Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SCG061-04 会場:302 時間:5 月 25 日 17:15-17:30

応力状態の推定、南海トラフ地震発生帯掘削掘削サイト C0009
Stress state estimate by geophysical logs in NanTroSEIZE drilling project site C0009

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To determine the fault mechanism and seismogenic zone in NanKai Trough, NanTroSEIZE investigated 1.6 km (mbsf) riser drilling in the central Kumano forearc basin to characterize the geophysical properties for future drilling through the megasthrusts. There were several downhole measurements run in this pilot drilling including image logs, caliper and comprehensive geophysical logs sets. The borehole breakout and lack of the drilling induced tensile fractures in this reprocessing image logging indicated the direction of the minimum horizontal compressive stress (Shmin), which show the consistent with the far-field stress direction. If the borehole breakout observation in the possible accretionary prism are representative the relationship with the rock strength and horizontal principal stresses, the different behaviors of borehole rock failure emphasize the variation of horizontal principal stress ratio. In this paper, we constrain the possible magnitude and orientation of horizontal principal stress. The stress induced shear wave anisotropy in Unit III and breakout azimuth in Unit IV are suggested that the direction of SHMAX in this well parallel to the direction of Philippine sea plate to Japan motion. Despite there is uncertainty of rock strength, the P-wave velocity profile shows the less variation with the depth represent the change of rock strength in the small level. The lack of breakout and tensile fractures in Unit III are attributed to the effective hoop stress acting on the borehole wall are less than the rock strength, which implied there are lower difference of horizontal principal stress. The higher differential horizontal principal stress in Unit IV caused the presence of breakout as we observed in the resistivity image logs.
Keywords: NanTroSEIZE, FMI, Boorehole breakout, Rock strength, Effective stress