Title: Forward and Inverse Modeling of Planetary Gravity and Topography
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Abstract: The aim of this work was to investigate various mechanisms compensating the observed planetary topography – crustal isostasy, elastic support and dynamic support caused by mantle flow. The investigated models were applied to three different planetary problems. Firstly we applied dynamic compensation model to explain today large-scale gravity and topography fields of Venus and investigate its mantle viscosity structure. The results seem to support not only models with constant viscosity structure but also a model with a stiff lithosphere and a gradual increase of viscosity toward a core. In the second paper several crust compensation models were employed to estimate the density of the Martian southern highlands crust. Since the used methods depends differently on crustal density changes, we were able to provide some constraints on the maximum density of the studied region. In the third application, the strength of a possible ocean floor gravity signal of Jupiter's moon Europa was studied. It turned out that if the long wavelength topography reaches height at least a few hundred meters, we will be probably able to detect it with current measurement accuracy.
Keywords: gravity field, topography, planets, internal structure