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ENTICE Satellite Orbital Simulator Enhanced with ARTS

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High-altitude clouds play a key role in Earth's weather and climate which is crucial to life on Earth. However, many aspects of high-altitude cloud formation and evolution are not well understood and poorly modelled in climate simulations. Earth's NexT-generation ICE mission (ENTICE) has been proposed to help solve this problem. ENTICE's scientific objective is to advance our fundamental understanding of clouds by identifying how anvil clouds interact and evolve with ambient thermodynamic conditions. Combining a 94 GHz radar and multi-frequency sub-millimeter microwave radiometers, ENTICE would measure diurnally resolved ice water content, vertical profiles of cloud ice particle size, and in-cloud temperature and humidity from space. This in turn will help reduce uncertainties in cloud climate feedback and improve both climate and weather modelling. Building off previous work on the orbital characteristics required to fulfill ENTICE's science goals, this paper attempts to improve the accuracy of past simulations. In this study, the atmospheric radiative transfer simulator (ARTS) software is used to enhance the fidelity of the simulated radar and radiometer retrievals from the previous study. ARTS is a radiative transfer software developed by the University of Hamburg and Chalmer University. The study looks at both a multi frequency radiometer and radar at 94 GHz. The results of these simulations will be used to enhance future satellite missions that study high clouds.