Comparison between two 3D polarized radiative transfer models: MCstar and MYSTIC

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The incoming solar radiation reaching the Earth is partially polarized due to its interaction with atmospheric compounds like gases, aerosols and clouds formed by water droplets and ice crystals. Then, the polarization state of this solar radiation contains valuable information about these compounds. In fact, unpolarized but also polarized sky radiances are usually measured to retrieve aerosol and cloud properties. This task is generally done using a Radiative Transfer Model (RTM) to simulate the measurements under different atmospheric scenarios; the solution is usually the atmospheric scenario that provides the observations closest to the measurements. Therefore, RTMs play an important role in remote sensing of the atmosphere among other fields.

Different RTM exists nowadays, some of them incorporating powerful techniques like the calculation of the polarization state of light, or to solve the radiative transfer under 3D inhomogeneous atmospheres such as under partially cloudy conditions. Under the availability of several models, it is crucial to study their performance with real measurements, but also to develop comparisons between them. In this framework, the International Polarized Radiative Transfer (IPRT) started a model intercomparison project to provide benchmark results for polarized radiative transfer [1,2].

In this work, we aim to continue the mentioned intercomparison using a new 3D polarized RTM: MCstar/OpenCLASTR [3,4] (https://gitlab.com/mshrmm/mcstar). This comparison is done using as reference the MYSTIC/libRadtran 3D RTM [5] and for some of the scenarios proposed in the IPRT intercomparison [1].

References

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