

## Thermal fluid migration in the Kumano forearc basin, Nankai Trough, estimated via vitrinite reflectance measurement

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Thermal history of the Kumano forearc basin as well as slope basin sediments and accretionary prism in the Nankai Trough was examined. We estimated Paleo-temperature using the vitrinite reflectance measurement of sediments collected from the Nankai Trough Seismogenic Zone Experiment as part of the Integrated Ocean Drilling Program (IODP NanTroSEIZE) Sites C0004, C0007, and C0009. We detected a paleothermal anomaly in the Kumano forearc basin at Site C0009 that has a 200 m wide peak with a maximum temperature of 79 °C, ranging from 1000 to 1200 meter below sea floor (mbsf). Based on the relatively large width (~200 m) and geometry of the paleo-temperature structure, we propose that the anomaly was caused by the passage of relatively warm fluids. Estimation of reflectance increase through vitrinite reaction promotion suggests that 80–100 °C thermal fluid had passed with at least 100 ky, thus causing the anomaly.

The thermal fluid upwelling could relate to thrusts and ancient splay fault activity near Site C0009. The thermal anomaly zone in the Kumano forearc basin at Site C0009 coincides with the currently fluid conduit zone. Fluid rich zones have been identified close to as well as seaward and landward of Site C0009 using seismic reflection and velocity data and geochemical data from deeply sourced mud volcanoes. Tsuji et al. (2015) and Nishio et al. (2015) also argued that the fluids migrated along active and/or inactive fault zones, possibly the connected to the plate boundary. These results suggest that, although the landward portion of the accretionary prism appears to be inactive with respect to seismic slip, inactive structures play a significant role in fluid and heat transport within the prism. Furthermore our results indicate that massive fluid circulation occurs spatially and temporally through thrusts in the subduction zone.

Keywords: Nankai Trough Seismogenic Zone Experiment as part of the Integrated Ocean Drilling Program (IODP NanTroSEIZE), Kumano forearc basin, Vitrinite reflectance measurement, Paleo-thermal structure