
Article:
Li, S., Wignall, P.B. and Poulton, S.W. orcid.org/0000-0001-7621-189X (2025) Co-application of rhenium, vanadium, uranium and molybdenum as paleo-redox proxies: Insight from modern and ancient environments. Chemical Geology, 674. 122565. ISSN 0009-2541

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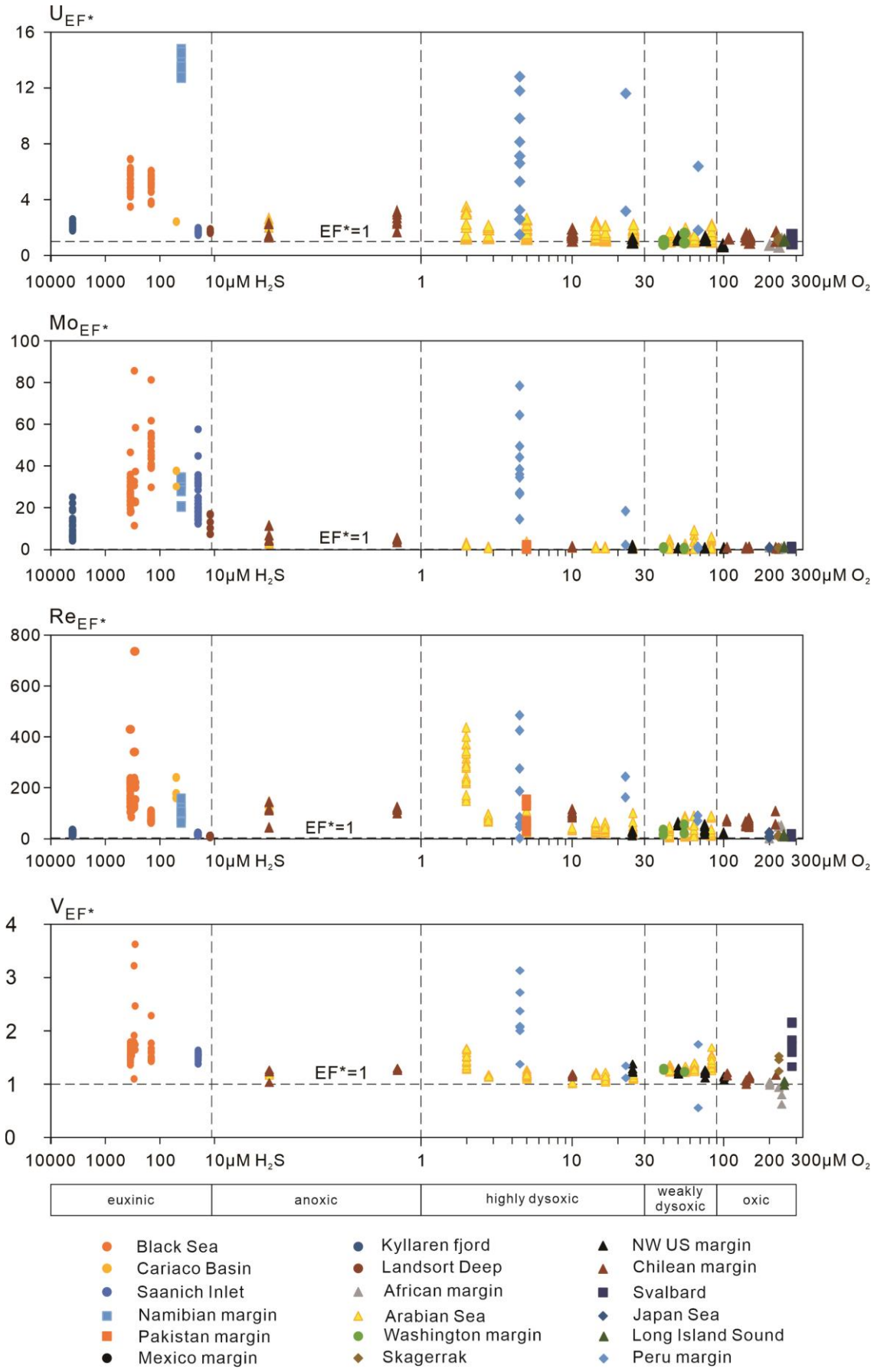

Fig. 1. RSTM enrichment factors for modern redox-sensitive marine environments. Redox regimes are divided into 6 groups (oxic, weakly dysoxic, highly dysoxic, anoxic, euxinic). Dashed lines denote $EF^{*} = 1$.

