Retrieval of cloud optical properties using simple approximations: the SLALOM retrieval

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A new technique relying on SimpLe Approximations for cLOudy Media (SLALOM) for the retrieval of cloud optical and microphysical parameters from optical satellite data during daytime is introduced. The technique is based on simple yet highly accurate approximations of the asymptotic solutions of the radiative transfer theory which have recently been implemented in the forward radiative transfer model CLOUD. These approximations enable a solution of the equations of the corresponding backward model during runtime leading to a very fast computation speed. Since these asymptotic solutions are generally applicable to weakly absorbing media only, pre-calculated look-up tables for the reflection function and plane albedo of a semi-infinite cloud and the escape function are used to overcome this restriction within this new retrieval. SLALOM is capable to retrieve the cloud optical thickness, the effective cloud droplet radius, the liquid and ice water paths as well as the particle absorption length from water and/or ice clouds. A Fortran implementation of both CLOUD and SLALOM is available for download.