Cl isotope study on gas condensates of island arc-volcano implying ^{37}Cl-enrichment during slab subduction

M. MUSASHI[1*], J.-I. KIMURA[2], Q. CHANG[2], M. NOMURA[3], M. MATSUO[4], & K. SHOZUGAWA[4]

[1] Shibaura Institute of Technology, Saitama, Japan (*correspondence: mmusashi@shibaura-it.ac.jp)
[2] JAMSTEC, Yokosuka, Japan
[3] Tokyo Institute of Technology, Tokyo, Japan
[4] University of Tokyo at Komaba, Tokyo, Japan

Chlorine isotope geochemistry of pore waters of seafloor sediments showed that the isotopic fractionation occurred beneath subduction zones [1], suggesting that the subducted slab is progressively enriched in ^{37}Cl relative to the dehydrated fluid from it. However, Cl isotopic compositions (δ^{37}Cl: δ notation relative to SMOC) of volcanic gas samples from volcanic front of Izu-Bonin-Mariana arc were δ^{37}Cl <0 [2], implying that δ^{37}Cl values in island arc magmas will be negative reflecting involvement of the ^{37}Cl-poor fluid from evolved slab in their mantle source. To verify a trace of the ^{37}Cl-poor slab fluid, the δ^{37}Cl values of gas condensates from an island arc volcano were analysed by UV-FsLA-MC-ICP-MS with a precision better than 0.07‰ (two-standard error).

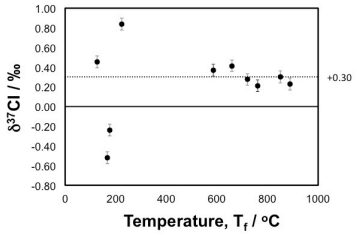

Figure 1. Correlation between δ^{37}Cl and temperature, T_f.

The results show that the δ^{37}Cl values are constant at +0.3‰ when T_f > 400°C. The constant δ^{37}Cl value from the high-T_f gas condensates most likely represents that of the host magma from which the gas is directly and continuously derived with less isotopic fractionation. Contradictory to [2], we find the magmatic δ^{37}Cl = +0.3‰, implying that the ^{37}Cl-rich slab fluid influences in the mantle source.

[1] Sharp & Barnes (2004) *EPSL* **226**, 243-254. [2] Barns et al. (2008) *Geol*. **36**, 883-886.