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Migration and carbonate mineralization by past CO2-rich fluid in the Izumi Group, southern Osaka: A natural analogue on

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The stability of storage system recently attracts attentions with an increasing importance of CO2 geological storage (CGS) as a counter-measure to the global warming. Physical and sedimentary-petrological properties of seal layer are particularly important in relatively short time span. A good seal layer composed of thick, poorly permeable mudstone lacking any fractures, however, is difficult to expect in Japan as it lies on an active island arc. Nevertheless, it can be expected for moving reservoir fluid to dissolve into intact formation water during its lateral and upward migration, thereby trapped through a mechanism called solubility trapping. In fractured bedrock, the flowing CO2-rich fluid in fractures is further expected to precipitate carbonates, which finally closes the fractures and recovers mechanical strength of the bedrock. These processes, however, cannot be investigated in an actual demonstration site, even though the follow-up study in the Iwanohara demonstration site strongly suggests chemical changes of reservoir fluid toward the conditions promoting mineral precipitation.

Carbonate minerals considered to be stable under the geochemical conditions of CGS are widespread in the foothills of Izumi Mountains, southern Osaka, SW Japan. The area is a good example of carbonate mineralization from CO2-rich fluid and can be a natural analogue on the geochemical processes associated with the migration of CGS reservoir fluid. This study reports the differences on the development of carbonate-bearing alteration veins in relation to the geological properties of seal layers.

Keywords: carbonate vein, dawsonite, self-sealing, seal layer, reservoir fluid, CO2 geological storage