i.e. radiation) in the atmosphere.

The contribution to the total radiation received by a lidar system are so carried out taking into account the main components of the atmospheric environment and the laser radiation interaction processes of single/multiple scattering, absorption and ground reflection.

Among the quantities computed by the LIDES code it is useful to mention here the lidar Backscatter Ratio, BR, i.e. the ratio between total and molecular backscatter. BR calculations are especially investigated in this work, which are useful to identify layers of non-molecular scattering.

To enhance the efficiency of the Monte Carlo simulation artificial devices (such as local forced collision and splitting) are foreseen, which can enable the user to drastically reduce the variance of the calculation.

In this work, the LIDES code is described and sample applications (e.g. BR calculations in the presence of volcanic aerosol or cirrus clouds) discussed as examples of its reliability.