

Nitrogen in Strongly Peraluminous Granites Provides Insight to the Timing and Nature of Biomass Burial between the Precambrian and Phanerozoic.

**FAWN S. M. HOLLAND¹, EVA E. STÜEKEN¹, WEI DAN²,
PENG WU³, YU ZHU⁴ AND SAMI MIKHAIL¹**

¹University of St Andrews

²Guangzhou Institute of Geochemistry, Chinese Academy of Sciences

³Chengdu University of Technology

⁴Yangtze University

We present new nitrogen abundance data from strongly peraluminous granites (SPGs) between 780-1040Ma to infer changes in biomass burial between the Precambrian and Phanerozoic. Because SPGs are formed via partial melting of metasedimentary rocks, they can be used to investigate the environmental history which was initially recorded in their sedimentary protoliths. For example, the nitrogen [1] and phosphorous [2] abundances for SPGs show elevated concentrations in the Phanerozoic relative to Archean and Proterozoic samples. Because nitrogen and phosphorous are both enriched in biomass, the concurrent increase in [N] and [P] suggests an increase in biomass burial across the Precambrian-Phanerozoic transition. Importantly, biomass contains high levels of organic carbon, which is a reductant, meaning that the enhanced biomass burial would have contributed to atmospheric oxygenation around that time.

This study provides whole rock nitrogen data for SPGs, resolving an existing data gap in the literature between the Proterozoic and Phanerozoic (470–1435Ma). This enables us to better resolve when the increase in biomass burial occurred. This is an important time gap because of the overlap with the Neoproterozoic oxygenation event (the largest rise in atmospheric O₂) and the Cambrian Explosion (the rise of animal life). Our data will allow us to test the relative timing of biomass burial against the oxygenation and complexification of the biosphere.

[1] Mikhail, S. et al., (2024), *Geology*, 52, 87-91.

[2] Bucholz, C.E. (2022), *Earth and Planetary Science Letters*, 596, p.117795.