SOLAR SYSTEM SHIFTS IN OXYGEN ISOTOPES ASSOCIATED WITH SUPERNOVA INJECTION OF ALUMINUM 26. C.I. Ellinger[1], P.A. Young[1] and S.J. Desch[1]. [1]School of Earth and Space Exploration, Arizona State University. steve.desch@asu.edu..

Injection of material ejected from a core-collapse supernova, into the solar system's already formed disk, is one proposed mechanism for producing the short-lived radionuclides such as ^{26}Al, inferred from isotopic studies of meteorites to have existed in the solar nebula. Gounelle & Meibom [1] have argued that injection of sufficient supernova material to explain the abundance of ^{26}Al inferred from meteorites would necessarily shift the oxygen isotopic composition of the solar system, reducing δ^{17}O and δ^{18}O by several tens of per mil. The lack of evidence for such shifts, [1] argue, excludes a supernova origin for ^{26}Al. We critically examine this claim and investigate whether such large isotopic shifts necessarily follow injection of a meteoritic abundance of ^{26}Al. Unlike previous studies, we consider the anisotropy of supernova explosions in a 3D simulation and compute local production of isotopes in spatially distinct regions in the supernova (see [2] for more details). Supernovae explode quite often with at least some degree of anisotropy and a forming solar system is likely to receive *not* the average composition of the ejecta (as [1] assume), but material from particular zones within the supernova. We consider in particular zones where ^{26}Al is produced.

We find that predictions of the production of ^{18}O is initially very dependent on the thermodynamic history of the region due to the temperature-dependent branching ratio of ^{18}F at high ($>10^9$ K) temperatures. At the end of the anisotropic supernova simulation, however, we find that the abundance of ^{18}O in the ejecta is in general much higher than in spherically symmetric (1D) simulations. Shifts in δ^{17}O, on the other hand, have a smaller range, tend to be positive, and only a few per mil in magnitude. Significantly, the shifts could move the solar nebula material from a composition similar to that of the Sun, as measured by the Genesis mission, to a composition like that of calcium-rich, aluminum-rich inclusions or CAIs, the first solids to form in the solar system. That is, injection of ^{26}Al quite plausibly might shift oxygen isotopic ratios from near (-60‰,-60‰) in the three-isotope plot for oxygen [3], to a point near (-50‰,-50‰) corresponding to the first condensates in CAIs e.g., [4-5]. We conclude that injection of ^{26}Al from a supernova is **not** incompatible with the oxygen isotopic ratios of solar nebula materials.

References: [1] Gounelle, M. and Meibom A. 2007, ApJL 664, L123. [2] Young, P. A., Ellinger, C. I., Arnett, D., Fryer, C. R., & Rockefeller, G. L., 2009, ApJ, submitted. [3] McKeegan, K.D. et al. 2009, LPSC 40, 2494. [4] Ushikubo, T., Hiyagon, H. & Sugiura, N. 2005 LPSC 36, 1283. [5] Krot, A.N. et al. 2005 ApJ 622, 1333