# *Sr*ching for silicate weathering feedback in the geological record

C. R. PEARCE[1*], G. L. FOSTER[2], P. F. SEXTON[3], M. J. HENEHAN[4], K. M. EDGAR[5] AND I. J. PARKINSON[5]

[1]National Oceanography Centre Southampton, European Way, Southampton, SO14 3ZH; c.r.pearce@noc.ac.uk
[2]Ocean and Earth Sciences, University of Southampton, European Way, Southampton, SO14 3ZH
[3]Department of Environment, Earth and Ecosystems, The Open University, Walton Hall, Milton Keynes, MK7 6AA
[4]Department of Geology & Geophysics, Yale University, 210 Whitney Avenue, New Haven, CT 06511
[5]School of Earth Sciences, University of Bristol, Wills Memorial Building, Queen's Road, Bristol, BS8 1RJ

Silicate weathering feedback is one of the principal mechanisms thought to regulate atmospheric $CO_2$ and climate throughout Earth's history [1]. Central to this hypothesis is the concept that continental weathering is enhanced during episodes of global warming and remains elevated until atmospheric $CO_2$ levels, and hence global temperatures, have returned to their pre-perturbation states. Ground-truthing this theory requires proxies that are sensitive to changes in global weathering regimes over timescales equivalent to the climatic perturbations. The radiogenic strontium ($^{87}Sr/^{86}Sr$) isotope system has frequently been used to characterise such changes in continental weathering through time, although limits on analytical precision coupled with the long residence time of Sr in seawater (>2 Myr) have traditionally meant that significant shifts in the flux and/or composition of Sr reaching the oceans were needed to detectably perturb the $^{87}Sr/^{86}Sr$ composition of seawater over short timescales. However, recent increases in Sr analytical precision now mean that variations in $^{87}Sr/^{86}Sr$ can be used to constrain the extent of continental weathering over short (<100 kyr) intervals [2], raising the possibility of using this system to investigate transient increases in continental weathering and potentially provide the 'smoking gun' for silicate weathering feedback.

This study presents new high-precision $^{87}Sr/^{86}Sr$ data across the PETM and MECO hyperthermal events. Foraminifera from multiple core sites are used to verify the global nature of these high-precision Sr records and their ability to assess changes in global weathering during these extreme climatic intervals. Our results are compared to other weathering sensitive proxy data and to the weathering perturbations predicted across these periods, and are used to assess the extent to which silicate weathering feedback may have contributed to climatic recovery during these events.

[1] Berner *et al*. (1983) *Am. J. Sci*., v.**283**, p.641-683. [2] Mokadem *et al*. (2015) *EPSL*, v.**415**, p.111-120.