

Water aggregates in the Earth's contemporary and prebiotic atmosphere

Veronica Vaida, University of Colorado, Boulder, CO 80309-0215

Sunlight drives the chemistry of the Earth and determines its temperature and climate. Atmospheric models (GCM) are used to evaluate the various factors which contribute to the Earth's temperature, including factors that make small contributions individually but with important cumulative effects. This presentation will focus on the impact of hydrogen bonded water clusters in radiative transfer.

The intense and extensive absorption of IR and NIR radiation by water in the atmosphere causes the largest contribution to the greenhouse effect. The importance of water in the atmosphere prompts the reexamination of its properties with special attention given to hydrogen bonded complexes (hydrates). Intermolecular interactions such as those responsible for condensation and cluster formation can significantly alter the optical properties and the reactivities of constituent monomers, affecting both atmospheric chemistry and climate. The spectroscopy and photochemistry of molecular hydrates will be discussed in light of recent observations which constrain previous estimates. The fundamental data base required to calculate atmospheric abundances, absorption cross sections and photochemical yields will be reviewed.