Distribution of Pt, Os, Ir during liquid metal segregation under extremely reducing conditions

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Experimental deformation studies have been performed on a natural, partially molten H6 ordinarly chondrite (Kernouvé) to enhance our understanding of early differentiation processes. One of the goals of the experiments is to determine the partitioning of siderophile elements during deformation and dynamic liquid metal segregation. We report results from a set of experiments in which deformation was performed under extremely reducing conditions. The study was conducted at temperatures between 925°C and 950°C, at 1.3 GPa confining pressure with a strain rate of 10^{-4}/s. Major element analyses show that in zones of deformation the compositions of both silicate and metal phases are considerably modified. Metallic compositions include (Mg,Fe)S, which is found with Si-bearing FeNi metal (+/- P), and Fe-Ni-S quench metal. Texturally, Fe-Ni-S appears to have been liquid and lines grain boundaries and cracks. Fe-Ni-Si compositions are found in the shear zones produced during the deformation experiment. Si-bearing FeNi metal and (Fe,Mg,Ca,Mn)S are found with silicate glass, forsterite (Fo_{92-96}) and enstatite (En_{98}). We also report highly siderophile element (HSE) concentrations measured in the Fe-Ni, FeS and Fe-Ni-Si metallic phases by LA-ICPMS. Earlier work has shown that the D's of many of the HSE are dependent on the sulfur content of the liquid metal with HSE concentrated in the Fe-Ni solid rather than FeNiS liquid. This also holds true under these reducing conditions however, Pt (not analyzed in earlier runs due to the use of Pt jackets) behaves noticeably differently to either Os or Ir. While Os and Ir are predictable in their distribution, Pt is highly concentrated in the modified Fe-Ni-Si +/- P bearing metal. D values for Pt, Os and Ir between FeNi (solid) and FeS (liquid) outside of the shear zones are approximately 20 for Os, to 70 for Ir and slightly lower for Pt and Au at 4 and 2.5 respectively, as expected. In the shear zones where the metal is reduced, D values for Os and Ir between FeNiSi +/- P and FeS liquid are as with FeNi and FeS, ranging from 11 and 55 for Os and Ir. Au also remains similar at 3.3. Pt, however, jumps consistently to much higher values. These data suggest that Si and possibly P play and important role in concentrating Pt. Further experiments in idealized systems are needed.

Provenance of early Paleozoic siliciclastic sandstones from NW Argentina – Results from an ongoing study on detrital zircons

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Paleogeoraphic reconstructions can be greatly aided by provenance studies on sedimentary rocks. We will present initial results of an ongoing varietal study on detrital zircons from siliciclastic sandstones of the Cambrian Mesón Group, Ordovician Purna Turbidite Complex and Las Vicuñas Formation and the Silurian Salar del Rincón Formation in NW Argentina (ca. 23-24°S, 65-67°W). The sediments were deposited along the western Gondwana margin, with both tectonically active and passive margin phases. Cathodoluminescence images of the zircon grains give insight into grain morphology, zoning and growth phases and we use them for a first approach to classify the zircons. This analysis also gives insight into the magmatic or metamorphic history of the grains. The majority of the zircons in the studied units are 50-150 µm long, slightly abraded to rounded and have oscillatory zoning, typical for a magmatic origin. Zircons with more than one growth phase are rare. The degree of rounding point to low and high degrees of abration for different grains, which possibly can be indicative of detrital input both from local and regional source areas. First LA-ICPMS *in situ* U-Pb data for 50-100 zircons in each of 5 analysed samples indicate three distinguished U/Pb age-peaks at ca. < 550 Ma, ca. 600-850 Ma and ca. 1.2-1.6 Ga. These peaks can be observed throughout most sandstones of the different ages and from varying locations, that have been analysed so far. The results imply a long and continuous influx of clastic material from crustal source areas in Gondwanan realms.