^{53}Mn: a Tool to Determine Interplanetary Dust Flux on Earth over Several Million Years

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^{53}Mn ($T_{1/2}$ = 3.8My) is formed by spallation due to cosmic rays on Ni and Fe in extraterrestrial matter. Because of the long exposure time and cosmic rays' high intensity, the concentrations are order of magnitudes more than on Earth. Measuring ^{53}Mn concentrations in formations like ferro-manganese crusts on Earth reveals the interplanetary dust flux on Earth over a very long time. The Munich AMS facility [1] allows ^{53}Mn/Mn determinations down to a ratio of about 10^{-14}. We measured ^{53}Mn/Mn concentrations by means of accelerator mass spectrometry (AMS) in dated layers of ferro-manganese crusts. The exponential decay of ^{53}Mn can be seen over several million of years. Combining this with ^{10}Be ($T_{1/2}$ = 1.3 My) concentrations, determined in the same layers, yields to the flux. ^{10}Be is formed primarily by cosmic rays in the Earths' atmosphere, thus fluctuations of cosmic rays intensity are cancelled by the decay corrected ratio of ^{53}Mn/^{10}Be. We see that the cosmic dust flux is almost constant of million of years, neglecting possible short time fluctuations. Those cannot be seen because of a limited time resolution for our samples of about 300ky.

References

[1] K. Knie, T. Faestermann, G. Korschinek, G. Rugel, W. Rühm, and C. Wallner, *Nucl. Instr. Meth.* **B172**, 717, (2002).