# $^{182}W/^{184}W$ and Re-Os systematics of the Singhbhum and Dharwar komatiites, India: implications for 3.3Ga mantle evolution

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$^{182}W$ is produced by β-decay of the extinct nuclide $^{182}Hf$, which has a relatively short half-life of 8.9 million years. Hf is a lithophile and W is a siderophile; therefore, during segregation of the Earth's core, Hf remained in the silicate phase and W preferentially partitioned to the metal phase. It is expected that such Hf-W fractionation occurred prior to the extinction of $^{182}Hf$ on the early Earth. Various investigators have reported positive and negative anomalies in $\mu^{182}W$ (ppm) values, deviation relative to the present-day mantle value ($\mu^{182}W = 0$) in terrestrial systems. Most ancient rocks older than 2.5 Ga generally show relatively uniform $\mu^{182}W$ values of +10 to +15 (e.g., Willbold *et al.* 2011, Touboul *et al.* 2014, Liu *et al.* 2016, Mundl *et al.* 2018, Tusch *et al.* 2019). On the other hand, some komatiites such as Schapenburg and Komati (both having 3.5 Ga) have negative $\mu^{182}W$ value and $\mu^{182}W$ that is unresolved from modern value, respectively (Touboul *et al.* 2012, Puchtel *et al.* 2018). Also, Mei et al. (2019) presented non-positive anomaly in the W isotope of the Anshan komatiite with 3.0 Ga.

We analyzed the W isotopes of the 3.3 Ga Singhbhum and Dharwar komatiites, India, to figure out chemical evolution of the mantle from the viewpoint of $\mu^{182}W$. The Singhbhum and Dharwar individual samples have $\mu^{182}W$ ranging from -0.5 to +5.6 (n = 3) and from -1.4 to +5.0 (n = 4), respectively. These values are much less than the range of the uniform $\mu^{182}W$ values of rocks older than 2.5 Ga as mentioned above. The results imply that deep mantle already had a low $\mu^{182}W$ during 3.5 to 3.0 Ga, probably because of late veneer of chondritic materials and/or that deep mantle of that period was heterogeneous with respect to $^{182}W$ isotope.