

Origin and distribution of chloride in pore water beneath the New Jersey Shallow Shelf, IODP Exp.313

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IODP Exp. 313 was conducted in the mid New Jersey Shallow Shelf (NJSS) in 2009. This expedition focuses on geological structure and history of sedimentological environment with sea level change. Three holes were drilled along the MAT (Mid-Atlantic Transect) and the maximum depth was 750 mbsf.

On the other hand, in the NJSS, previous expeditions and oil explorations have found that the pore water beneath sea floor has very wide range of chloride concentration. This variation of Cl concentration is considered to reflect the history of salinization and desalinization of pore water with sea level change. However, process and mechanism of Cl distribution is not clarified. Objective of this study is to understand origin and behavior of pore water and chloride using pore water samples taken by Exp. 313.

Cl concentration of pore water samples were from about 20 to 995 mmol/kg (4 to 190% of seawater). "Fresh" pore water (Cl < 100 mmol/kg) were distributed from about 15 to 420 mbsf and were mainly in silty layers. This result suggests that pore water in low permeable layers such as silt and clay were relatively not susceptible to salinization by seawater.

Considering the stable isotopic ratios of oxygen and hydrogen and Cl concentration of pore water, origins of pore water should be meteoric water, present sea water and paleo sea water. Also, origins of chloride were considered to be present and paleo sea water and brine. From the sea floor to 250~350mbsf, chloride in pore water was originated from mixing of the meteoric water and present/paleo sea water. On the contrary, chloride was originated from mixing of the meteoric water and brine.

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