Genesis of ultramafic related magnesite in Northwest Turkey along the Izmir-Ankara Suture: A stable isotope study

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The magnesite occurrences of Eskisehir area (Süleymaniye, Margı, Tutluca), which are hosted by Alpine type ultramafic rocks, have been studied, in order to elucidate the origin of water, carbon and are compared with similar magnesite occurring in Turkey and other countries. Süleymaniye magnesite occurences have $\delta^{13}C$ (PDB) values ranging from -2,71 ‰ to -7.69 ‰; Margı magnesite occurrences $\delta^{13}C$ (PDB) values ranging from -7.59 ‰ to -11.24 and Tutluca magnesite occurences have $\delta^{13}C$ (PDB) values ranging from -8.69 ‰ to -10.4 ‰. Süleymaniye magnesite occurrences have havier isotopic value of others. They have similar $\delta^{18}O$ (SMOW) isotopic values ranging from 27.35 $\delta^{13}C$ ‰ to 30.78 ‰. Petrographic, mineralogic and isotopic data indicate that magnesite precipitation of Eskisehir area in near surface environment at low P and T.

Critical review of Hf-W and U-Pb clocks for terrestrial core formation

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Since the discovery of radiogenic ^{182}W in the Earth's mantle in 2002, the extent to which the incoming accreting bodies (impactor) isotopically equilibrated with the proto-Earth before the two cores merged to form Earth's core has been hotly debated. Resolving this issue is critical for interpreting Hf-W constraints on terrestrial core formation and the origin of the Earth and Moon. Models of accretion highlight that either (i) the Hf-W age of terrestrial core formation is well constrained between 10-30 Myr [1] as long as the degree of metal-silicate equilibration is between 40-100% [2], or that (ii) the Hf-W systematics constrains the degree of equilibration to 40% and do not constrain timing at all [2]. In the latter case, the U-Pb system has been used to argue for a much later time of core formation [3].

Problems with the late core formation model are as follows. (a) the Moon and the Bulk Silicate Earth (BSE) have nearly identical O, Cr and W isotopes [4], which is difficult to explain if the impactor and the proto-Earth equilibrated only to 40%. (b) Coudpled ^{142}Nd-^{182}W modeling suggests that silicate differentiation would occur before core-mantle segregation [5]. (c) The basic premise of using U-Pb systematics of the BSE to estimate timing of core formation may be incorrect. Ref. [6] emphasized the fact that the BSE, as represented by oceanic basalts, lies to the right of the geochron in Pb-Pb space. In order to resolve this "paradox", ref. [6] computed a model age for the BSE and suggested a 100-200 Myr age for Pb segregation to the core, but because Canyon Diablo troilite was assumed to represent the core, these model ages are minimum estimates for the timing of Pb segregation. In ref. [7], we show that Pb segregation could have been much later, but instead of the core, Pb segregation may have been controlled by sulfide-silicate differentiation associated with the formation of continents. (d). Finally, the similar ^{182}W of the Earth and Moon [4] does not necessarily imply that the Earth-Moon system formed after ^{182}Hf had decayed (>60Myr) because both bodies are still radiogenic compared to chondrites. The key question is whether Hf/W ratios for BSE and the Moon are distinguishable?

[1] Yin *et al*. (2002) *Nature*, **418**, 949. [2] Rudge *et al*. (2010) *Nature Geo*. **3,** 439. [3] Wood and Halliday (2010) *Nature*, **465**, 767. [4] Touboul *et al*. (2007) *Nature,* **450**, 1206. [5] Moynier *et al* (2010) *PNAS*, **107**, 10810. [6] Allegre *et al*. (1995) *GCA*, **59**, 1445. [7] Lee *et al*. (this meeting).