

Nankai Geomechanical Model: the stress tensor determination in the vicinity of subduction zone

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In last five years, we processed the massive logging data and core samples in Nankai area for determining the stress evolution in this interseismic period after 1944 Tonakai earthquake. The 3D geomechanical model is developed by the slip deficit model and finite-element model in this research. These detailed models are used to determine the wide scale stress field in the Nankai. The drilled IODP well sites are designed to be the fine control points in our geomechanical models. Based on the multiple ICDP expeditions near the Nankai trough (C0002A, F, and P) in different depths, the one-dimensional stress profile can be confirmed with the lateral boreholes loggings. Even the recently drilling did not reach the subduction zone; the stress state in site C0002 is the best control point of Nankai. Our models provide the considerable results by the reliable boundary conditions. This model simulated the stress orientation and magnitude generated by the slip deficit model, area seismicity, and borehole loggings. Our results indicated that the stress state keeps in normal faulting stress regime in our research area, even near the Nankai trough. Although the stress magnitude is increasing with the depth, one of the horizontal principal stresses (S_{hmin}) is hardly greater than the vertical stress (overburden weight) in the reachable depth ($>10\text{km}$). This result implies the pore-pressure anomaly would happen during the slip and the stress state would be varied in different stages when the event occurred.

Keywords: Slip deficit model, Stress state, Subduction zone, Geomechanical model, NanTroSEIZE