Porosity estimation of ionic-liquid infiltrated rock samples by digital data processing

*Manato Akishiba[1], Wataru Tanikawa[1], Go-Ichiro Uramoto[2], Kentaro Uesugi[3], Akihisa Takeuchi[3], Masahiro Yasutake[3], Yuki Morono[1]

1. Kochi Institute for Core Sample Research, Japan Agency for Marine-Earth Science and Technology, 2. Kochi University, 3. Japanese Synchrotron Radiation Research Institute

Pores are the portion of rock or sediment volume occupied by components such as water, microbial life, petroleum liquids, and gases. Their three-dimensional visualization provides critical constraints on the physical, chemical, and biological processes. In addition, it has importance in investigations of materials transport processes in geologic materials.

Three-dimensional visualization of pore structures in rock samples can be achieved by CT imaging, which does not require sample preparation steps. However, it is sometimes challenging to extract pores from CT images due to the low contrast between minerals and pores.

For selective visualization of these pores, we developed a method that infiltrates constant concentration ionic liquid into the pores and enhances the contrast between minerals and pores in CT imaging. In this method, pores had a constant brightness because the contrast and background brightness were standardized. A proportional relationship was found between the threshold for extracting pore spaces and the average brightness of images. The porosity could be estimated by calculating the thresholds using this proportional relationship. In this presentation, we discuss the method of image processing and factors affecting the accuracy of porosity value.

Keywords: pore space, X-ray CT