Relationship between plate boundary temperature and shallow slow earthquakes off Kii Peninsula and Hyuga

*Akihiro Ohde[1,2], Juichiro Ashi[1,2]

1. Graduate School of Frontier Sciences,The University of Tokyo, 2. Atmosphere and Ocean Research Institute, The University of Tokyo

Seismic-aseismic boundaris are thought to be significantly controlled by the temperature of the plate boundary fault [e.g., *Hyndman and Wang*, 1993, JGR]. In the Nankai Trough, however, shallow slow earthquakes such as very low frequency earthquake (VLFE) and low frequency tremor coincide with slow slip events have been known to occur at the shallower portion than thermally defined seismogenic zone [e.g., *Obara and Ito*, 2005, EPS]. Understanding occurrence region of VLFEs could contribute to disaster mitigation because VLFEs hold tsunamigenic potential of the shallow plate boundary. However, whether occurrence region of VLFEs and the tremors is constrained by plate boundary temperature is poorly known. Here, we widely estimate the plate boundary temperature in the whole Nankai subduction zone using bottom-simulating reflectors (BSRs) marking the lower boundaries of the methane hydrate stability zones, and discuss relationship between plate boundary temperature and VLFEs/tremor.

Formation of methane hydrate is constrained by temperature and pressure conditions and thus methane hydrate BSRs can be an indicator of subseafloor temperature. BSRs are present in the wide range of the Nankai accretionary prism and the forearc basins. Therefore, we can widely estimate the plate boundary temperature from BSR depths. As a result of comparison between plate boundary temperature and VLFEs/tremors, we find VLFEs and the tremors begin to occur at around 50˚C along the plate boundary fault. This may imply that the regions of VLFE and tremor occurrence are dependent on temperature. If so, spatial distribution of upper limit of VLFE and tremor is obtained in the Nankai Trough.

Keywords: shallow slow earthquakes, bottom-simulating reflector, temperature

