

Assessing the pre-Oceanic Anoxic Event 2 osmium isotope seawater composition of the western Tethys

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Background: Osmium (Os)-isotopes can provide high-resolution chemostratigraphic control during time of paleoenvironmental disturbances, such as increased weathering or mantle input. The Os-isotope composition across the global oceanic anoxic event 2 (OAE2) has been established for many global sites, yet the preOAE2 interval for the western Tethys is virtually absent (Fig. 1). The Os-isotope composition record across the OAE2 interval has given support to most favoured causative mechanism for the OAE2 being increased mantle activity as a result of the large igneous provinces (LIPs). As such, it is hypothesized that pulses in mantle activity fuelled climatic warmth and marine productivity via the input of volcanic gases and bio-limiting nutrients [Brumsack, 2006; Du Vivier et al., 2014; Jones et al., 2020; 2023].

Aims and Method: To establish the preOAE2 Os-isotope signature of the western Tethys the Wunstorf and/or Grobern section in Germany will be investigated through core analysis working with collaborator Silke Voigt (Goethe Universitat, Germany). The Wunstorf core records the earliest Turonian to the mid-middle Cenomanian. Currently, Os-isotope data is only available to a depth of 48 m in the Wunstorf core (Du Vivier et al., 2014). This project will generate a high-resolution Os-isotope profile to the core base at 80 m via the Re-Os isotope laboratory in Earth Sciences. This project will permit an evaluation of the Os-isotope composition of the western Tethys with the eastern Tethys, northern Pacific Ocean and the Western Interior Seaway (Du Vivier et al., 2014; 2015; Li et al., 2022).

Strategic Fit & Training: Understanding global climate change is a key research target for national UK (e.g., NERC) and international (e.g., IGC, IODP, PAGES and NSF) funding agencies. The scientific community interested in the nature, causes and consequences of oceanic organic matter deposition and palaeoceanographic changes in the Cretaceous is very

Strategic Fit & Training continued: interested in the outcome of this project. Including the modern oceanographic community, who are concerned about the developing of oceanic anoxia with increasing CO₂ concentrations. Further interest will be from Earth Scientists studying the factors that affect climate change. The research project will further promote the World leading Re-Os laboratory in Earth Sciences. The student will receive training in isotopic (Os, C) applications to evaluate paleoclimate/ocean circulation models. In addition, I will be exposed to collaborators who are experts in their fields: they will provide training in aspects of stratigraphy both in the field and in the laboratory (e.g., Prof Silke Voigt, Goethe Universitat, and Prof Brad Sageman, Northwestern University). This project will provide valuable experience in sedimentology, stratigraphy, the acquisition of sediment samples for chemostratigraphy and in particular, Os isotope analysis.

