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Kanto Asperity Project: A New Concept and Contents of A New Proposal

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1. Introduction
Kanto Asperity Project (KAP) is proposals for IODP. The proposals were submitted in 2007 and 2009. The review by IODP was very severe, so we were forced to make rearrangement about conceptual frameworks and drilling site setting. This presentation shows a new concept about scientific goals and a new proposal.
2. A new concept for KAP
Our scientific goal is to understand characteristics of asperities. The Kanto region has three asperities in the same depth.
-Taisho (1923) asperity: recurrence time is 200-400 yr. Coupling rate is 80-100%.
-Genroku (1703) asperity: recurrence time is about 2000 yr. Coupling rate is about 10-30%. This asperity may always move with the Taisho asperity.
-Slow slip asperity: recurrence time is 5-6 yr. Coupling rate is 70-100%.
To understand these variable characteristics of asperities, we made two conceptual frameworks.
1) Why these different asperities exist under the same depth, this means the same pressure and temperature conditions.
2) What is the slow slip? Can the slow slip events be used for assessing earthquake generation models?
To answer the concept 1, we propose some hypotheses about causes of the difference. Our present hypotheses are as follows;
- Different materials cause the differences.
The Philippine Sea plate has volcanic forearc and serpentinite diapirs in the trench inner slope. Taisho and Genroku asperities may consist of volcanic rocks, on the other hand, the slow slips may consist of serpentine.
- Effect of subducted sea mounts is related to the differences.
Tsumura et al. (2009) found a burred sea mount just at the Genroku asperity. Mochizuki et al. (2008) suggested that subducted sea mount can change coupling strength.
- The longer stay in a depth increases coupling strength.
The relative plate motion between the Philippine Sea plate and the North American plate is almost parallel to the Sagami Trough. So, the Taisho asperity stays in a depth longer than the Genroku and slow slip asperities. The longer stay in a depth may promote dehydration processes, and increases coupling strength.
To assess these hypotheses, studies on geology and tectonics, geophysical monitoring for estimating materials on each asperity, and deep drilling into the subducted sea mount are important.
To answer the concept 2, monitoring is essential. We now plan to submit a new proposal about monitoring.
3. A new proposal about monitoring
The slow slip events off Boso are not "normal" earthquakes ("normal" means events with dynamic rupture.), but occur at the same depth and have the same coupling rate as those of normal earthquakes like the Taisho. The slow slip events also occur with small earthquakes. So, if we

assume that the differences between the slow slip events and normal earthquakes are only in dynamic rupture process of the earthquake generation models, and that frictional properties control the differences, we may apply the earthquake generation models to the slow slip events through tuning frictional properties. Under this assumption, we can assess earthquake generation models using the slow slip events. The slow slip events off Boso repeat 5-6 years. If we conduct 10-20 years observation at the slow slip area, we can obtain 3-4 times of entire cycle of the slow slip events. Using the data, we can revise the earthquake generation models. If we apply the improved models to normal and slow slip events, we can estimate frictional (material) properties and reveal the differences between normal and slow slip events.
To obtain detail slip distribution and stress changes through the entire cycle of the slow slip events, we should construct observation network in the sea area of off Boso. We plan 4 borehole observation sites which provide high sensitive measurements using strainmeters, broadband seismometers, and tiltmeters, and also plan to develop ocean bottom geodetic measurements.

Keywords: asperity, earthquake generation model, ocean drilling, monitoring, slow slip