

## Mechanism of eruption of Kumano mud volcano, Nankai accretionary prism

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Deep-rooted fluids in the accretionary prism play an important role in the occurrence of earthquakes near trench. The fluid samples from forearc mud diapirs help us to delineate possible fluid origins and/or sediment-water interactions at depth within the accretionary prisms. It is, however, difficult to research deep-seated fluids from pore water samples using traditional hydrogen and oxygen isotopic compositions owing to contamination from seawater. Lithium (Li) is relatively unsusceptible to contamination from seawater because the Li content of deep-rooted fluid is significantly higher than that of seawater. In addition, Li has two stable isotopes, <sup>7</sup>Li and <sup>6</sup>Li, with respective relative abundances of 92.5% and 7.5%, and <sup>7</sup>Li/<sup>6</sup>Li ratios may provide further insight into the origin of deep-rooted fluids. We therefore analyzed <sup>7</sup>Li/<sup>6</sup>Li ratios of pore fluids in mud volcano in the Kumano forearc basin to investigate the fluid regime in Nankai accretionary prism. In this study, we analyzed two different drilled mud cores at site C0004 and site C0005 that were recovered from center and margin of the Kumano #5 mud volcano, respectively. These samples were recovered using D/V CHIKYU that was equipped with a riser drilling system. The results show that delta <sup>7</sup>Li values of analyzed Kumano mud volcano fluid vary from +5.5 to +10.6 per-mil (delta <sup>7</sup>Li =  $[\frac{[\text{Li-7}]/[\text{Li-6}]_{\text{sample}}}{[\text{Li-7}]/[\text{Li-6}]_{\text{L-SVEC standard}}} - 1] \times 1000$ ). Judging from the delta <sup>7</sup>Li values were correlated with the Rb/Li ratios, we argued that the lowest delta <sup>7</sup>Li value, +5.5 per-mil, as that of a deep-derived end-member fluid. It has already reported that the delta <sup>7</sup>Li value of decollement fluid in Nankai subduction zone is +10 per-mil (You et al., 1995. *Geology* 23, 37-40). Because the Cl/Li ratios are significantly lower than seawater value, the Li isotopic difference between Kumano mud volcano fluids and Nankai decollement fluids are not due to seawater contamination. Thus, our Li isotopic data revealed that the Li in Kumano mud volcano fluids are originated from deeper (higher temperature) than those in the Nankai decollement fluids. Based on the Li isotopic data, we further estimated the fluid-sediment reaction temperature is 300 degree C. Based on the results, we discuss the mechanism of eruption of the Kumano #5 mud volcano.

Keywords: lithium isotope, mud volcano, Nankai, earthquake, accretionary prism, deep-rooted fluid