

Comparison of age of groundwater and dissolved organic matter

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Column experiments in laboratory showed that dissolved organic matter (DOM) went through the column with little interaction with the rocks and may be transported with same velocity with solution [1]. This result showed that migration of contaminants that related with DOM might be accelerated in natural system. The residence time (age) of groundwater in the subsurface can be determined from He concentrations [2] and the residence time of DOM can be evaluated from radiocarbon in it (DO¹⁴C) [3]. In this study, the age of groundwater and DOM were compared to elucidate the velocity of DOM in subsurface compared with groundwater in natural systems over long time frames (e.g., 10,000 years).

Groundwater samples from a fracture system in granite were obtained from a research site in Gifu Prefecture, in the center of Japan. DOM dissolved in the groundwater was collected using a DAX-8 resin or nano-filtration membrane. The He concentration of the groundwater and DO¹⁴C of the DOM were measured and evaluated ages were compared. The results were in a good agreement, indicating that most DOM moved through the fractures at the same velocity of groundwater in the investigated area.

Thus, a comparison of the age of groundwater and DOM was found to provide useful information for understanding the migration of DOM in natural system during the long period.

[1] Artinger, R. *et al.* (2002) *J. Contam. Hydrol.* **58**, 1-12.

[2] Hasegawa, T. *et al.* (2016) *Geochim. Cosmochim. Acta* **192**, 1-12.

[3] Nakata, K. *et al.* (2013) *J. Hydrol.* **489**, 189-200.