



## **X-ray computed tomography images of the Nankai Trough Seismological Experiment (NanTroSEIZE) Cores: preliminary results from IODP Expeditions 314 and 315**

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X-ray computed tomography (CT) of rock core provides nondestructive cross-sectional or three-dimensional core representations from the attenuation of electromagnetic radiation. Attenuation depends on the density and the atomic constituents of the rock material that is scanned. Since it has the potential to non-invasively measure phase distribution and species concentration, X-ray CT offers significant advantages to characterize both heterogeneous and apparently homogeneous lithologies. In particular, once empirically calibrated into 3D density images, this scanning technique is useful in the observation of density variation.

In this paper, we present a procedure from which information contained in the 3D images can be quantitatively extracted and turned into very-high resolution core logs and core image logs including (1) the radial and angular distributions of density values, (2) the histogram of distribution of the density and its related statistical parameters, and (3) the volume, the average density and the mass contribution of voids and vugs, the damaged and the non-damaged core material fractions. In turn, these quantitative outputs (1) allow the recognition of bedding and sedimentary features, as well as natural and coring-induced fractures, (2) provide a high-resolution bulk density core log, and (3) provide quantitative estimates of core voids and core damaged zones that can further be used to characterize core quality and core disturbance, and apply, where

appropriate, volume correction on core physical properties (gamma-ray attenuation density, magnetic susceptibility, natural gamma radiation, non-contact electrical resistivity, P-wave velocity) acquired via Multi-Sensors Core loggers (MSCL).

The procedure is illustrated on core data (XR-CT images, continuous MSCL physical properties and discrete Moisture and Density measurements) collected during IODP Expedition 315 (Nankai Trough Seismological Experiment - Stage 1, Japan). Preliminary results are compared to Logging While Drilling data collected during IODP Expeditions 314.