

Redox-sensitive proxies to reconstruct detailed palaeoecological conditions in the 1.1 Ga Taoudeni Basin, Mauritania

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The Atar/El Mreïti Group (1.1 Ga, Taoudeni Basin, Mauritania) is a shallow marine deposit recording remarkably preserved microfossils assemblages among which 11 species of eukaryotes and 37 *incertae sedis*.

In order to understand the environmental conditions in which these organisms thrived and the factors controlling the observed diversity, we developed a palaeoecological model based on (1) reconstruction of marine sedimentary depositional environments, during phases of marine transgression and regression, (2) reconstructions of palaeoredox depositional conditions, derived from iron speciation data, and (3) quantitative analysis of microfossils.

We showed that the recorded eukaryotic diversity is higher in oxic shallow marginal marine environments, where nutrient inputs are higher and thus that the eukaryotic diversity was controlled, at least in part, by the availability of molecular oxygen and the delivery of nutrients. This result is consistent with other models for the mid-Proterozoic oceans but represents basin-scale depositional conditions.

To complete this model at a finer scale, we studied the distribution of a suite of proxies, both redox-sensitive and non-sensitive, such as Ti, V, Cr, Mn, Co, Ni, Cu, Zn, As, Se, Mo, Cd, Re, Pb, Th, and U. Their distribution and intercorrelation highlight several characteristic horizons where metals and specific microfossil assemblages are associated, hence suggesting specific biological affinities or metabolic activities for some fossilized microbial populations linked to previously determined palaeoredox conditions.