

Project EARTH-13-SHELLSPH1: Global expression of climatic and palaeoceanographic events in black shales: generation of new high-resolution records from the Jurassic of the Neuquén Basin, Argentina

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In the last decade, great strides have been made in documenting and understanding patterns of pronounced palaeoclimatic and palaeoceanographic change from shale and mudrock successions in NW Europe. Much of this progress has come from increasingly high-resolution studies using established techniques (e.g. biostratigraphy and carbon-isotope stratigraphy) and also the application of novel methods (e.g. analysis of osmium isotopes and molybdenum isotopes). In order to make further progress in understanding the global extent of these environmental changes it is necessary also to study and compare basins distant from NW Europe.

The Neuquén Basin in western Argentina has proven to be particularly promising as a target for high-resolution stratigraphic studies. The basin formed a restricted seaway in a back-arc basin during the Jurassic where thick successions of organic-rich shale and deep-water sandstone accumulated, intercalated with occasional ash beds. Through a combination of biostratigraphy, organic-carbon stratigraphy, isotope stratigraphy, and isotope geochronology, the expression of the global Toarcian Oceanic Anoxic Event (T-OAE) – a major black shale event – has been recently recognised (Al-Suwaidi et al., 2010).

The present proposal aims to build on these initial studies by answering two outstanding questions: 1) what were the wider sedimentological and diagenetic consequences of the T-OAE in the Neuquén Basin, and 2) what is the expression in the Neuquén Basin of other black shale events known from NW Europe, such as those at the Sinemurian-Pliensbachian boundary (e.g. Korte & Hesselbo, 2011), or within the Tithonian (Vaca Muerta Formation)? The work programme will comprise at least two field seasons in Argentina in which the key sections showing these intervals will be targeted for high-resolution study.

The project will provide training in field sedimentological and stratigraphic techniques and laboratory-based petrographic and geochemical analyses. Fieldwork will be collaborative with colleagues from La Plata University, Argentina.

Candidates will have completed or be in the final year of a masters-level degree in a relevant geoscience discipline.

Al-Suwaidi, AH, Angelozzi, GN, Baudin, F, Damborenea, SE, Hesselbo, SP, Jenkyns, HC, Mancenido, MO and Riccardi, AC, (2010) First record of the Early Toarcian Oceanic Anoxic Event from the Southern Hemisphere, Neuquen Basin, Argentina, J GEOL SOC LONDON. Vol. 167, pp. 633-636 doi: 10.1144/0016-76492010-025

Korte C, Hesselbo SP, (2011) Shallow-marine carbon- and oxygen-isotope and elemental records indicate icehouse-greenhouse cycles during the Early Jurassic, *Paleocenography*, in press.