S isotopes of pyrite from PTB sediments in the Perth Basin: toxic H_2S ocean in latest Permian and high bacterial activity in Early Triassic

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The Permian-Triassic boundary in marine sediments from Redback2 drill hole in Perth basin in Western Australia is makred by a change from massive bioturbated mudstone enriched in heavy and oxianionic trace elements to microbial laminated mudstone enriched in trace elements indicative of low oxygen ocean bottom environments.

C and S isotopes variations across the boundary display an 'S' pattern. $d^{13}C$ change from -24‰ to -31‰ , whereeas $d^{34}S$ change from -47‰ to heavier than -25‰ in wholerocks and up to 0‰ in pyrite nodules. The lighter signature of wholerocks is likely due to an admixture of sulfur from sulphides dissolved in seawater and adsorbed on sedimentary/organic particles.

C and S isotopic signatures and the general enrichment of siderophile trace elements suggest anoxic ocean bottom in latest Permian. Permian sedimentary horizons enriched in toxic elements, such as Ni, Co, Se, As, Te, Sb, correlated with wholerock sulphur isotopes may indicate mafic volcanic H_2S and trace element contribution to seawater chemistry.

C and S isotopic signature of Early Triassic whole rocks and pyrite nodules suggest sulphide oxidation bacteria activity during diagenesis rather than admixture of sulphate component.

The sample at the precise PTB contains euhedral pyrite only and is characterized by an abnormally positive $d^{34}S$ (> +4‰) in individual pyrites as well as in wholerock, however, there is no correlation with trace elements contents. Large changes in S and C isotopes in pyrite from the PTB was also registered in Hovea drill hole [1], but there it is characterized by highly dispersed, rather than strongly positive values. The general patterns of isotopic variations over time are very similar in both PTB locations in the Perth Basin.

[1] Kliti Grice,et al (2008) Photic Zone Euxinia During the Permian-Triassic Superanoxic Event. *Science*, v.**307**, p.706–709.