

AMS

Development of a CrIS Simulator for Clouds and Dust Aerosols

Shouguo Ding, Ping Yang, Shaima L. Nasiri
Texas A&M University, College Station, Texas

The objective of this study is to develop a Cross-track Infrared Sounder (CrIS) radiance simulator for aerosols and clouds. We have also developed three sets of high spectral bulk scattering models of dust aerosols and ice and water clouds for CrIS. In this study, dust aerosol particles are assumed to be tri-axial ellipsoids and the single scattering properties of ellipsoidal dust-like aerosol is based on an existing database. The single scattering properties of individual ice crystals are based on the latest updated database of various nonspherical ice crystal habits, which include droxtals, hexagonal plates, hexagonal hollow columns and solid columns, three-dimensional bullet rosettes, and several types of aggregates with both smooth surface and severely roughened surface. The single-scattering properties of water droplets are derived from the Lorenz–Mie theory. To validate the simulator, we will compare the simulated brightness temperatures directly with CrIS observations under various weather conditions. We also use this model to study the different IR high spectral radiative properties of dust aerosols, water clouds and ice clouds for future algorithm developments of dust detection and cloud thermodynamic phase determination.