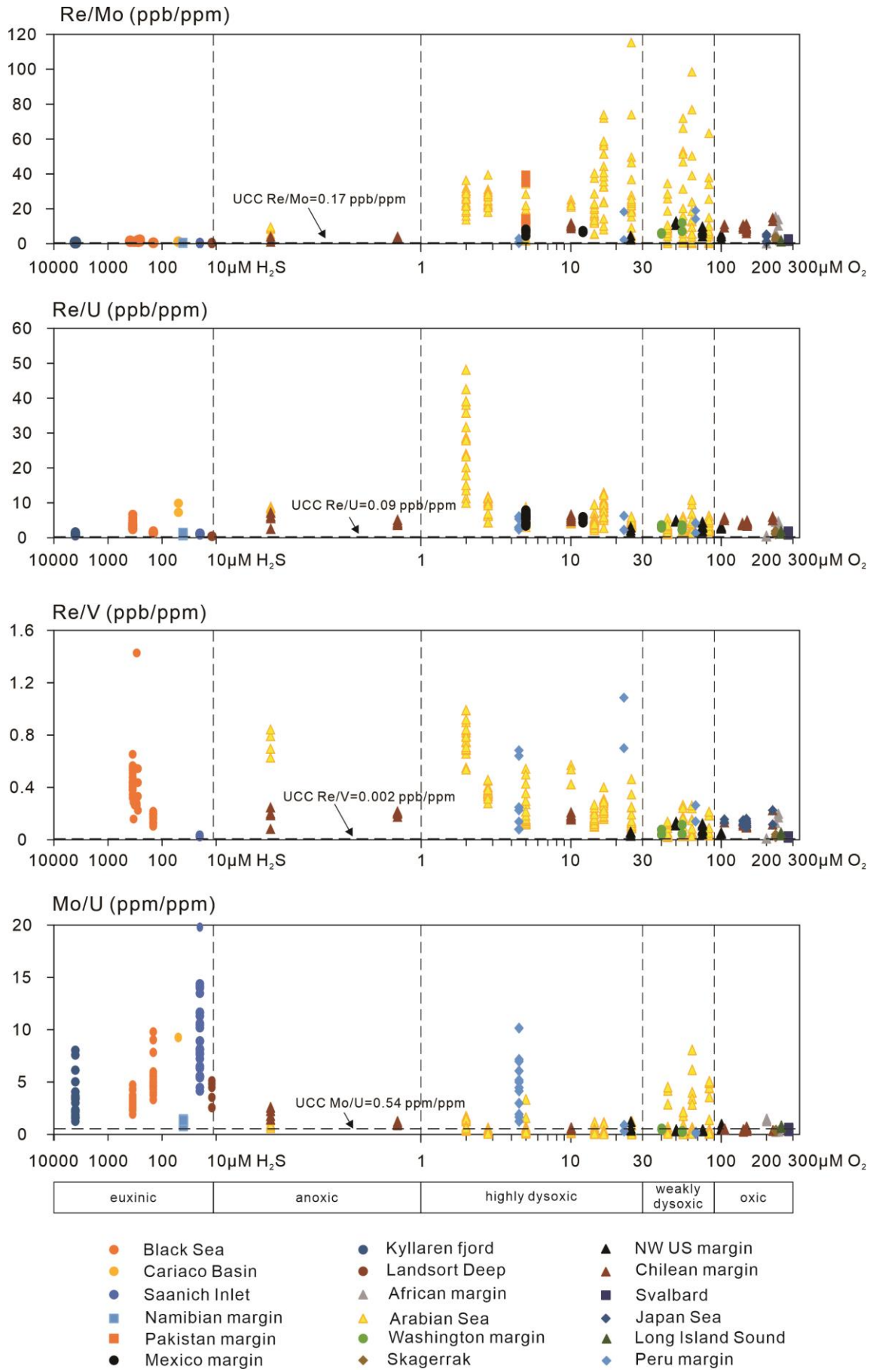

Fig. 2. Re/Mo, Re/U, Re/V and Mo/U ratios for modern redox-sensitive marine environments. Redox regimes are divided into 6 groups (oxic, weakly dysoxic, highly dysoxic, anoxic, euxinic). Dashed lines represent ratios for upper continental crust (McLennan, 2001).

