

Accelerator mass spectrometry with bespoke spectrometers: experience with ^{36}Cl and prospects for actinides

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The analysis of accumulated cosmogenic ^{36}Cl by accelerator mass spectrometry (AMS) is a valuable environmental and geological sciences research tool. Overcoming the ^{36}S stable nuclide isobar interfering with measurement is challenging, however. Traditionally this has required large accelerators, but following recent technical advances it is now possible with ~30 MeV ion energies and 5 MV, or even smaller, modern bespoke spectrometers. Accordingly a new generation of these is being deployed around the globe, increasing accessibility and promoting wider and more varied ^{36}Cl use.

However, the technical ability to identify ^{36}Cl ions is quite distinct from demonstrated high-performance AMS. ^{36}Cl -analysis quality assurance data from the SUERC 5 MV spectrometer will be presented to demonstrate routinely achievable quality and highlight characteristics of such bespoke instruments. In particular, the Scottish data serves a proxy for the possibilities of the new 1 MV and 6 MV spectrometers being acquired at ANSTO as a part of the Centre for Accelerator Science.

The first machine to be commissioned will be a 1 MV instrument designed especially for actinide AMS. Actinide analysis capability development is trending as has ^{36}Cl -AMS, and much of the early work was done with larger legacy-physics accelerators. It is anticipated that with the new small spectrometer the sample throughput and precision will be considerably improved allowing new applications for actinides.