δ²³⁸U in organic-rich marine and lake sediment suggest surface oxygenation at 3.0 Ga

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The timing of the onset of oxygenic photosynthesis is still debated, with current estimates spanning over one billion years. A previous study combining trace element, iron isotope, and U-Th-Pb geochronology suggests a stratified 3.2 Ga ocean, with slightly oxygenated surface ocean and a completely anoxic deep ocean (Satkoski et al., 2015). Statistical treatment of previous and new U isotope data shows a detectable transition in uranium isotope systematics at around 2.95 Ga, suggesting a sizable shift in oxidative weathering on Earth’s surface. In particular, several samples from the Singen Iron formation in the Pongola Supergroup yielded fractionated δ²³⁸U (Wang et al., 2017). Signs of oxygenation at 2.95 Ga were also suggested by previous Cr and Mo isotope studies (Crowe et al., 2013; Plana

References