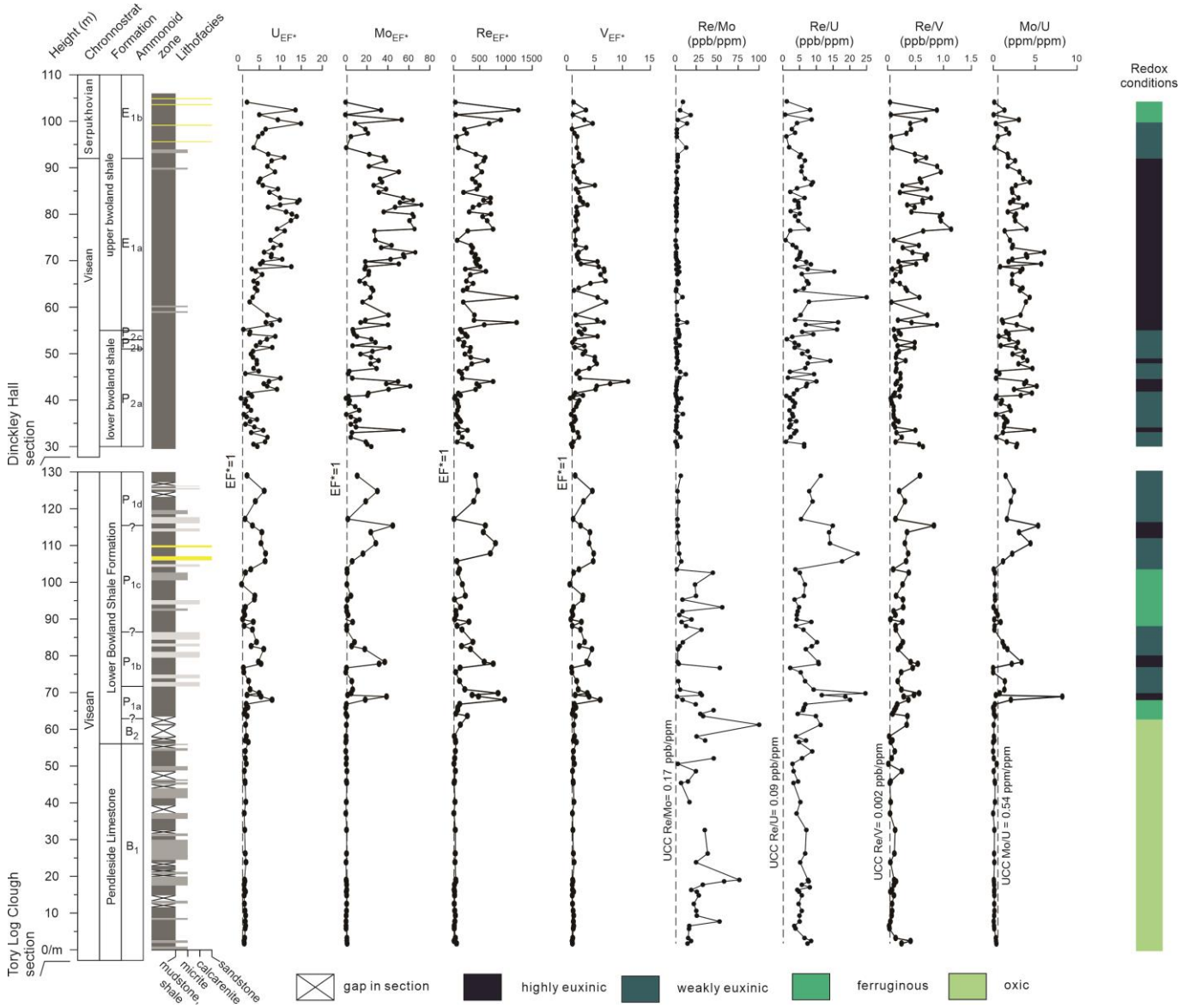

Fig. 3. Chemostratigraphic profiles for RSTM data through the Tory Log Clough and Dinckley Hall sections of the Carboniferous Bowland Basin, UK. Uranium and Mo data, and summary redox interpretations are from Li et al. (2024). Dashed lines on EF^* plots are at EF^* = 1, and dashed lines on ratio plots represent UCC values.

