

X-ray CT images of oceanic lithologies obtained on Oman Drilling Project drillcores during ChikyuOman 2017 and 2018

*Katsuyoshi Michibayashi¹, Peter B Kelemen², Margurette Godard³, Eiichi TAKAZAWA⁴, Damon A H Teagle⁵, The Oman Drilling Project Science Party⁶

1. Department of Earth and Planetary Sciences, Nagoya University, 2. Columbia University, 3. Université Montpellier, 4. Niigata University, 5. Southampton University, 6. ICDP

The Oman Drilling Project (OmanDP) has drilled >3,200 meters of the Oman ophiolite during Phases 1 and 2 in Holes GT1A, GT2A, GT3A, BT1B, CM1A, CM2B, BA1B, BA3A and BA4A. All cores have been described on board D/V Chikyu during the summers of 2017 and 2018. X-ray computed tomography (X-ray CT) images were obtained on all cores as a routine part of the IODP measurement protocol onboard D/V Chikyu.

The X-ray CT scanner (Discovery CT 750HD, GE Medical Systems) scans and reconstructs an image of a 1.4 m section in 10 minutes and produces a series of scan images, each 0.625 mm thick. The X-ray source and detector are installed inside of the gantry opposite each other. The excitation voltage and current for X-ray tube are 140 kV and 100 mA, respectively. Core samples are scanned in the gantry with a scanning rate of 20 mm/sec. The distribution of attenuation values mapped to an individual slice comprises the raw data that are used for subsequent image processing. Successive two-dimensional (2D) slices of 512 x 512 pixels yield a representation of attenuation values in three-dimensional (3D) voxels of 512 x 512 by ~1600 in length. Data generated for each core consist of core-axis-normal planes (XY planes) of X-ray attenuation values with dimensions of 512 x 512 pixels in 9 cm x 9 cm cross-section, with a resolution of 0.176 mm/pixel.

As a consequence, we have >3,200 meters length of X-ray CT images from the dyke/gabbro transition zone to the gabbroic sequence to the mantle sequence to the basal thrust of the ophiolite. All X-ray CT images have been processed to match with individual photo images of the archive halves of the cores. The data are useful for assessing sample locations and quality. X-ray CT images can be used for 3D fabric analyses even after core has been cut in half and subsampled for other analyses.

Keywords: OmanDP, XCT, image