The study on Mars has greatly been advanced due to new data from modern missions as well as to new results from theoretical and numerical works. Morphology and variable phenomena, seen on the surface, in the atmosphere and its surrounding plasma, all indicate that Mars is still an active planet. After the successful launch of Japan's new EPSILON rocket (September 2013), possibilities of small planetary missions are becoming more realistic (Mars is the most important target object, of course). In this session, current researches on Mars, including the latest results from missions, as well as future mission plans are discussed.

11:40 AM - 11:55 AM
[PPS02-P05_PG] Equation of state of \((\text{Fe, Ni})_3\text{S}\) phase - Implications for Mars internal structure

3-min talk in an oral session
Shunsuke AKAGI\(^1\), *Takeshi SAKAI\(^1\), Naohisa HIRAO\(^2\) (1.Geodynamics Research Center, Ehime University, 2.Japan Synchrotron Radiation Research Institute)

Keywords: Mars core, equation of state, Mars lower mantle

The existence of lower mantle (MgSiO\(_3\)-perovskite layer) has an important role on Mars thermal evolution. The layer thickness of Mars lower mantle depends on the depth of the core-mantle boundary (CMB). The depth of CMB is related to the Mars core density. Although the structure model of Mars core was discussed based on the equation of state of pure iron and FeS (e.g., Urakawa et al., 2004), \(\text{Fe}_3\text{S}\) phase and also the effect of nickel on the density should be considered. We newly established the equation of state (EoS) of \((\text{Fe}_{0.89}\text{Ni}_{0.11})_3\text{S}\) up to about 40 GPa by high pressure experiment using diamond anvil cell. Considering EoSs of \(\gamma\)-Fe (Tsujino et al., 2013), \(\gamma\)-FeNi (Tsujino, 2012), \(\text{Fe}_2\text{S}\) (Seagle et al., 2006), and \((\text{Fe}_{0.89}\text{Ni}_{0.11})_3\text{S}\), the effects of nickel and sulfur on the density was determined. Then, we determined the Mars core density corresponding to the composition model based on SNC meteorites. Our new model shows relatively thin lower mantle compare to previous one. Moreover, if Mars core contains 16 wt.% S and 7 wt.% Ni (Sanloup et al., 1999) and if Mars has an entirely liquid core (Fei and Bertka, 2005), there is a possibility of disappearance of Mars lower mantle.