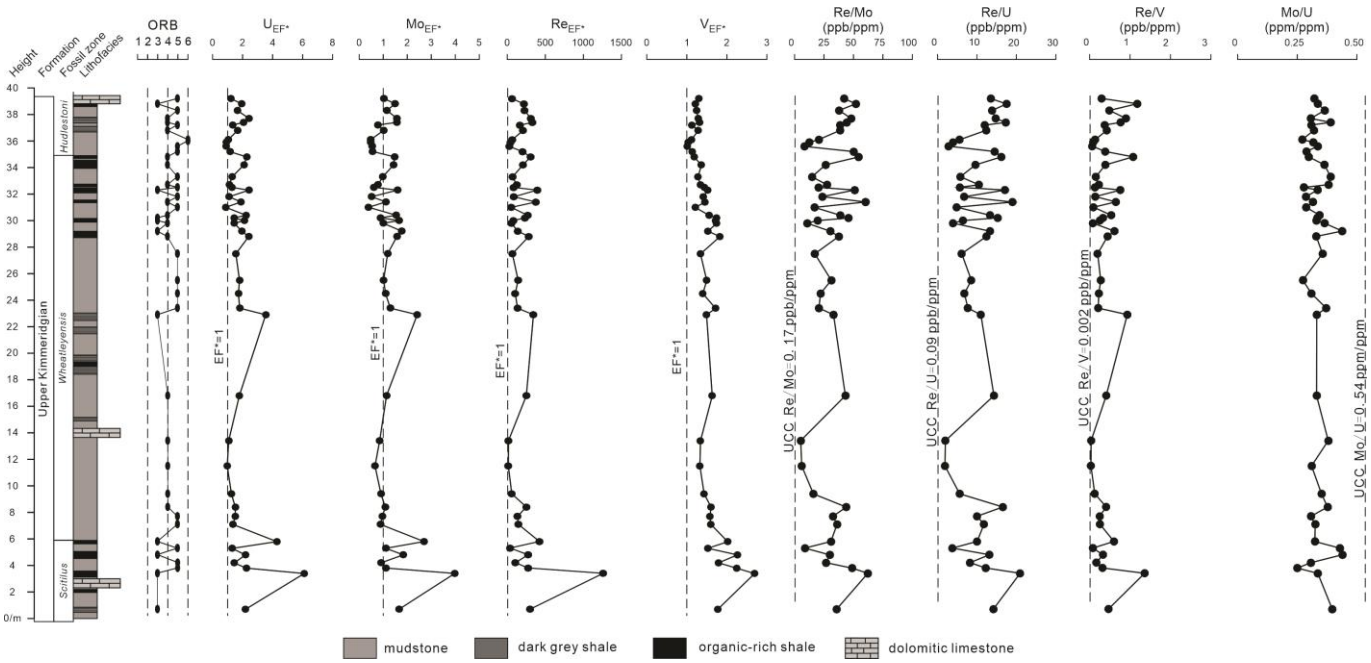

Fig. 4. Chemostratigraphic RSTM data and summary of oxygen-restricted biofacies through two intervals of the Jurassic Kimmeridge Clay Formation from the Wessex Basin, southern England (see Supplemental Table S2 for full data for all samples). Oxygen-restricted biofacies and lithological information are from Wignall and Hallam (1991) and Newton (2001). Dashed lines on EF^* plots are at $EF^* = 1$, and dashed lines on ratio plots represent the UCC values.

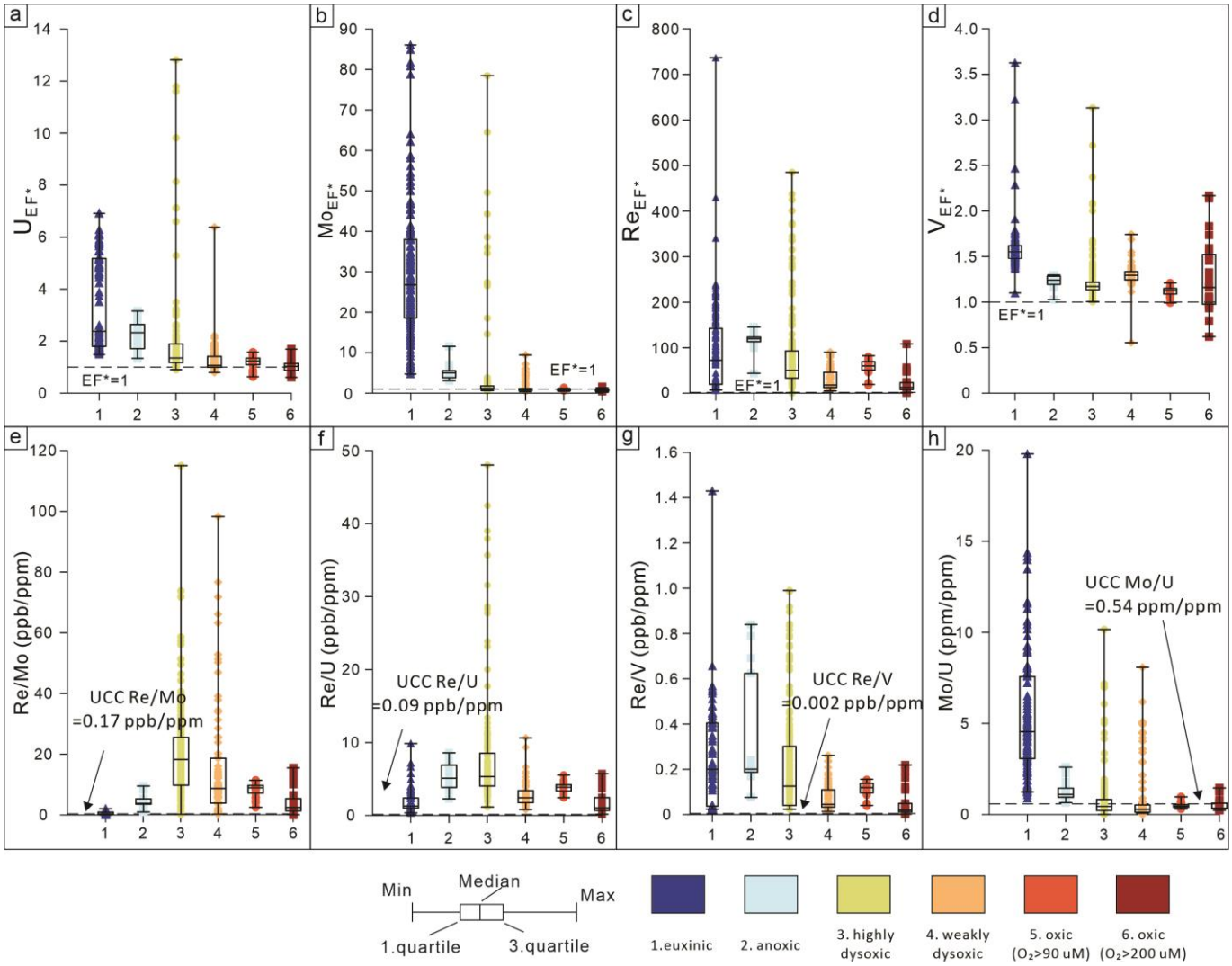

Fig. 5. Summary of RSTM enrichment factors and ratios for modern environments. Dashed lines on ratio plots represent UCC values.

