

## **Martian interior structure models with different crustal density**

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The information necessary to construct a model of Mars (observation data, a choice of a chemical model, a cosmogonic aspect of the problem) is discussed. We consider an interior structure model which comprises four submodels - a model of the outer porous layer, a model of the crust, a model of the mantle and a model of the core. The first 10-11 km layer is considered as an averaged transition from regolith to consolidated rock. The mineral composition of the crustal basaltic rock varies with depth because of the gabbro-eclogite phase transition. Mineralogical and seismic models of the Martian crust were constructed by numerical thermodynamic simulation by Babeiko and Zharkov (2000). For the obtained from this simulation densities at the crust-mantle boundary (about 3.3-3.4 g/cm<sup>3</sup>) a density contrast between the crust and the mantle is low enough. However, the joint interpretation of gravity and topography data assumes that there is a noticeable density jump at the crust-mantle boundary. As discussed by many authors a plausible range of bulk crustal densities is from 2.7 to 3.1 g/cm<sup>3</sup>. It can be interpreted as either the composition of rocks at the surface of Mars is somewhat different than those of the Martian basaltic meteorites or a certain amount of crustal porosity might be expected if water (or some other substances) is present in the subsurface. Assuming a range of crustal densities (2.7-3.2 g/cm<sup>3</sup>) and the average thickness of the martian crust of 50 and 100 km we have recalculated a set of interior structure models of Mars to determine this effect on the other model parameters. The models are strongly constrained by new values of Love number  $k_2$  and the mean moment of inertia have been derived by Konopliv et al. (2006). The inferred radius of Martian core (from the Love number  $k_2$ ) is between 1700 and 1800 km. Keeping in mind that the estimated value of the correction introduced to the Love number

$k_2$  due to the inelasticity of the interior can be both somewhat higher ( $\approx 0.005$ ) or slightly lower ( $\approx 0.003$ ) we have the inferred model radius of Martian core between 1650 and 1830 km. As the radius of the core is increasing two tendencies are seen: the density of the core is decreasing and the Fe/Si weight ratio is approaching to its chondritic value 1.7. From cosmochemical point of view, it is difficult to assume that the core contains more than 20 wt % of sulfur. The radius of such core is about 1600 km. Therefore, if the core of Mars turns out to be larger, it should contain some light admixture elements.