

Iodine records of local surface seawater redox conditions from Ediacaran to early Cambrian in south Yangtze basin, South China

DA LI¹, ZUNLI LU², XIAOLI ZHOU² AND HONGFEI LING¹

¹State Key Laboratory for Mineral Deposits Research, School of Earth Sciences and Engineering, Nanjing University, Nanjing 210046, China

²Department of Earth Sciences, Syracuse University, Syracuse NY, 13244, USA

The naissance and extinction Ediacaran biota and the following radiation of skeletal metazoans in the early Cambrian has been linked to the widespread development of oxygenated oceanic conditions, especially the surface ocean redox conditions. However, a precise temporal redox evolution of the shallow water has not been resolved. Here we report iodine data of carbonates from two sections on Yangtze Platform (Jiulongwan-Wuhe-Yanjiahe section, Hubei Province and Xiaotan section, Yunnan Province) covering a period from 635 Ma to ~525 Ma [1] 2[].

Iodine is a redox-sensitive and biophilic element. Iodate persists exclusively in oxic waters and is the sole iodine species incorporated into carbonate minerals, allowing I/(Ca+Mg) ratios in shallow carbonates to be used as a paleo-redox indicator. Our carbonate I/(Ca+Mg) ratios from two shallow water sections are mostly below 1 $\mu\text{mol/mol}$, lower than some of the values reported for Great Oxidation Event and the Lomagundi Event [3]. Overall, the I/(Ca+Mg) ratios decreased in the Doushantuo Stage (635-551 Ma) possibly indicating gradual shoaling of local chemocline at the Jiulongwan section. I/(Ca+Mg) does not show any notable change coeval with the rapid $\delta^{13}\text{C}$ drop during the Shuram Excursion. I/(Ca+Mg) ratios remain low through the Dengying Stage at Jiulongwan, whereas slightly higher ratios are found in the Dengying Stage at Xiaotan section, emphasizing different local conditions recorded by the proxy. The Cambrian part of Xiaotan section shows interesting stratigraphic trends, although the baseline values are below 0.5 $\mu\text{mol/mol}$. These data suggest local oxygen penetration depth likely was very shallow at both sections in the studied interval.

[1] Ling, H.-F., et al., *Precam. Res.*, 2013. 225(0): p. 110-127.

[2] Li, D., et al., *Precam. Res.*, 2013. 225(0): p. 128-147.

[3] Hardisty, D.S., et al., *Geology*, 2014. 42(7): p. 619-622.