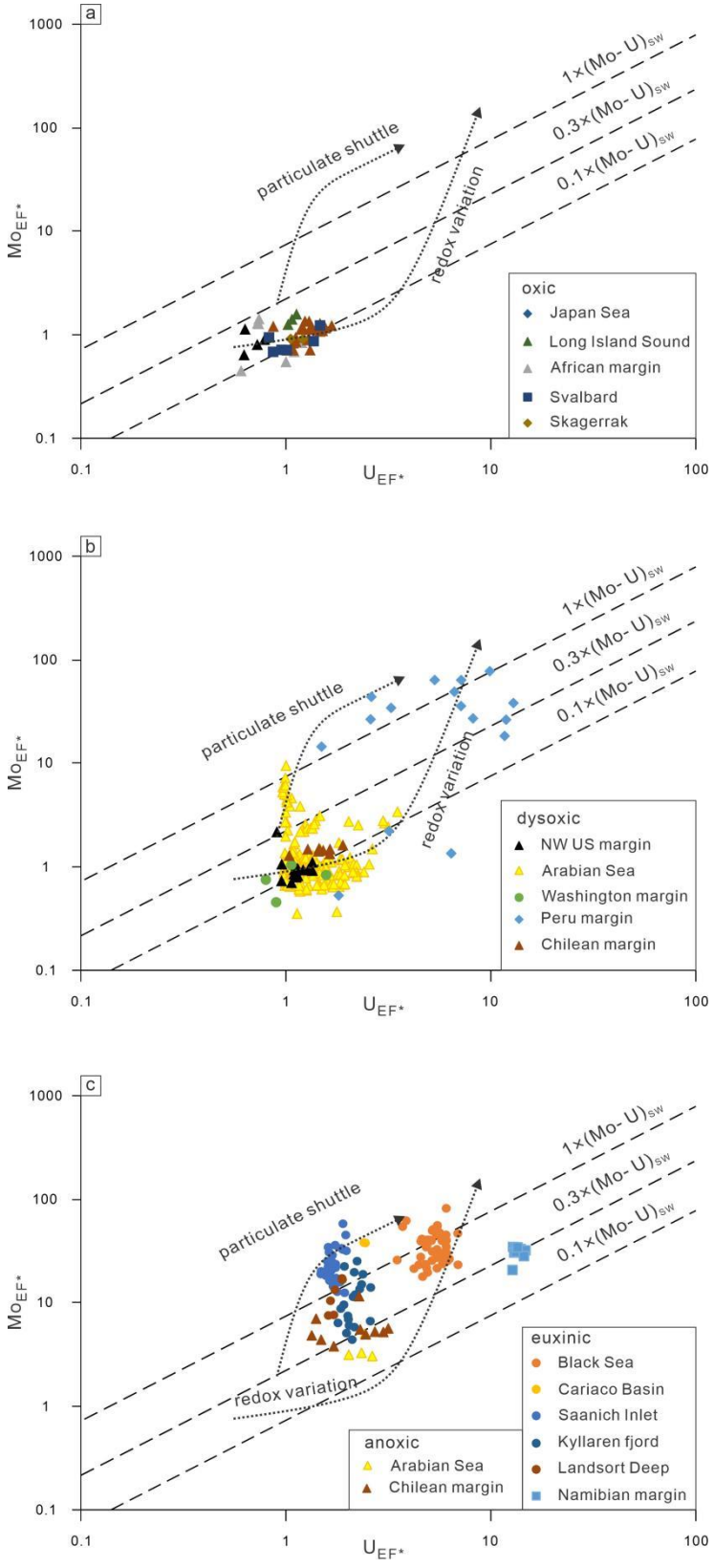

Fig. 6. Mo_{EF}^{*}-U_{EF}^{*} covariation for different redox conditions in modern environments. a) oxic settings; b) dysoxic settings; c) anoxic- euxinic settings. The diagonal dashed lines illustrate proportions of the seawater (SW) Mo/U molar ratio. Dotted lines indicate different Mo accumulation pathways, whereby the 'particulate shuttle' represents uptake of Mo during the water column precipitation of Fe-Mn (oxyhydr)oxides, and the 'redox variation' trajectory reflects oxic, through dysoxic and anoxic, to euxinic water column conditions (Algeo and Tribovillard, 2009).

