Major cation, carbon system and trace element chemistry in pore waters from the Iberian margin: Implications for paleoproxies

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A significant body of work exists on the chemistry of pore waters from DSDP and ODP cores (e.g. [1] [2]) showing large gradients in sea salt cations and anions interpreted in terms of diagenetic reactions such as the formation of Mg-rich clays and dolomite [3]. Another class of diagenetic reactions involves the breakdown of organic matter and trace element behaviour [4]. The translation of chemical gradients into fluxes requires estimates of pore water chemistry across the sea water - sediment surface boundary. Application of the chemistry of benthic foraminiferal calcite for seawater palaeochemistry requires estimation of the chemistry of pore waters which may differ from that of bottom seawater because of diagenetic reactions.

We collected multi-core samples from 10 sites on cruise RRS James Cook JC089 on the southwest Iberian continental margin. Pore waters were extracted from the core surface and at 1 cm depth intervals down core (typically to ~40 cm depth) using Rhizon samplers and analysed for Alkalinity, DIC, ∂13C, major cations (e.g. Na, K, Mg, Ca, Li, B, Sr) and reactive trace metals (e.g. Mn, Fe, Ba, Mo, V, U) as well as O_2 penetration and pH determined using microelectrodes. This allowed us to inspect chemical behavior at the bottom water - sediment interface. Examples of results are a large gradient in $\partial^{13}C$ of DIC, the similarity of zero O_2 penetration followed by an increase in Mn concentration and then decrease to zero, the similarity of Li to Mn and, in contrast to much DSDP/ODP work, Ca^{2+} and Mg^{2+} both decrease with depth in pore waters near the sediment surface.

[1] Gieskes (1975) *Annu. Rev. Earth Planet. Sci.* **3**, 433. [2] Sayles (1981) *Geochim. Cosmochim. Acta* **45**, 1061. [3] Higgins & Schrag (2010) *Geochim. Cosmochim. Acta.* **74**, 5039. [4] Froelich *et al*., (1979) *Geochim. Cosmochim. Acta.* **43**, 1075