Oxygen isotope anomalies of the Sun and the original environment of the Solar system

Jeong-Eun Lee

Department of Astronomy and Space Science, Sejong University, Seoul 143-747, Korea

We present results from a model of oxygen isotopic anomaly production through selective photodissociation of CO within the collapsing proto-Solar cloud. Two recent Solar wind oxygen isotope measurements have yielded dramatically different results, in one case showing a mass-independent signature of Δ17OSMOW ~ -20 and in the other case +20 for the Sun. An enriched Sun, when compared to the refractory components in the Solar System, has been suggested to be difficult to explain. We find that our model produces a proto-Sun with a wide range of 17O values depending on the intensity of the ultraviolet radiation field. Our models imply the birth of the Sun in a stellar cluster with an enhanced radiation field and are therefore consistent with a supernova source for 60Fe in meteorites. δ-values ~ 0 to 800 are predicted for H2O ice at the inner edge of the collapsing cloud, consistent with recent δ-values for H2O inferred for recently discovered nanocrystal aggregates in Acfer matrix (Sakamoto et al. 2007).