# Archaean barite: Strontium isotopes as a tracer of early crust-mantle evolution

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Barite, formed in some Archaean marine settings, is less susceptible to later alteration than carbonates and thus is more reliable in reconstructing the isotope composition of Archaean seawater. Due to the long residence times and redox insensitivity in the oceans, the Sr isotopes can be used to link the Sr-seawater trend with crustal evolution. Stratiform barites were deposited simultaneously with chromiferous chert in the Ghattihosahalli Schist Belt (equivalent in age to the neighbouring ~3.3 Ga Sargur Schist Belt), Western Dharwar Craton, India. Strong spatial heterogeneities have been preserved in S isotopes [1], Sr isotopes and major elements (this study) despite pervasive ductile deformation and regional amphibolite facies metamorphism over long time-scales. The transparent primary barite grains with Rb/Sr ratio <0.003 preserve a least radiogenic $^{87}Sr/^{86}Sr$ ratio of 0.701338±17 (2σ) that most likely records the isotope ratio at the time of formation. The contemporaneous mantle value of ~0.7007 [2] shows that the barites formed at ~3.2 Ga from a reservoir with elevated Rb/Sr, most likely derived from continental crust.

The Sr isotope composition of continental crust through time is difficult to access due to its vulnerability to thermal overprinting and recrystallization. The initial isotopic composition of crustal rocks is better preserved in the accessory mineral apatite which is highly resistant [3]. The Sr isotope data from the Dharwar Craton, along with those determined on barite from the Barberton Greenstone Belt [4] supports a gradual rise in $^{87}Sr/^{86}Sr$ of seawater over time rather than a steeper evolution from 3.46 Ga as proposed elsewhere [5]. This also questions the high net rates of continental growth during that time [6].

[1] Muller et al. (2017) *Pre. Res.* 295, 38-47 [2] Shields and Veizer (2002) *Geochem. Geophys. Geosyst.* 3, 1-12 [3] Tsuboi and Suzuki (2003) *Chem. Geol*. 199, 189-19 [4] Henshall (2017) diss. ETH No. 24171 [5] Satkoski et al. (2016) *Earth Planet. Sci. Lett.* 454, 28-35 [6] Dhuime et al. (2012) *Science* 335, 1334-1336