

Dating the dramatic and dynamic in the Neoproterozoic: New Re-Os age constraints and paleoweathering proxy data

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The Neoproterozoic Era (1000-541 Ma) witnessed the return of widespread glaciations, major fluctuations in geochemical proxy records, and numerous biological innovations associated with the radiation of eukaryotes that culminated with the emergence of Metazoans. Understanding the drivers and rates of change through this critical transition has been limited by the lack of a robust chronology. Here we present multiple new Re-Os geochronology data from Neoproterozoic sedimentary strata from China and North and South America that refine global correlation schemes and further constrain this critical interval of Earth history. Our new age constraints help define the temporal framework for events including the earliest evidence of eukaryotic biomineralization seen in the fossil record, the Bitter Springs carbon isotope anomaly, large-scale weathering perturbations associated with the termination of the >55 Myr Sturtian glacial epoch, and the “Shuram-Wonoka” carbon isotope anomaly, which is the largest perturbation to the carbon cycle recorded in the geological record.