CURRENT PROJECTS

GeoQuEST contribution to a cosmogenic nuclide mineral separation laboratory in the School of Earth and Environmental Sciences, UOW

In the last decades, cosmogenic nuclides have become increasingly important in the Earth Sciences. These nuclides are produced in rocks (termed *in situ*) at the Earth's surface, and in the atmosphere (termed *meteoric*), by bombardment of atoms by high-energy cosmic particles originating from our galaxy. *In situ* cosmogenic nuclides will accumulate in surficial deposits over time such that their concentration will be directly related **to both the exposure age** and the **rate at which the surface is eroding**. Thus, by measuring the abundance of cosmogenic nuclides in a rock, river sediment, or soil sample, we can determine the length of time this material has resided on the Earth's surface, and also how quickly it was brought to the surface by the removal of overlying material. In essence, the cosmogenic nuclide technique is similar to radiocarbon dating, but it can determine surface exposure ages and erosion rates back in time over a much broader timescale: from a couple of hundreds to several millions of years.

The preparation and analysis of cosmogenic nuclide samples is a lengthy and complex process, and can be broken down into three different steps: (i) preparation of ultrapure mineral separates, (ii) extraction of isotopes of choice, and (iii) isotope ratio determinations. The very low rate at which cosmogenic nuclides are produced – a couple of atoms per gram of rock per year – means that isotope ratio determinations are done via Accelerator Mass Spectrometry (AMS). The AMS facility at ANSTO routinely does measurements for cosmogenic ^{10}Be and ^{26}Al – the two isotopes used the most in current research. The preparation of ultrapure mineral separates – in this case of the mineral quartz – is extremely time consuming and is currently the 'bottleneck' in the chain of analyses. To this end, GeoQuEST has contributed towards the setting up of a dedicated wet chemistry laboratory with ample space to house specialised mineral separation equipment and a large volume of samples, and that is equipped with two regular-sized fume-hoods.

The new laboratory located in 41.301 supports the work of numerous staff and PhD students.

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