# Chlorine distribution and structural state within the aragonite shell of the long-lived marine mollusc *Arctica islandica*: exploring a potential palaeosalinity proxy

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Chloride is a major component of seawater. Incorporation of variable concentrations of this anion within biomineral carbonates (e.g., brachiopod shells, coral skeletons, foraminiferal tests and mollusc shells) could potentially be used as a seawater palaeosalinity proxy.

Synchrotron radiation micro-XRF and X-ray Absorption Near Edge Structure (XANES) techniques have been used to map the distribution and investigate the structural state of chloride within thin sections of the argonite shell of the long-lived marine mollusc *Arctica islandica*. Data were collected on GSECARS (GeoSoilEnviroCARS) X-Ray Microprobe beamline 13-ID-E at the Advanced Photon Source (APS), Argonne National Laboratory, Illinois, U.S.A. Reference XANES spectra have been generated for different seawater-relevant chloride compounds, such that the chlorine K-edge XANES features can be used to study the structural state of chloride within the natural carbonate biomineral samples.

Micro-XRF elemental mapping of chloride distribution within the *Arctica islandica* specimens also is compared to previously identified heterogeneity in bromide incorporated within the same aragonite mollusc shell samples, seawater bromide being another major component of seawater and thus another potential seawater palaeosalinity proxy. Documented heterogeneity of these two elements within large biomineral carbonate skeletons, such as mollusc shells (and potentially also brachiopod shells and corals), has implications for future sampling strategies if bromide and chloride concentrations are to be used for robust non-biased time-series palaeosalinity reconstructions.