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Hydrothermal discharge in near-surface sediments and its effects on geochemistry of pore fluids and sediments from the southernmost Okinawa Trough and the shallow margin off northern Taiwan

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Hydrothermal fluid discharging onto the seafloor has two modes: directly emanating via the chimney-like structure and diffusely flowing through the sediments. Here, we focused on the latter mode and its effect on the geochemistry of pore fluids and sediments from the Geolin Mounds (GLM) and Mienhua Volcano (MHV) hydrothermal fields, at water depths of 1380 ~ 1520 m, in the southernmost Okinawa Trough as well as from the Keelung Submarine Volcano (KLSV) hydrothermal field, at a water depth of ~65 m, off northeastern Taiwan. The apparently declined Mg concentration (<30 mM) in pore fluid relative to seawater revealed our sampling locations were in hydrothermal circumstances. The apparently Cl-depleted pore fluids observed in the GLM and KLSV and slightly Cl-enriched ones in the MHV supported the occurrence of phase separation. The slightly low pH (5.67~6.38) and enriched dissolved inorganic carbon (DIC = >30 mM) with heavy isotopic compositions ($\delta^{13}C_{DIC}$ = 0.39~7.00 ‰) in pore fluids further evidenced the sediments were acidic and impregnated with *in-situ* liquid CO_2, which has been proved to enhance the CO_2-fluid-sediment reaction and subsequently enrich the pore-fluid metal elements, such as Fe, Mn, Ca, K, and so forth. However, the enrichments of pore-fluid Ca were observed in the GLM and MHV, but slight depletion in the KLSV, revealing the discrepancy of mineral in sediments. The significantly high Li concentrations in pore fluids with mostly constant ratios of Li/Ti (~18.5) in bulk solids implied that Li in pore fluid was mainly sourced from high-temperature (>350 ^{o}C) heated fluids beneath the GLM, MHV and KLSV interacting with terrestrial sediments in the deep stratums.