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A novel method to determine the half-life of 32Si

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A novel method using high-resolution 10Be concentrations to correct 32Si data from independently dated depth profiles is presented. It is demonstrated that by correcting 32Si deposition rates for temporal changes based on production rate fluctuations the derived half-life of 32Si agrees with half-life determinations based on physical measurements of artificial samples.

Currently, the half-life of 32Si is not accurately known. Moreover, results from physical measurements of artificial samples yielded much shorter half-lives (100-172 yr) than results based on depth profiles. For depth profiles most results were between 250 and 300 yr (Clausen, 1973), with the exception of a relatively recent work on a varved lake sediment which resulted in 178 yr (Nijampurkar et al., 1998).

Using high-resolution 10Be concentrations from the Dye3 ice-core each data point of the Northern hemisphere ice-core 32Si concentrations is corrected for temporal variations in deposition rate. This means that we assume that temporal variations in 32Si and 10Be deposition are identical instead of using the assumption of constant deposition rates that resulted in the long half-lives. In the case of the varved lake sediment, 32Si/Si ratios are corrected in the same way as 32Si concentrations for the ice cores.

We present our results that half-lives of longer than 180 yr can be ruled out for 32Si and propose using 10Be and 32Si concentrations from the same samples of independently dated profiles as a new method to apply 32Si for dating purposes. Preliminary results have been presented at the QRA meeting in Glasgow 2006 {schnabel et al., 2006].

HB Clausen, Journal of Glaciology 12 (1973) 411.

VN Nijampurkar et al., Earth and Planetary Science Letters 163 (1998) 191.

C. Schnabel, J. Beer, HB Clausen, QRA annual discussion meeting Glasgow, 2006.