

Simulations in the terahertz band on the plateau by two different radiative transfer models

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A high-resolution dual-band terahertz (THz) radiometer is being designed for measuring vertical distributions of chemical species in the middle atmosphere on the Tibetan Plateau. The forward simulation should be conducted firstly for the development of a matching retrieval algorithm. In the study, two radiative transfer models, ARTS and AM, are used to simulate spectra of water vapor, ozone and carbon monoxide on the plateau based on the spectral design of the THz radiometer. Characteristics of the emission lines of these three gases in this spectral band are demonstrated. Impacts of several different spectral parameter settings on the simulations are evaluated through a series of sensitivity experiments. Reasons for the differences in spectral simulations between two models are analyzed for individual gases, respectively. The study indicates that the ARTS is more suitable to the retrieval algorithm of THz radiometer, and obtains an optimal parameter setting of the ARTS for the three species.