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Li and Sr isotopic systematics of fluid inclusion in quartz vein from Nobeoka Tectonic Line: deep fluid in Nankai prism

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In accretionary prism, fluid pressures rise and fluid is expelled, resembling a saturated sponge being tectonically squeezed. To understand geochemical features of deep fluid in accretionary prism, we analyzed the lithium (Li) and Strontium (Sr) isotopic compositions of fluid inclusions in quartz veins from Nobeoka Tectonic Line (NTL), which has been interpreted as a deep out-of-sequence thrust (7-9 km) in the Shimanto accretionary complex. The thickness of the shear zone in the footwall of NTL varied from 100 to 300 m. Relatively thick zones were composed of black shale with numerous sandstone blocks. Amount of mineral veins of quartz and calcite were precipitated within the sandstone blocks. Microscopic observations, under optical microscope and scanning electron microscopy-cathodoluminescence, showed that fiberous crystals were precipitated within the microcracks, as veins in the sandstone blocks. This texture could indicate that pore fluid in and around the fault zone migrated via the microcracks, possibly accompanying stable frictional sliding. In contrast, thinner shear zones were characterized by black shale rich melange facies. Mineral veins in the sandstone blocks were much less common than thicker zones. Instead, some millimeter to centimeter s liner veins of quartz and calcite were occurred along sharp shear plane in the fault zone. These veins included much fragments of host black shale and primary-precipitated crystals, indicating that high-pressurized pore fluid flowed rapidly simultaneously with the shear plane development. The results of this study show the Li-Sr isotopic difference of fluid recovered from these two types of quartz veins. We also compare these results with those of other related-fluids in the Nankai accretionary prism.

Keywords: fluid inclusion, lithium isotope, strontium isotope, Nankai accretionary prism, out-of-sequence thrust, fault vein