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A material record of slow slip in the shallow accretionary prism

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Recent geophysical observations have shown a great variation in seismicity in a shallow accretionary prism, from the coseismic slip of a large earthquake such as the 1944 Tonankai earthquake to slow slip of VLF in Nankai Trough. During the Integrated Ocean Drilling Program (IODP) Nankai Trough Seismogenic Zone Experiment (NanTro SEIZE) Stage 1, the frontal thrust and a megasplay fault were drilled and cored. The measurements of vitrinite reflectance geothermometry were performed within these two major slip zones and revealed the occurrence of the temperature anomaly along the faults. We combined the data with core-scale structure and interpolated the vitrinite reflectance (R_o) applying Steinman function. The smoothed data showed that broad peaks exist within certified slip zones and the peak positions locate in black narrow zones in each fault. We simulated R_o distribution using temperature alteration model and a kinetic method of thermal maturation of vitrinite. The results show that the range of the R_o distribution is expanding relative to the width of heat generate region and the long-term heating (~ 100 s) is needed for the proceeding of the maturing reaction rim. Therefore, we concluded that the measured R_o distributions indicate that the slow slip occurred in the shallow accretionary prism.

Keywords: slow-slip, vitrinite refraction, kinetics