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Hydrogeochemical anomaly before 2018 Hokkaido Eastern Iburi earthquake

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Changes in hydrogeochemistry before and after earthquakes, attributed to the mixing of fluids from different sources or water-rock reactions, have been reported for over 50 years. Despite the accessibility of water samples after earthquakes, routine observation of groundwater geochemistry prior to a large earthquake remains challenging. Therefore, Tsunogai and Wakita (1995) used commercially available bottled drinking water to reveal an increase in chloride ion concentrations in groundwater before the M7.2 1995 Kobe earthquake.

Sano et al. (2020) specifically emphasized changes in carbonate contents, carbon isotopes ($\delta^{13}C$), and ^{14}C activity a few months before the M6.7 earthquake in eastern Hokkaido, Japan, in 2018, using the same method. Decreases in $\delta^{13}C$ were attributed to the migration of CO_2-enriched fluid into the groundwater from a CCS injection site near the sampling area and the earthquake epicenter (Sano et al., 2020).

We also utilized the same samples to investigate the potential contributions of deep-seated fluid within the CO_2-enriched fluid that entered the groundwater before the 2018 Hokkaido Eastern Iburi earthquake, using isotopic ratios of Li and Sr, which are good indicators to identify the origin of fluid and the presence of deep-seated fluid. The results of this study indicate that the CO_2 injected into the groundwater near the epicenter before the earthquake was not accompanied by water originating from deep-seated fluid.