

Cl isotopes in pore water beneath the New Jersey Shallow Shelf, IODP Exp.313

Takeshi Hayashi^{1*}, Hironori Otsuka², Hisao Ando³

¹Faculty of Education and Human Sciences, Akita University, ²Atmosphere and Ocean Research Institute, The University of Tokyo, ³The College of Science, Ibaraki University

Previous expeditions and oil explorations have found that pore water beneath the New Jersey shallow shelf has very wide range of Cl concentration (from tens to about 1200 mM). IODP Expedition 313 "New Jersey Shallow Shelf" also found pore water with wide range of Cl concentration (about 20 to 995 mM) in the middle of the shelf. The variation of Cl concentration is considered to reflect the history of salinization and desalinization of pore water with sea level change. Also, as for brine, source of Cl is considered to be evaporite or salt-diapir. We measured Cl isotopes (^{36}Cl , $\delta^{37}\text{Cl}$) to clarify the origin and behavior of Cl using pore water samples taken by IODP Exp. 313.

IODP Exp. 313 collected core samples of Eocene to Pleistocene units at three sites in the middle of the shelf. At H0027A, onshore side, Cl concentration of pore water was lower than 100 mM at the depth from 200 to 320 mbsf (middle Miocene). However, at the bottom part (614 mbsf; late Oligocene), Cl concentration was about 450 mM. On the other hand, at H0029A (offshore side), Cl concentration exceeded 530 mM at 345 mbsf (middle Miocene) and achieved to about 995 mM at 712 mbsf (late Oligocene). From the result of ^{36}Cl , Cl at the bottom of H0029A is considered to be in radioactive equilibrium. That is, the residence time of the Cl is estimated more than one million years. As for $\delta^{37}\text{Cl}$, difference between the deep part of two sites was not clear. Considering the lithology of sediments (mainly silty layers), it is estimated that Cl is mainly transported by advection of pore water through bedding plane and fracture of sediments.

This study is supported by CDEX/JAMSTEC.

Keywords: IODP, Expedition 313, New Jersey, continental shelf, pore water, Cl isotope