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Monthly report / February 2009

WP 3100: Raman scattering

In the previous monthly report it was reported that the absolute magnitude of the Raman scattered radiation was not correct, although the spectral signature looked good. This was caused by an approximation used for the calculation of the state sum Z (see Eq. 10 in the WP2200 report). This relation is now calculated without any approximation and the issue of the absolute magnitude of the Raman scattered radiation has been resolved. This also means that the ratio of the summed Raman scattering cross sections to the Rayleigh scattering cross section which was reported to be a little too low, is now correct. Testing of the Raman option against published results is ongoing. So far, the option has been tested for conservation of photons and several published cloudless sky cases. For cloudy skies there is a problem due to the step function like nature of the cloud together with the assumptions behind the solution of the radiative transfer equation. The solution to the problem is known and remains to be implemented.

Status: ongoing

WP 3200: Polarization in 3D atmosphere

The new code has been compared to benchmark results by Coulson (1960) and an excellent agreement was found. The implementation of the code is now completed (WP 3210).
To compute single scattering properties by aspherical particles we have so far tested two programs, a T-matrix code and a code based on the discrete dipole approximation. Both methods can only be applied for moderate size parameters. In the visible wavelength region they are appropriate for small aerosol particles but not for ice clouds. For ice clouds we need a tool based on the geometrical optics method. So far there is no decision which tools will be put into the libRadtran toolbox (WP 3220).
Single scattering properties for liquid clouds have been generated for a several wavelength using the Mie Code by Wiscombe. The computation of the database is straightforward and will be done within the next weeks (WP 3230).

Status: ongoing

WP 3300: Extension of surface properties

As an additional BRDF, the AMBRALS (**A**lgorithm for **M**odeling **B**idirectional **R**eflectance **A**nisotropies of the **L**and **S**urface; Wanner et al., 1997) has been implemented in libRadtran, to be used with the disort2 and mystic solvers. AMBRALS allows a variety of kernel-driven semiempirical BRDF models (Roujean et al., 1992) to be explored. In particular, the RossThick/LiSparse-R BRDF model is used in the MODIS BRDF product. AMBRALS therefore offers greatly improved possibilities for defining land surface BRDFs. Some more testing is required and even more user-friendly options for defining wavelength-dependent and horizontally inhomogeneous BRDFs.

Status: ongoing

WP 3400: More flexible aerosol handling

Status: closed

WP 3500: Further extensions

The test suite that compares the MYSTIC and the DISORT solver has been extended. So far it covers scalar radiative transfer in a plane-parallel atmosphere. More tests will be included to cover all possible modes (spherical, polarization, ...). This test suite should assure that no errors are included when MYSTIC is extended.

The work on the Graphical User Interface (GUI) is ongoing. The GUI is currently fully functional in the sense that it may be used to create simple input files, run them and plot the output. Further work includes the addition of more input options to the GUI, and to give the GUI a better "look and feel".

The implementation of refraction has not yet started (WP 3530).

Status: ongoing

WP 4100: Verification plan
Updated verification plan for Raman scattering and polarization.

Status: ongoing

WP 4210: Verification against other RT models

Some verification of new algorithms is in progress:
- MYSTIC with polarization against polradtran and DISORT for various atmospheric conditions.
- MYSTIC with polarization against benchmark results by Coulson (1960)

Status: ongoing

WP 5100: Final ATBDs

Writing of final ATBDs in progress.

Status: ongoing