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東南海地震1944震源域の分岐断層と前縁断層浅部の摩擦加熱の証拠：IODP NanTroSEZIZEステージ１の成果

Evidence for high frictional heat at a shallow portion of the faults, Tonankai earthquake rupture area

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The Integrated Ocean Drilling Program (IODP) Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) (Kinoshita et al., 2009) drilled and cored in the shallow portion of the 1944 Tonankai M 8.2 earthquake rupture area, crossing two major faults, the megasplay and plate-boundary decollement thrusts. During NanTroSEIZE expedition 316, core samples were obtained at the frontal thrust (Site C0007: 494m csf), which extends from the decollement to the sea floor at the toe of the accretionary wedge, and at the megasplay fault (Site C0004: 400m csf), which extends from the decollement through the interior of the wedge. Structural features and biostratigraphic age inversion in the core sample defined the location of the fault zones. The fault zone is characterized by fractured and brecciated sediments that contain some narrow, dark layers delineating the sites of concentrated shear (Kinoshita et al., 2009). The fault zone samples were studied using vitrinite reflectance, a sensitive geothermometer for sediment and rock. We employed a new device that permits measurement of small vitrinite particles in turbidites and fault zones. Bulk analysis of dissagregated samples of the host sediment reveals similar values of vitrinite reflectance, 0.24-0.27%, throughout the entire core of sites C0004 and C0007. This reflectance is close to lower limit of the vitrinite reflectance analysis, and the estimated temperature outside of the fault zone is lower than 20 C. In contrast, detailed reflectance mapping of the fault zones reveals high vitrinite reflectance values of 0.37 (SD: 0.16) % and 0.57 (0.35)% within and near the narrow dark layers of the frontal fault and the megasplay fault, respectively. Estimates of peak temperature in the fault zones depends on the heat source model, e.g., the width of the heat source is equal to the width of the high vitrinite reflectance zone (10-20 mm) or to a localized shear zone within the dark layer (1-2 mm). Assuming a 1 mm thick heat source, the estimated peak temperatures are 510 and 430 (+/-50) C in the megasplay fault and frontal thrust, respectively. For the case of a 20 mm thick heat source, the temperatures are 420 and 355 (+/-50) C, respectively. The localized high temperature likely reflects rapid, seismic slip, and because vitrinite reflectance records the maximum temperature, the faults have experienced seismic slip at

least one time.

キーワード:南海トラフ,断層,ビトリナイト反射率,付加体,沈み込み帯,東南海地震

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