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Jupiter's gravity field updates from Juno

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The Juno spacecraft arrived at Jupiter's system on July 4th, 2016 and reached the mid-point of its nominal mission in December 2018, after completing 17 perijove passes. Juno is currently orbiting Jupiter in a highly eccentric orbit, with a perijove altitude of about 4000 km that provides great sensitivity to the gravitational field of the planet. The radio science instrumentation on board Juno enables very accurate radial velocity (Doppler) measurements, with noise as low as 10 micron/s at an integration time of 60 s. The gravity field of the planet is recovered through detailed reconstruction of Juno's motion and observation model, performed with JPL's and University of Pisa's latest precise orbit determination codes, MONTE and ORBIT14 respectively.

We provide an update on Jupiter's gravity field, its tidal response and spin axis motion over the first half of Juno's mission. Although the Doppler data collected during the first two gravity-dedicated perijove passes have been reduced to the noise level by assuming a purely axially symmetric field for the gas giant, the current dataset, which includes ten passes, hints to a non-static and/or non-axially symmetric field, possibly related to several different mechanisms, such as normal modes, localized atmospheric or deeply-rooted dynamics.