Redox state of the late Paleoproterozoic marine environment: The Cape Smith Belt, Canada

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Paleoproterozoic is one of the periods when Earth's surface environment was changed dramatically. For example, it is suggested that oceanic sulfate reservoir was expanded during the Great Oxidation Event (GOE) and contracted at the end [1]. Although the oceanic environment during the GOE is clarified by several previous studies, that after the GOE, especially after 2.0 Ga, is still poorly constrained. In order to clarify the sedimentary environment, we reconstructed 50 m lithostratigraphy and chemostratigraphy of major and trace element compositions of the black shale, as well as C-S isotope data ($\delta^{13}C_{org}$, $\delta^{34}S$).

Our main target is a part of the drilled core from the Northern Povungnituk Group, Cape Smith belt of Canada. The sequence consists of the alteration of sandstone and black shale deposited at northern margin of the Superior province at ~1.9 Ga. The black shale in the sequence rich in organic matter and pyrrohotite which origin is likely to sedimentary pyrite genelated by bacterial sulfate reduction.

Vanadium (V) is a proxy of the paleo-redox state because this element is one of the redox-sensitive elements, which accumulates in sediment as oxiside or hydroxide under sulfidic environment [2]. The V content nomalized by TiO_2 drastically increases from 102 ppm/wt% to 616 ppm/wt%, suggesting that transition of redox condition from non-sulfidic to sulfidic. $\delta^{13}C_{org}$ and $\delta^{34}S$ change at the same interval ($\delta^{13}C_{org}$: -30.6 – -33.2 ‰, $\delta^{34}S$: +11.9 – -4.1 ‰) and that suggests some trigger which affects $\delta^{13}C_{org}$ and $\delta^{34}S$ caused development of sulfidic condition. These transitions are likely to represent input of isotopically light HCO_3^- and SO_4^{2-}.

[1] Scott et al., (2014) *EPSL.* **389**, 95-104. [2] Algeo & Maynard, (2004) *Chem. Geol.* **206**, 289-318.