

Regional deep water anoxic conditions during the Hirnantian extinction event

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The Late Ordovician Hirnantian glaciation (~444 Ma) coincided with a marine carbon cycle perturbation, and one of the largest mass extinction events in the Phanerozoic. However, the underlying causes leading up to the extinction event are not fully understood. It has been suggested that a Hirnantian expansion of anoxic conditions, driven by the glacio-eustatic sea-level fall, acted together with the reduction of habitats as the major kill mechanism [1]. To further resolve the end-Ordovician water column chemistry, a multi-proxy geochemical approach was applied to a new drill core and surface material from a deep-water section in central Nevada. Here, enrichments in U and Mo suggest euxinic conditions at the onset of the Hirnantian. Furthermore, ratios of highly reactive iron over total iron (Fe_{HR}/Fe_T) increases from the Katian to values of ~0.5 in the Hirnantian stage, indicating an anoxic water column. We argue that the onset of the Hirnantian can be linked to an euxinic event and that these observations are evidence of expanding anoxia during the first stages of the marine regression which has been lacking documentation at shallower-water sections.

[1] Hammarlund *et al.* (2012) *Earth Planet. Sci. Lett.* **331-332**, 128-139.

Petrography and diagenesis of Pab sandstone, implications for hydrocarbon exploration in southern Pakistan

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In this study the petrography, diagenetic fabric and hydrocarbon reservoir rock characterization of the Cretaceous Pab sandstone is carried out. Mostly the rock type is arkosic arenite but feldspathic Greywacke is also seen. The dominance of mono-crystalline quartz, alkali feldspar and heavy minerals (Tourmaline, Zircon, and Garnet) point to a provenance source dominated by acidic igneous rocks. Presence of the Quartz overgrowth with mostly concavo-convex boundaries along with the presence of some point and sutured contacts is the major modification caused by the increased geothermal gradient and pressure in the middle to final phase of diagenesis. The synthesis of petrographic, diagenetic and plug porosity permeability data confirms a good hydrocarbon prospect of the unit in the region.