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Constraining the Interior Structure and Composition of Mars with Geodesy

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The deformational response of Mars to the solar tidal forcing is consistent with Mars having an at least partially liquid core (Yoder et al. 2003). It is however not known if the core contains a solid inner part or if it is completely molten as is suggested by the absence of a global planetary magnetic field. The state of the core depends principally on the not well known thermal state of the planet and on the concentration of light elements inside the core, which reduces the melting temperature of the core with respect to that of pure iron. In this study we use new geodesy data (Konopliv et al. 2011) to determine the size of the core and of the inner core and the concentration of light elements in the core. Additionally we assess to what extent geodesy data can constrain the mineralogy of the mantle and the density and thickness of the crust.