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Exploring the temperature profile of Jupiter's deep atmosphere

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Our understanding of the giant planets in our solar system has been significantly advanced by the Juno and Cassini missions. These planets provide us with the unique opportunity to understand the interior structure of giant exoplanets. Recent insight into Jupiter's atmospheric composition indicates a water concentration of 2-7 times solar in the equatorial region, surpassing the subsolar findings of the precursor Galileo mission. In this study, we conduct radiative transfer calculations for Jupiter's deep atmosphere including these enhanced water enrichment results and the presence of condensates predicted by chemical equilibrium models. Our primary focus is to derive a new temperature-pressure profile and assess the existence of potential radiative zones within the deep atmosphere. The presence of a radiative zone can have a profound impact on the internal structure of a planet and thus, a detailed analysis of Jupiter's temperature profile is essential for a comprehensive study of its interior structure.