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IODP南海トラフ地震発生帯掘削計画ステージ2第319次研究航海における温度検層

Temperature logging at Site C0009 of IODP Expedition 319, NanTroSEIZE

加納 靖之[1*], 木下 正高[2], 伊藤 久男[2], McNeill Lisa[3], Byrne Timothy[4], Saffer Demian[5], 荒木 英一郎[2], 江口 暢久[2], 高橋 共馬[2], Toczko Sean[2], 319 Scientists the Expedition[2]

Yasuyuki Kano[1*], Masataka Kinoshita[2], Hisao Ito[2], Lisa McNeill[3], Timothy Byrne[4], Demian Saffer[5], Eiichiro Araki[2], Nobu Eguchi[2], Kyoma Takahashi[2], Sean Toczko[2], the Expedition 319 Scientists[2]

[1]京大・防災研, [2]海洋研究開発機構, [3]University of Southampton, UK, [4]University of Connecticut, Storrs, USA, [5]Penn State Univ., USA

[1]DPRI, Kyoto Univ., [2]JAMSTEC, [3]University of Southampton, UK, [4]University of Connecticut, Storrs, USA, [5]Penn State Univ., USA

The drilling vessel Chikyu completed the first riser-drilling in IODP history to a depth of 1603 mbsf (meter below seafloor) at Site C0009 in the landward Kumano forearc basin in the Nankai convergent margin, Japan. To measure temperature and thermal structure around the borehole, we carried out a repeated temperature loggings. Temperature sensors are ran into the borehole along with logging tools during three wireline logging operations. Temperature logs during wireline logging run 1 and 2 were aquired from beneath 703.9 m WMSF to 1590 m WMSF during the pull out of the hole. The borehole temperatures are higher throughout the borehole in run 2 than in run 1. Wireline logging run 2 was initiated ~14.5 hours after run 1. There was no circulation between the logging runs. Tempareture data is recorded during wireline logging run 3 by using temperature sensors included in a tool for the hydraulic and stress tests (Modular Dynamic Tester, MDT). The temperature recorded whe the tool was being lowered was less than the temperatures recorded when the tool was being raised. Circulation during drilling and cleaning cooled the borehole and the formation around the borehole. We interpret that the two wireline logging runs, which run 2 record successively higher temperatures, record the borehole temperature gradually coming into thermal equilibrium with the surrounding formation. The low values recorded by the MDT are either due to circulation during the wiper trip after the wireline logging run 2 or due to the thermal inertia of the tool. Temperature increases with depth, and there are two changes in temperature gradient at 720 m WMSF and 1300 m WMSF. These depths are very close to the boundaries of logging and lithostratigraphic units and this may be related to thermal conductivity contrasts at unit boundaries.

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