Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SSS30-13 Room:Main Hall Time:April 28 14:45-15:00

Reevaluation of temperature at the updip limit of locked portion of Nankai megasplay, inferred from IODP Site C0002 tem

SUGIHARA, Takamitsu[1*] ; KINOSHITA, Masataka[2] ; ARAKI, Eiichiro[3] ; KIMURA, Toshinori[3] ; KYO, Masanori[1] ; NAMBA, Yasuhiro[1] ; KIDO, Yukari[1] ; SANADA, Yoshinori[1] ; MOE, Kyaw thu[1]

[1]CDEX/JAMSTEC, [2]KCC/JAMSTEC, [3]DONET/JAMSTEC

Temperature near the updip limit of the locked zone still has large uncertainties due to lack of knowledge about thermal and hydrological properties at depth.

In 2010, the first Long-Term Borehole Monitoring System was deployed at ˜900 m below sea floor (mbsf) above the updip limit of seismogenic fault zone in the Nankai Trough off Kumano (Site C0002).Four temperature records show that the effect of drilling diminished in less than 2 years and they all reached thermal equilibrium by 2012. From in-situ temperatures and thermal conductivities measured on core samples, the temperature and heat flow at 900 mbsf are determined as 37.9 ℃ and 56.1 mW/m2, respectively. This heat flow value is in excellent agreement with that from shallow borehole temperature corrected for rapid sedimentation in the Kumano Basin. We use these values to constrain the temperature below 900 mbsf to the mega-splay and plate boundary fault zones.

To extrapolate temperature downward, we use LWD bit resistivity data as a proxy for porosity and the thermal conductivity is modeled from this porosity using a geometrical mean model. Upon integration by the 1-D thermal conduction we included the radioactive heat and frictional heat production. Estimated temperature at the megasplay ranges between 132 to 149 ℃, depending on thermal conductivities and radioactive heat. It is significantly higher, by up to 40 ℃, than previous 2-D numerical model predictions that can account for the heat flow across the deformation front. The discrepancy may be explained either by increasing the effective frictional coefficients along the fault zones or by introducing a lateral fluid flow along the permeable layers somewhere in the sedimentary layer. Revision of 2-D simulation by introducing our new boundary conditions will also be useful. Ultimately, reaching the megasplay fault and in-situ temperature measurement in the drilled hole is required to understand seismogenesis in the Nankai subduction zone.

Keywords: Seismogenic zone, Nankai Trough, Megasplay fault, Thermal regime, IODP, NanTroSEIZE