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Updated Re-Os ages and Os isotope data from the Tonian Wynniatt Formation, Shaler Supergroup, Canada: constraining timing and paleoweathering for the Bitter Springs anomaly

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The Tonian Period (ca. 1000-717 Ma) was a pivotal time in the evolutionary history of eukaryotic life, punctuated by prominent paleoenvironmental and geobiological events including supercontinent amalgamation [1], large carbon isotope excursions (CIEs) [2], and early records of biomineralizing eukaryotes [3]. One of the most prominent biogeochemical features from this time is the Bitter Springs anomaly, a ~ -5‰ CIE that has been documented from sedimentary successions globally [2]. Though the causal mechanism(s) of the excursion are not well understood, its broad coincidence with redox fluctuations and the emergence of novel biomineralizing clades highlights its importance for investigating geobiological change during the Neoproterozoic [3-5]. However, widespread radioisotopic age constraints remain sparse for the Bitter Springs anomaly, which has limited efforts for global age models and correlation of biogeochemical and paleontological data crucial for studying this turning point in the history of life.

Here, we provide new Re-Os ages for syn-excursion strata from the Wynniatt Formation, Shaler Supergroup, Northwest Territories, Canada. These data provide valuable updated age constraints for the Wynniatt Formation that will ultimately improve age models for both the Shaler Supergroup and regionally correlated strata throughout NW Canada. We also provide initial seawater Os isotope ratios (Osi) during the Bitter Springs anomaly, providing constraints on the relative influences of and changes in continental weathering and mantle-derived Os fluxes with implications for understanding potential causal mechanisms such as changes in paleoclimate and/or ocean nutrient fluxes.

References

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