

Using radiative transfer models to study the atmospheric water vapor content and to eliminate telluric lines from high-resolution optical spectra

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Abstract

The Radiative Transfer Model (RTM) and the retrieval algorithm, incorporated in the SCIATRAN 2.2 software package developed at the Institute of Remote Sensing/Institute of Environmental Physics of Bremen University (Germany), allows to simulate, among other things, radiance/irradiance spectra in the 2400–24 000 Å range. In this work we present applications of RTM to two case studies. In the first case the RTM was used to simulate direct solar irradiance spectra, with different water vapor amounts, for the study of the water vapor content in the atmosphere above Sierra Nevada Observatory. Simulated spectra were compared with those measured with a spectrometer operating in the 8000–10 000 Å range. In the second case the RTM was used to generate telluric model spectra to subtract the atmospheric contribution and correct high-resolution stellar spectra from atmospheric water vapor and oxygen lines. The results of both studies are discussed.