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83-5: EXPANSION OF ANOXIA/EUXINIA AS DRIVER FOR EARLY SILURIAN EXTINCTION EVENTS: NEW SEDIMENTARY AND GEOCHEMICAL PROXY DATA FROM BALTICA

Sunday, 22 October 2017
09:00 AM - 05:30 PM
Washington State Convention Center - Halls 4EF

The early Silurian was characterized by global oceanographic and biotic turnover associated with survival/recovery from one of the largest mass extinctions in the Phanerozoic. Lower Silurian (Llandovery) strata contain evidence for widespread anoxia, continued glaciation, and three positive carbon ($\delta^{13}C_{carb}$) isotope excursions: Early Aeronian, Late Aeronian, and Valgu. However, mechanisms capable of causing widespread climactic and oceanographic changes that can be linked to biotic events are poorly understood. Silurian conodont and graptolite records show episodes of biotic extinction, some of which are coincident with major perturbations in the carbon cycle. Previous studies have proposed major oceanographic circulation and climatic changes as the driver for these marine extinction events and changes in marine lithofacies patterns.

This study presents new geochemical data using redox proxies such as Fe speciation and trace metal geochemistry along with pyrite-sulfur ($\delta^{34}S_{pyr}$) and organic carbon ($\delta^{13}C_{org}$) from a Llandovery deeper water (basinal) shale sequence within the Baltic Basin (Sweden). In parallel, this study presents preliminary inorganic carbon ($\delta^{13}C_{carb}$) and carbonate associated sulfur ($\delta^{34}S_{CAS}$) data from a correlative shallow shelf carbonate sequence in northern Estonia. Preliminary results record positive shifts in $\delta^{13}C_{org}$ ranging from +2‰ to +4‰, in magnitude, for two globally recognized carbon isotope excursions through the Aeronian to the Telychian as well as positive shifts in corresponding $\delta^{34}S_{pyr}$ during these carbon cycle perturbations. In conjunction, preliminary iron speciation and trace metal geochemistry data present implications for local water column and global oceanographic conditions. Results thus far link several Llandovery moderate extinction events, recorded in many marine taxonomic groups, to evidence for a local water column that was predominantly anoxic and intermittently euxinic, and possible global expansion of these reducing conditions locally/globally at times during the Llandovery. Expansion of this basinal to global pool of sulfidic waters into shallow shelf settings provides a unique mechanism to tie biotic turnover events to perturbations of the global C and S cycles.

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