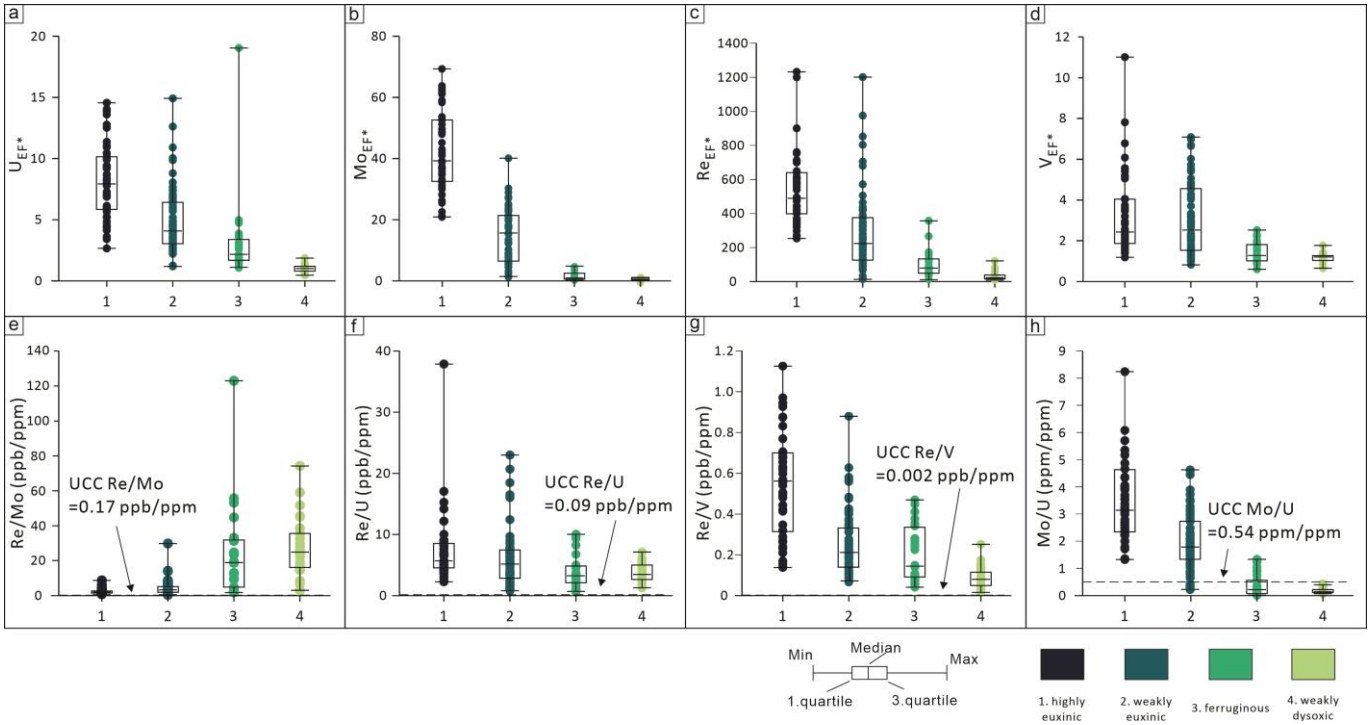

Fig. 7. Summary of RSTM data for the Tory Log Clough and Dinckley Hall sections of the Carboniferous Bowland Basin, UK. Dashed lines on ratio plots represent the UCC values.

