

## Origin of H, N and O isotopic correlations between Earth and asteroids: Origin of water

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Present most plausible interpretation for origin of terrestrial water is that terrestrial water introduced by asteroids because of similarity of H isotopic composition between terrestrial water and asteroidal clay minerals. However, it is not trivial what the similarity occurred. In order to solve the origin of the similarity, it is necessary to add more independent analytical results of isotopic compositions of other elements. In this report, we discuss correlations isotopic compositions among H, N and O of inner planets and asteroids and try to specify the origin of water of the Earth.

Similarity of oxygen isotopic composition between inner planets and asteroids are established (Yurimoto et al, 2008). Nitrogen isotopic compositions seem to be similar among these asteroidal objects (Marty et al, 2011; Alexander et al, 2012). Hydrogen isotopic compositions show large variation among inner planets, but these variations are due to results of dissipation of planetary atmosphere after atmosphere formation. Therefore, it is considered that inner planets originally had the same isotopic composition for these elements corresponding to terrestrial values. Large D-enrichments have been shown in some chondrites, but most chondrites have similar D/H ratios to terrestrial value (Marty et al, 2011; Alexander et al, 2012). These results suggest that the isotopic compositions of these elements are originally essentially similar among inner planets including asteroids. The author suggest that isotopic variations of these elements in the whole solar system could be systematically interpreted by various degree of contribution of low temperature condensates (icy components) in the solar nebula (this conference). I discuss the origin of isotopic homogeneity of these elements in the inner planet region of the solar system by application of the same model. The results suggest that mixing between condensed icy components from inner solar nebular gas and icy components from outer solar nebular region is essential to determine the isotopic compositions of inner planets.

The mixing of the two icy components was demonstrated by the oxygen and hydrogen isotopic compositions of fluid inclusions on asteroidal bodies. These results show that isotopic analysis of icy components of asteroids, cometary objects and icy satellites by future planetary exploration must be needed. The new results must provide essential information to clarify the origin of water of our Earth.

Keywords: asteroid, Earth, isotope, water, H<sub>2</sub>O