THE DEVELOPMENT OF AMS MEASUREMENTS OF MANGANESE-53 FOR EROSION RATE STUDIES

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Much of the recent research involving the detection of cosmogenic ^{53}Mn has focused on meteorites where typical relative concentrations of the radioactive to stable isotope are at the 10^{-9} level or higher. In contrast, geochronological applications, such as erosion rate studies, demand much higher sensitivities, down to the 10^{-12} level. Recent advances in accelerator mass spectrometry (AMS) at the Australian National University have achieved this level of sensitivity and opened the way to the use of ^{53}Mn as a powerful tool for landscape evolution studies. Because of its long 3.7 Ma half life, it may be paired with other cosmogenic isotopes, either radioactive ^{10}Be or stable ^{21}Ne, in order to study surfaces eroding at very low rates, below 0.1 m/Ma. Since Fe is the main target for its production, ^{53}Mn is well suited to ancient iron-rich landscapes such as those found throughout Australia, especially at sites where quartz-bearing minerals may have weathered away.

Measurements have been recently performed at the ANU with the aim to calibrate the ^{53}Mn production rate. These have been carried out using haematite samples collected from surfaces in Brazil whose age implies a saturated ^{53}Mn concentration and are known to have very low rates of erosion (< 0.1 m/Ma). The AMS measurement technique for ^{53}Mn is described and first results for the ^{53}Mn production rate will be discussed.