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Millennium-scale mass transport through rock fractures in vicinity of emerged coral and its application to CCS technique

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CCS (Carbon dioxide Capture and Storage) is one technique to mitigate the contribution of CO₂ gas to global warming. And, it is known that mineral trapping is the stable technique for the storage of CO₂. The discharged CO₂ gas from power plant and factory is injected into aquifer of deep underground and is trapped in carbonate minerals which are created by water-rock interactions. Therefore, it is necessary to understand the mechanism and the period for secondary mineral creation in rock fracture. In this research, the coral veins which have connected to the emerged coral in Yakushima, Japan have studied in order to apply to the mass transport and the creation of secondary minerals in rock fracture as natural analogue. It is observed that the vicinity of coral veins has the solidified part along the vein. Microscopic observations revealed that the solidified area is filled with amorphous material and several fragments including the coral fragment. Furthermore, chemical analyses showed that the amorphous material contains the abundance of calcium. In addition, the radioactive dating was performed to reveal the age of the coral veins. The results showed that the coral vein is younger than the emerged coral and become older when it is closer to the emerged coral. Results of this study suggest that the coral veins have possibility of evaluating the millennium-scale mass transport and the formation process of secondary minerals in rock fracture.

Keywords: rock fracture, emerged coral, AMS age, CCS