WAVE-INDUCTION MODELS OF EQUATORIAL WINDS ON JUPITER AND SATURN

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We investigate the plausible origin of the equatorial winds in the atmospheres of the outer planets using a general circulation model. The Kelvin-wave induction model of the Jovian equatorial jet was originally proposed by Maxworthy to explain the origin of the super-rotating jet. However, the meridional structure of such jets, which are driven by an equatorially-trapped Kelvin wave, are inevitably Gaussian, and an additional mechanism is thus needed to account for the broad shape of the observed equatorial jets. Previously, we investigated the influence of Hadley-type circulation forced by meridional differential heating to successfully overcome this deficiency. However, there may also be other equally plausible explanations such as the hydrodynamic instability of the induced jet and multiple wave forcing. We discuss some results from new numerical simulations of wave-driven equatorial winds in the light of recent observations such as the temporal variation of the equatorial jets.