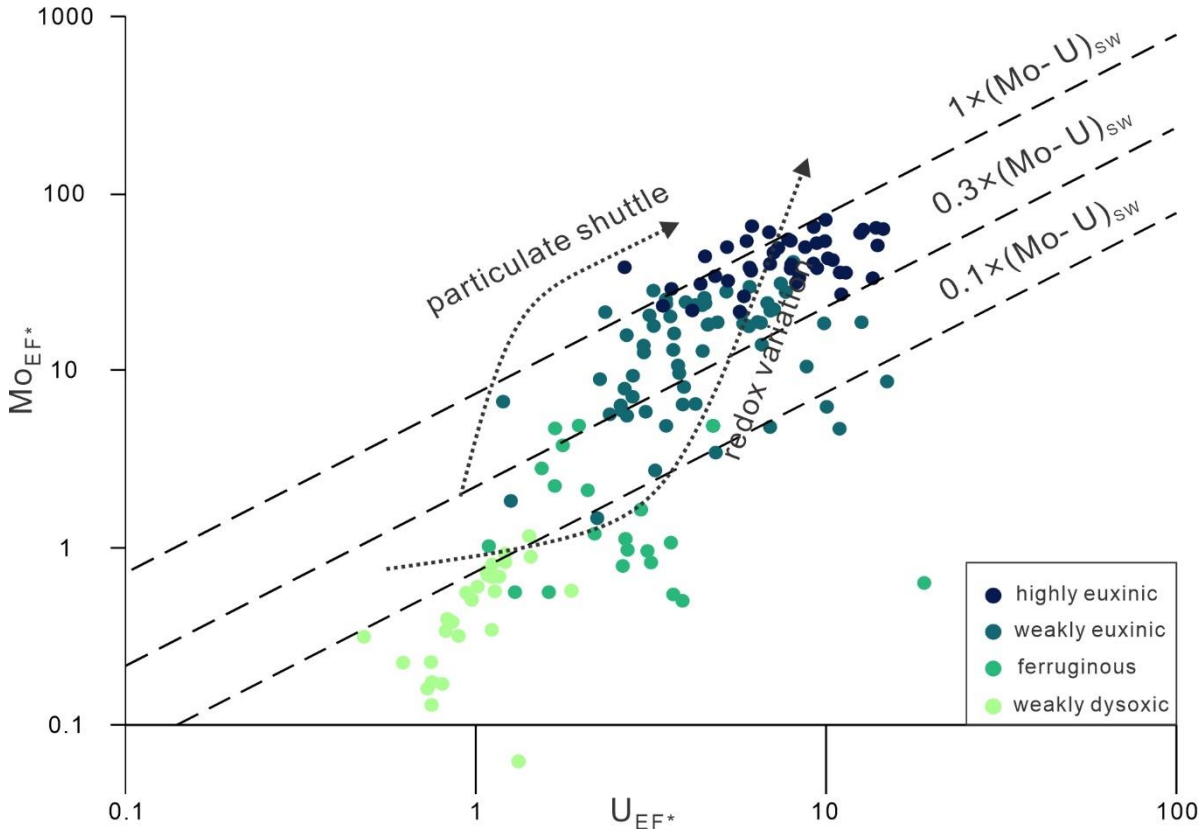

Fig. 8. Mo_{EF}^{*}-U_{EF}^{*} covariation for different redox conditions in the Bowland Shale Formation (cf. Li et al., 2023). The diagonal dashed lines illustrate proportions of the seawater (SW) Mo/U molar ratio. Dotted lines indicate different Mo accumulation pathways, whereby the 'particulate shuttle' represents uptake of Mo during the water column precipitation of Fe-Mn (oxyhydr)oxides, and the 'redox variation' trajectory reflects oxic, through dysoxic and anoxic, to euxinic water column conditions (Algeo and Tribovillard, 2009).

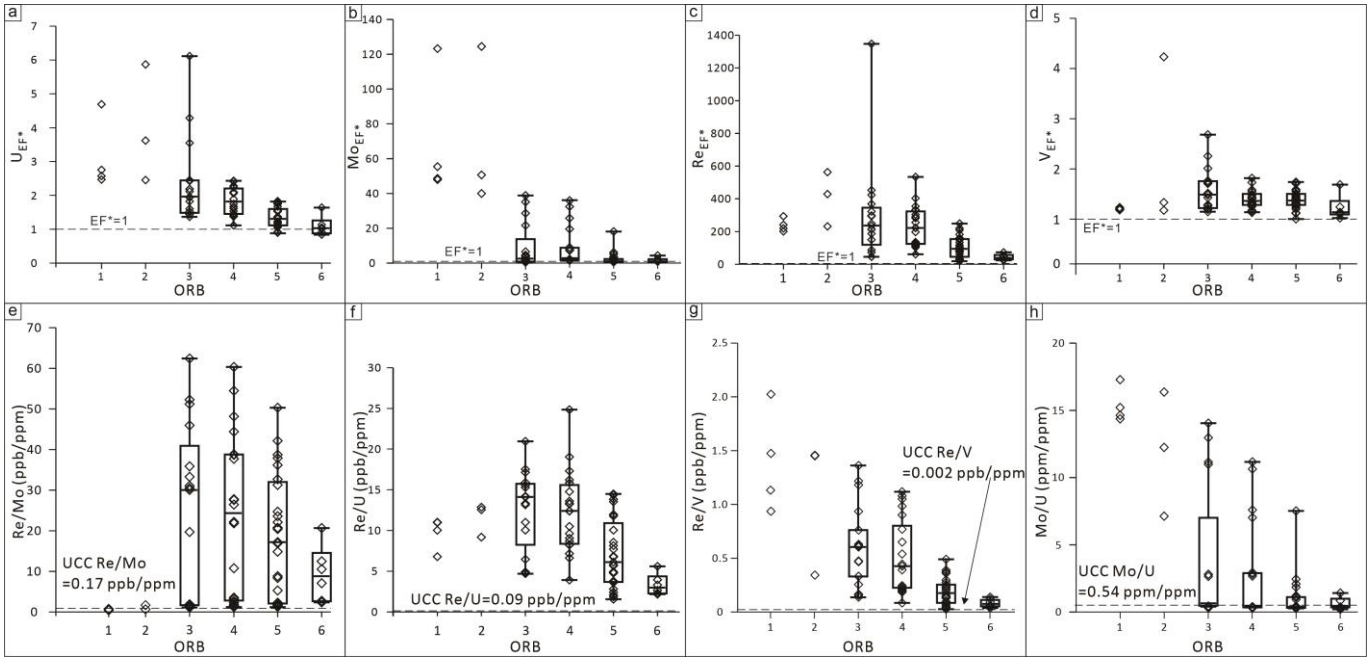

Fig. 9. Enrichment factors and RSTM ratios for the Kimmeridge Clay Formation. Samples are classified into 6 oxygen restricted biofacies groups (Raiswell et al., 2001). Boxes represent the 1st and 3rd quartile, separated by the median; whiskers indicate minimum and maximum values for each group. Dashed lines on EF^* plots are at $EF^* = 1$, and dashed lines on ratio plots represent UCC values.

