

Investigating the role of diffusion on Li isotopes in pore fluid and sediment samples at IODP site U1338

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With improved mass spectrometry techniques, lithium isotope research has rapidly expanded in the last two decades. Many studies have been completed using lithium isotopes as proxies for continental weathering intensity. Studies of seafloor basalts, marine pore fluids and foraminifera attempt to quantify the processes that affect Li isotopic composition to better understand the global lithium cycle. However, as attempts are made to understand the lithium cycle, it is essential that we study all processes which could impact the lithium isotopic composition of materials.

One such process is diffusion. Diffusion of lithium in solids has been extensively studied as a potential source of lithium isotopic fractionation in igneous rocks [1]. However, very little research has been completed concerning fractionation during low temperature diffusion of Li in aqueous solutions, such as marine pore fluids. Previous studies have found fractionation of lithium during diffusion experiments and models suggest that the fractionation factor associated with diffusion is 0.99772 [2]. Diffusion could have a significant impact on the lithium isotopic composition of pore fluids and other solutions in which diffusion is occurring

This study investigates the role of diffusion in marine sediments at IODP Site U1338 (Equatorial Pacific; water depth: ~4200m; sed: ~402m of pelagic drape)[3]. Li concentrations at this site demonstrate that diffusive steady state has not been reached, indicating that diffusion and reaction are occurring in the profile. Isotopic composition of the pore fluids along with associated sediments will be analyzed. The data will be modeled to determine the impact of diffusion at this site.

1. Tomascak et al. (2016), *Springer*.
2. Richter et al. (2006), *Geochim. Cosmochim. Acta*, 70, 277-289.
3. Expedition 320/321 Scientists, (2010). *In* Pälke et al. *Proc. IODP*, 320/321.