The Helium and Neon isotopic compositions in the Beimarang ophiolites from the Yarlung Zangbo River, Tibet, SW China

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The noble gases isotopic compositions in the Beimarang ophiolites from the Yarlung Zangbo River, Tibet, SW China were measured by MM5400 mass spectrometer using stepwise heating method. A large amount of He was released at 700°C for serpentinite and a altered pyroxene peridotite, and at 300°C for the others. The temperature released maximal He contents was decreased with the increased altered grade. The R (^{3}He/^{4}He) value in the serpentinite was 7.02Ra (Ra = 1.400×10^{-6}, is the ^{3}He/^{4}He ratio in air), 4.63Ra, 5.81Ra and 4.56Ra, at 300, 700, 1100, 1600°C, respectively. The R values in the altered pyroxenic peridotite were between 0.389Ra and 1.72Ra at various temperatures. The R value in a hornblende diorite was also 1.16Ra at 1100°C. Considering metamorphism, it is supposed that the R value of the original fluid in the serpentinite would be higher than 8Ra, which is the typical value in MORB. The peridotite, the matrix of the serpentinite, maybe comes from lower mantle. For the two altered hornblende diorites, the R value was decreased with the increased altered grade. In these samples, the ^{20}Ne/^{22}Ne ratios were between 10.6 and 16.18 with an average of 12.49, and the ^{21}Ne/^{22}Nevalues were between 0.02789 and 0.062 with an average of 0.03665. The data points of the samples were mainly arrayed along L-K (Loihi-Kilauea, hotspot) line in the three isotopic diagram of the neon. Summarily, the obtained data indicate that the formation of the Neo-Tethys Ocean, which was represented by the Yarlung Zangbo River ophiolites, would be associated with a plume-type volcanism.

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Isotopic and elemental constraints on the first 100 Myr of Earth history

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James Hutton (1785) in formulating his concept of *Deep Time* stated there is "…no vestige of a beginning, no prospect of an end" for the Earth. Emerging evidence at the dawn of the 21st century from radiogenic daughter isotopes of short-lived, now extinct radioactivities, suggests that every single piece of rock one could pick up on the Earth's surface faithfully records the vestiges of a beginning, no matter how effective the Earth was in concealing its early history. It is often stated that there is no rock record from the Hadean era, the first 500 Myr of the Earth history. However, modern isotope geochemistry shows that all rock samples we can lay our hands on have acquired their chemical and isotopic characteristics from the Earth's first 100 Myr, even as early as the first 10-30 Myr history after the Solar System's birth.

The current prevailing paradigm for the last stage of planet formation is characterised by 20 or so Mars-sized planetary embryos perturbing each other into crossing orbits and merging into the present configuration of four inner planets via giant impacts. Our satellite Moon is thought to be a by-product of the last giant impact on Earth. We thus resort to the Moon for additional information for the first 100 Myr of Earth history. The W isotopic composition of the Moon has evolved through four iterations in the last decade (1997, 2002, 2005, 2007) in the geochemists' ongoing quest for the truth. It is now added to the group of elements (e.g. O and Cr) that show a remarkable similarity in their isotopic composition between the Earth and Moon. However, such similarity does not imply that the Earth-Moon system was formed after ^{182}Hf had decayed (>60Myr), as incorrectly stated in the recent literature. Still the bulk silicate Earth and the Moon are radiogenic by 2 epsilon units (ε_{182W}), reflecting their ingrowth from high Hf/W reservoirs when ^{182}Hf was extant. The "flat isochron" of high-Ti, low-Ti and KREEP basalts only reflects later internal silicate differentiation within the Moon. This information is not directly relevant to the timing of Moon formation, as we cannot argue Earth is ~4 Gyr old using Acasta gneiss. The key question is *are Hf/W ratios for the bulk silicate Earth and Moon distinguishable?* If the Moon is made from the Earth mantle material due to the giant impact, thus having similar W isotopic composition, logically their bulk Hf/W ratio should be the same. As neither Hf nor W are volatile, significant fractionation between them is unlikely during the Moon formation event.