Submicron measurements of Mg isotopes in biogenic carbonates using LA-MC-ICPMS

ALEKSEY SADEKOV[1]*, NICHOLAS S. LLOYD[2], SAMBUDDHA MISRA[1], ANTJE MEWES[3], STEPHEN SHUTTLEWORTH[4], GERALD LANGER[1], JELLE BIJMA[3] AND HENRY ELDERFIELD[1]

[1]Department of Earth Sciences, University of Cambridge, Cambridge. CB2 3EQ. UK (*correspondence: Aleksey.Sadekov@esc.cam.ac.uk)

[2]Thermo Fisher Scientific, Hanna-Kunath-Str. 11, 28119 Bremen, Germany

[3]Alfred Wegener Institute, Am Handelshafen, 2, D27570 Bremerhaven, Germany

[4]Teledyne Photon Machines, Gallatin Park, Bozeman, MT 59715, USA

Magnesium is one of the most abundant elements in the earth's crust and in seawater. Fractionation of its stable isotopes has been shown to be useful indicator of many geological, chemical and biological processes. For example, biogenic carbonates display ~4‰ range of δ^{26}Mg values, which is attributed to variable degree of biological control of Mg ions during biomineralisation. Understanding this biological control is essential for developing proxies based on biogenic carbonates. Current methods of magnesium isotope measurements in carbonates are often time consuming and require relatively large sample volume. In this work, we present a new approach of measuring Mg isotopes in biogenic carbonates using Laser Ablation MC-ICP-MS. We will show that this microanalytical approach provides accurate and relatively fast measurements of Mg isotopes in biological carbonate with precision down to 0.2‰ (1σ). But to achieve this level of precision, matrix matching between samples and standards is required. We will present extensive investigation of Mg isotopes fractionation under different laser parameters and standard-sample pairs. We will also demonstrate how our new method can provide additional information about biomineralisation. For example, we will demonstrate submicron variation in Mg isotopes across shells of planktonic foraminifera *Orbulina universa* and Mg isotope composition of different groups of benthic foraminifera. Both examples will be used to draw attention to the complexity of Mg incorporation into biogenic carbonates.