

Sampling and Analysis of Dissolved Noble Gases in the Porewater of Marine Sediments in Northeastern Okinawa Trough, Japan

Tefang Lan[1]

[1] Ocean Research Institute, University of Tokyo

Noble gases dissolved in porewater of marine sediments preserve primitive chemical signatures of in-situ fluids. High hydrostatic pressure increases gas solubility on sea floor also enhances the abundance of noble gases in marine sediments. Noble gases have been widely exploited as geochemical tracers. With properties of high mobility and chemical inertness, noble gases do not react with other species under almost all circumstances. The major consequence of this inertness is that noble gases pass easily into the gas phase, and is efficiently lost from the solid Earth. Scientists have adopted these great properties to elucidate the source and the evolution history of fluids for several decades. Air contamination, however, affects noble gas analysis severely, has been a key issue during core-recovering.

Here we present the multi-core pore-water sampler and analysis procedures of samples from Northeastern Okinawa Trough. The sampler is capable of taking sediments from various depths, which offers information of noble gases in different depths. In addition to multi-depth sampling, this device prevents samples from air-contamination during recovering. Thus noble gas signatures could be even more primitive than those dissolved in seawater. Analysis of samples from the device requires a special extraction system. Sediments are heated within copper tubes and are blown out to a vacuum vessel in certain temperature. We further heat the vessel to advance noble gas diffusion. The sampler paired with the analysis procedure is proved to be useful and can be applied to various marine and hydrological research.