Petrographic and Geochemical Evidences indicating the crustal assimilation in the within-plate basalts: Karasar Basalt (Divri_i-Sivas, Central Anatolia, Turkey

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Karasar basalt outcropping as the thick bedded lava flows can be divided into two groups according its textural features: First group basalts have a holocrystalline-intersertal texture while second group has a holocrystalline porphyryc texture. Quartz xenocrysts surrounden by epitaxitic clinopyroxene microlithes have been observed in the second group basalts. Biotite minerals in the groundmass of the some basalts belonging to second group have also been observed.

First group basalts have ranging from 50% to 54 %SiO_2 , 1.11-1.38 %K_2O and 30-42 ppm Rb while second group basalts have 45% to 48 %SiO_2 , 0.52-0.76 % K_2O and 21-28 ppm Rb. All the samples of the Karasar basalt have an alkaline character. Trace element data show that the Karasar basalt indicate the within-plate character.

On the basis of the petrographical and geochemical charecteristics of the Karasar basalt, such a model can be proposed for the evolution: An alkaline magma was generated by the low degree partial melting of the lherzolithic upper mantle material. While this magma rises in the cracks developed during the Neotectonic period in the thickened continental crust, first lava flows was enriched in Si, K and Rb by crustal assimilation, and later lava flows were uncontaminated or little contaminated.

^{182}Hf-^{182}W in meteorites and the timescale for planetary formation

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Determining the chronology according to which planetary bodies were assembled in the early Solar System is essential for a better understanding of star- and planet-forming processes. Astronomical observations place severe constraints on the formation time of gas-giant planets (possibly with a solid core of ten Earth masses) to within a few million years after central star formation and before complete dissipation of nebular gases. Formation of terrestrial planets before the nebular gas dissipation is also consistent with the observed solar He and Ne components incorporated into the Earth's mantle during the magma ocean epoch. The standard model of planet formation predicts that Mars-sized bodies will form within 0.1 Ma of the origin of the Solar System. Various chronometers have been used to determine that basaltic lava flows on the surface of Vesta formed within 3 Ma of the origin of the Solar System. A major challenge to such a short timescale is that some published Hf-W isotopic data require a very long duration ($60\ ^{+4500}/_{-10}$ Ma) for the formation of the terrestrial planets (Lee and Halliday, 1996). The Hf-W data for eucrites, if compared to the currently accepted high initial solar value of $^{182}Hf/^{180}Hf = 2.75 \times 10^{-4}$ (Lee and Halliday, 2000), indicate a late formation of Vesta at 16 Ma (Quitté et al., 2000), inconsistent with live ^{53}Mn and ^{26}Al in eucrites. Such a long timescale, if correct, calls into question our understanding of the main growth stage of planet formation. Our new Hf-W data (Yin et al., 2002) show that the solar initial $^{182}Hf/^{180}Hf = 1.00 \times 10^{-4}$, substantially lower than the accepted higher value. Furthermore, ε_W for chondrites is ~2 ε-units lower than that of the Silicate Earth. We show that the main growth stage (63%) for the Earth is largely completed in ~10 Ma, and the Moon-forming giant impact is dated at 29 Ma. Our new data also resolve the inconsistency between Hf-W, Mn-Cr and Al-Mg chronologies for eucrites and support a very short timescale (< 3 Ma) for formation and melting of Vesta.

References

Lee D.-C. and Halliday A.N., (1996), *Science* **274**, 1876-1879.
Lee D.-C. and Halliday A.N., (2000), *Chem. Geol.* **169,** 35-43.
Quitté G., Birck J.-L. and Allègre, C. J., (2000), *Earth Planet. Sci. Lett.* **184**, 83-94.