

# DIRT TALK

## ORDOVICIAN IRONSTONE OF THE WESTERN ASTURIAN-LEONESE ZONE, SPAIN: COASTAL UPWELLING, OCEAN ANOXIA AND PALEOZOIC BIODIVERSITY

Alex Squires, M. Sc Geology, Acadia University

*January 25, 2019, MILLIGAN ROOM, 4:00 PM*

### **Abstract:**

Middle to Upper Ordovician ironstone and associated sedimentary rocks of the Western Asturian-Leonese Zone (WALZ), Spain, provide new information regarding the paleoceanography of the Rheic Ocean and the Paleozoic Fe cycle. Examination of drill cores and outcrops indicates the southeastern margin of the Rheic Ocean was a dynamic continental shelf where upwelling of ferruginous seawater and storm currents controlled ironstone deposition.

Parasequence composition and stacking relationships suggests iron deposition occurred in two distinct ironstone factories during a rise in relative sea-level. Proximal parasequences coarsen-upwards through cross-stratified sandstones into a granular hematite-rich ironstone capped by a flooding surface. Distal parasequences fine-upwards from silty ironstones to a bioturbated siltstone with rare reworked phosphatic beds bounded by a flooding surface.

These lithofacies associations support an emerging model for ironstone deposition where coastal upwelling delivered and stimulated the precipitation of Fe in shelf sediment. This notion provides further evidence for the development of persistent anoxic water masses in an Ordovician ocean that was near the threshold of becoming fully ventilated. New data suggests that minor extinction events punctuating the Great Ordovician Biodiversification Event may be traced to these anoxic waters, which in addition to Fe were also enriched in biologically toxic trace elements. Precipitation of upwelling-related ironstone may have helped sequester these redox sensitive trace elements, providing a negative feedback response to aid post-extinction recovery.