NEW CONSTRAINTS ON THE ORIGIN OF SHORT-LIVED ^{10}Be IN THE EARLY SOLAR SYSTEM.

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Introduction: Since its finding in CAIs [1], short-lived ^{10}Be has generally been considered to be the product of interactions between energetic particles emitted by the young active Sun and the inner edge of the solar accretion disk [1-3]. Models [3-6] show that, contrary to ^{26}Al, no special conditions (in fluence or target composition) are required to produce the amount of ^{10}Be observed in CAIs (and the same is true for other SLRs such as ^{41}Ca). However two other origins have been proposed for ^{10}Be: (i) trapping of galactic cosmic rays in the presolar cloud [7] and (ii) implantation in CAIs or their precursors of protosolar wind [8]. These different scenario make different predictions that can be tested in light of the growing number of ^{10}Be data for CAIs and refractory grains. Here we report [9] a study (^{10}Be and ^{26}Al) of three "classical" Efremovka CAIs, one of which showing signs for the incorporation of ^{41}Ca [10-11]. These new data, and previous ones, are used to better constrain the origin of ^{10}Be.

Experimental and results: The B and Mg isotopic compositions have been measured with the CRPG ims 1270 and 1280HR2 ion probes according to procedures already described (B isotopic ratios were calculated from ratios of total counts). The three CAIs from the CV3 Efremovka (E36, E65 & E66) have also been previously described [12]: E66 is a coarse grained type A CAI, E36 is a droplet shape type B2 CAI, and E65 is a type B1 CAI. The three CAIs show initial $^{10}Be/^{9}Be$ and $\delta^{11}B$ values which are identical within errors (2 sd): $7.0\pm1.4\times10^{-4}$ and -14.9±4.0‰ for E36, $7.0\pm1.7\times10^{-4}$ and -10.0±4.0‰ for E65, and $7.6\pm2.9\times10^{-4}$ and -10.5±6.8‰ for E66. They show well behaved ^{26}Al isochrons with initial $^{26}Al/^{27}Al$ ratios ranging from $4.33\pm0.18\times10^{-5}$ and $4.74\pm0.09\times10^{-5}$, but some clear signs of late perturbations are present in E65. .

Discussion: This new ^{10}Be data, in addition to previous ones [1,2,4,13-16] demonstrate two important observations for ^{10}Be : (i) contrary to ^{10}Be, there is no "canonic" or solar system initial which can be defined for $^{10}Be/^{9}Be$ and (ii) the initial $\delta^{11}B$ values of CAIs show significant variations which have a relationship with the initial $^{10}Be/^{9}Be$ excluding the decay of ^{10}Be in a reservoir with an homogeneous initial $^{10}Be/^{9}Be$ to be the source of the B isotope variations. The ^{10}B-rich initial $\delta^{11}B$ values imply that the reservoir which was irradiated to produce ^{10}Be had low B/Be ratios, contrary to those where spallation reactions take place in GCR or in the protosolar atmosphere. Irradiation of refractory solids, presumably the refractory precursors of CAIs made by condensation in the disk, seems to be the dominant source of ^{10}Be.

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