



## Physical properties of the Nankai inner accretionary prism at Site C0002, IODP Expedition 348

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Integrated Ocean Drilling Program (IODP) Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) Expedition 348 focused on deepening the existing riser hole at Site C0002 to ~3000 meters below seafloor (mbsf) to access the deep interior of the Miocene inner accretionary prism. This unique tectonic environment, which has never before been sampled in situ by ocean drilling, was characterized through riser drilling, logging while drilling (LWD), mud gas monitoring and sampling, and cuttings and core analysis. Shipboard physical properties measurements including moisture and density (MAD), electrical conductivity, P-wave, natural gamma ray, and magnetic susceptibility measurements were performed mainly on cuttings samples from 870.5 to 3058.5 mbsf, but also on core samples from 2163 and 2204 mbsf.

MAD measurements were conducted on seawater-washed cuttings ("bulk cuttings") in two size fractions of >4 mm and 1-4 mm from 870.5 to 3058.5 mbsf, and hand-picked intact cuttings from the >4 mm size fractions within 1222.5-3058.5 mbsf interval. The bulk cuttings show grain density of 2.68 g/cm<sup>3</sup> and 2.72 g/cm<sup>3</sup>, bulk density of 1.9 g/cm<sup>3</sup> to 2.2 g/cm<sup>3</sup>, and porosity of 50% to 32%. Compared to the values on bulk cuttings, the intact cuttings show almost the same grain density (2.66-2.70 g/cm<sup>3</sup>), but higher bulk density (2.05-2.41 g/cm<sup>3</sup>) and lower porosity (37-18%), respectively. The grain density agreement suggests that the measurements on both bulk cuttings and intact cuttings are of good quality, and the differences in porosity and density are real, but the values from the bulk cuttings are affected strongly by artifacts of the drilling process. Thus, the bulk density and porosity data on handpicked cuttings are better representative of formation properties. Combined with the MAD measurements on hand-picked intact cuttings and discrete core samples from previous expeditions, porosity generally decreases from ~60% to ~20% from the seafloor to 3000 mbsf at Site C0002.

Electrical conductivity and P-wave velocity on discrete samples, which were prepared from both cuttings and core samples in the depth interval of 1745.5-3058.5 mbsf, range 0.15-0.9 S/m and 1.7-4.5 km/s, respectively. The electrical resistivity (a reciprocal of conductivity) on discrete samples is generally higher than the LWD resistivity data but the overall depth trends are similar. On the other hand, the P-wave velocity on discrete samples is lower than the LWD P-wave velocity between 2200 mbsf and 2600 mbsf, while the P-wave velocity on discrete samples and LWD P-wave velocity are in a closer agreement below 2600 mbsf. The electrical conductivity and P-wave velocity on discrete samples corrected for in-situ pressure and temperature will be presented.

The shipboard physical properties measurements on cuttings are very limited but can be useful with careful treatment and observation.