Origins of a global marine late Silurian C isotope excursion: Insights from stable metal isotopes (Ca, Sr, Cr) from Gotland and Prague Basin

JURAJ FARKAS[1,2], JIRI FRYDA[2], CHRIS HOLMDEN[3], BARBORA FRYDOVA[2], MICHAL MERGL[2], ANA KOLEVICA[4] FLORIAN BOEHM[4] AND ANTON EISENHAUER[4]

[1]University of Adelaide, e-mail: juraj.farkas@adelaide.edu.au
[2]Czech University of Life Sciences, Prague, Czech Rep.
[3]University of Saskatchewan, Saskatoon, Canada
[4]GEOMAR, Helmholtz Centre for Ocean Research Kiel

The causes and *primary* versus *diagenetic* origins of the globally-recognized large positive C isotope excursions (CIE), recorded in the Paleozoic marine carbonates, and their purported links to coeval changes in the global C cycle are controversial and highly disputed [1, 2]. The largest positive $\delta^{13}C$ excursion of the entire Phanerozoic, i.e., the mid-Ludfordian CIE (~9‰), is documented in the Late Silurian marine carbonates worldwide [3]. Recently, it has been proposed that the origin of this CIE is related to a purported 'carbonate hypersaturation' of the late Silurian surface oceans [4], and the associated kinetically-controlled evasion of isotopically light CO_2 (and CH_4) gases from the surface oceans, coeval also with a rapid carbonate precipitation [4], and rate-controlled effects documented by Ca isotopes [5]. An alternative explanation suggest that this CIE and the above rate-controlled effects are rather due to an early marine diagenesis and post-depositional equilibration of primary marine carbonates with paleo-seawater or seawater-derived fluids, leading to resetting of primary isotope signals [2]. To further test these two plausible scenarios (i.e., a global seawater *hypersaturation* vs. *early marine diagenesis*), we present here stable Ca, Sr and Cr isotope records of Late Silurian marine carbonates from two remote paleo-locations, represented by Gotland (Sweden) and Prague Basin (Czech Rep.). Importantly, both sites yielded generally coherent $\delta^{44/40}Ca$, $\delta^{88/86}Sr$ and $\delta^{53}Cr$ trends across the CIE, corroborating the global nature of these isotope trends. We will discuss the implications of these results for the *primary* versus *diagenetic* origins of the late Silurian CIE, and also for the reconstructions of paleo-seawater metal isotope signatures.

[1] Saltzman & Edwards (2017) *EPSL,* **464,** 46–54. [2] Ahm et al. (2018) GCA, in press. [3] Fryda & Manda (2013), *Bull. Geosci.* **88**, 463–482. [4] Kozlowski (2015) *Bull. Geosci.* **90**, 807–840. [5] Farkas et al. (2016) *EPSL,* **451,** 31–40.