Supporting Information for "Constraining Jupiter's internal flows using Juno magnetic and gravity measurements"

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In this study, we take the background magnetic field to be a dipole. Here we examine the effect of the higher expected moments on the resulting flow-induced magnetic field. The axial quadrupole moment of Jupiter is only 1% of the axial dipole, and the axial octuple moment of Jupiter is only 2% of the axial dipole according to the VIP4 model of Jupiter $(g_1^0, g_2^0, g_3^0) = (428077, -4283, 8906)$. In order to quantify this effect, we introduce Jupiter's axial quadrupole moment and axial octuple moment to the background field in our calculations according to the VIP4 model, and compare the resulting magnetic perturbations to those obtained from a simple axial dipole (Fig. 1). It can be clearly seen that the resulting wind-induced magnetic field are extremely close to the one obtained from a simple axial dipole field, with a maximum difference of about 2.8% near the equator.

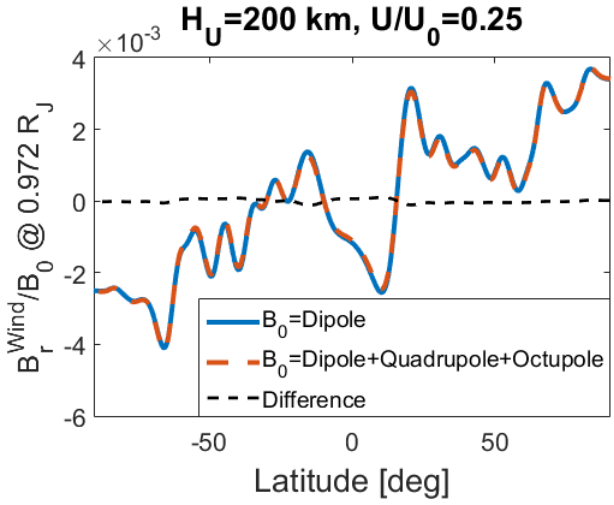

Figure 1: The wind-induced magnetic field as function of latitude. Shown are cases with a simple dipole background magnetic field (blue), a background field that includes the quadrupole and octupole moments (red), and the difference between the two cases (black).