

New insight on Jupiter's deep flows using a combination of Juno gravity and magnetic field measurements

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Abstract

The high-precision gravity and magnetic measurements provided by the Juno spacecraft allow new constraints on the deep flow. The gravity measurements provide insight into the depth of the flow via the relation between the density anomalies and the flow fields, and at depth where the electrical conductivity is high, the magnetic measurements can provide constraints as well. In this study, we investigate each of the gravity harmonics separately and show that each harmonic by itself can add boundaries on the wind strength at different depths. Adding magnetic field considerations, allows further constraints on similar depths as some of the gravity harmonics. Specifically, the information from J3 and the magnetic field combined, give upper and lower bounds to the strength of the flow at 0.95RJ. We also present a new method for determining the vertical profile of the zonal flow that fits both the gravity measurements and the expected time-varying magnetic field measurements.