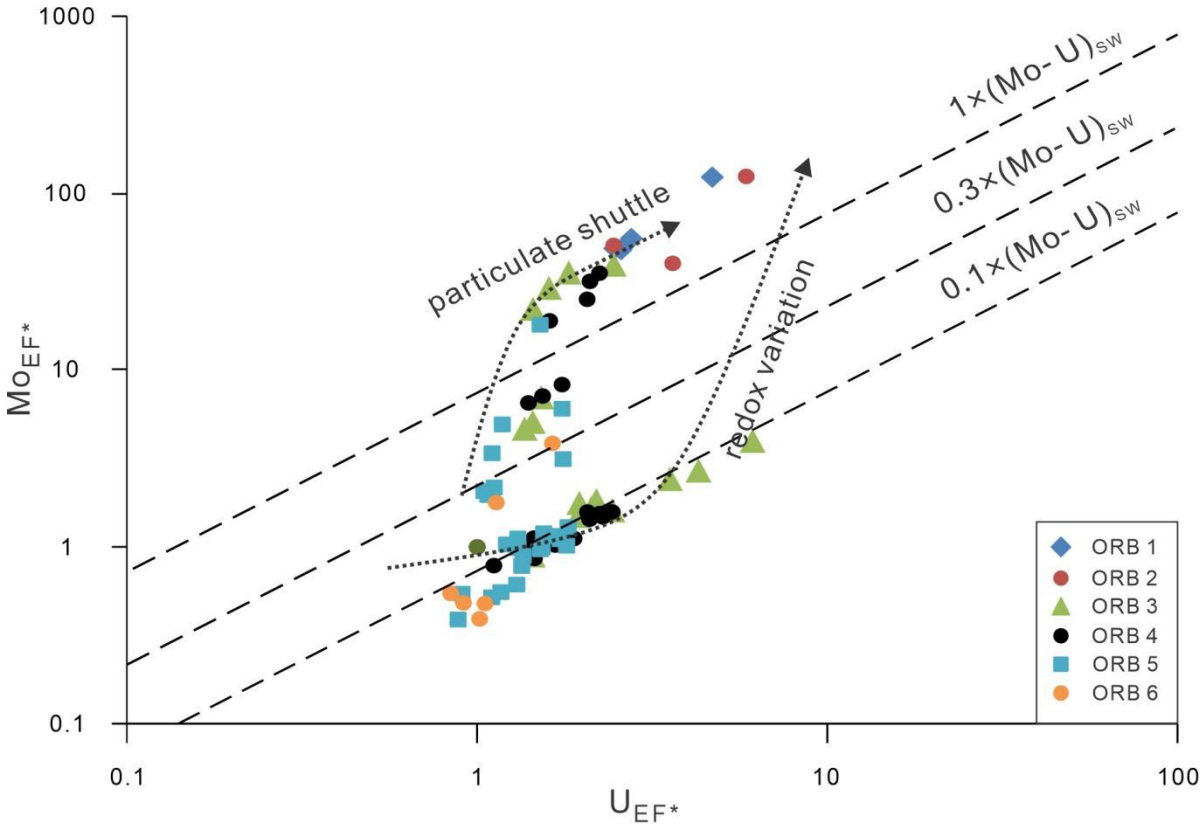

Fig. 10. Mo_{EF}^{*}-U_{EF}^{*} covariation for different oxygen restricted biofacies in the Kimmeridge Clay Formation. The diagonal dashed lines illustrate proportions of the seawater (SW) Mo/U molar ratio. Dotted lines indicate different Mo accumulation pathways, whereby the 'particulate shuttle' represents uptake of Mo during the water column precipitation of Fe-Mn (oxyhydr)oxides, and the 'redox variation' trajectory reflects oxic, through dysoxic and anoxic, to euxinic water column conditions (Algeo and Tribovillard, 2009).

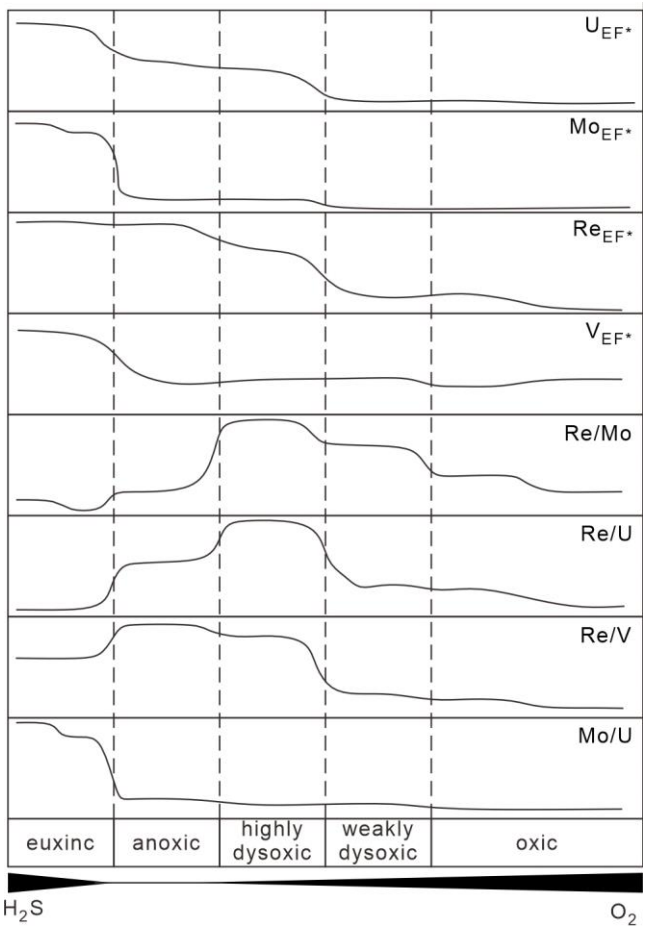

Fig. 11 Schematic behaviour of RSTM EF^* values and ratios as a function of the redox state of the depositional environment (the y-axis represents relative changes on a linear scale).