Deep Plume Interaction with Gas Giant Weather Layers: Preparing for Juno and Cassini Observations

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The weather layers of Jupiter and Saturn receive both solar radiation and heat from the deep interior. Currently, most numerical models fall into two broad categories: Deep, dry and convecting interior models that lack a stably stratified troposphere above, or thin shells that represent only a troposphere, with parameterized heating from the lower boundary. Here we present the results from a new coupled model that allows resolved deep convective plumes to interact with a stable "weather layer". We demonstrate the relative importance of a stable tropospheric lapse rate and the magnitude of bottom heating on the strength and depth of the jets. Studies of this kind will benefit understanding of Jupiter's dynamics, in particular the depth of the cloud-level jets, in advance of Juno's 2016 arrival. Moreover, the difference between Saturn and Jupiter is explored using a parameter sweep of tropospheric stability, which acts as a proxy for tropospheric water abundance.

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