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Observation plan of Ocean Bottom Pressure sensor for recognizing slow slip events at the off Boso Peninsula

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1. Introduction

The Kanto Asperity Project (KAP) sets two main objectives as follows. (1) To understand why the three different types of events occur laterally, at similar depths in the Sagami Trough. (2) To establish realistic earthquake-generation models using data obtained at each step of the process of the slow slip events (SSEs) off the Boso. The KAP-B is a monitoring project, and focuses on the second objective. The KAP-B plans a borehole observation network with high sensitive tilt meters. However, seaward slip area of the SSEs has not been fixed because observation points are placed on the land only. It is important for determining borehole sites to obtain whole slip area of the Boso SSEs. In order to clarify the whole slip area, we will use Ocean Bottom Pressure sensor (OBP) which is relatively inexpensive and easy to set up. In this study, we obtain an appropriate distribution of observatories for recognizing the whole slip area, and then we would like to suggest the plan for observation.

2. Methods

We estimated the error of OBP from the data which had been taken at Mariana back-arc basin in 2010. After the removal of tidal component from the data, we removed the component of ocean movement due to meteorological activity or oceanic current, by the differences between two data which had been taken at the similar location. As we eliminated both tidal and ocean movement component, we obtained that the gap from trend component has about 5mm of standard deviation. Hence, we considered that OBP has an error of 5mm approximately, and we applied this to the inversion analysis.

Next, we put a slip distribution at the offshore of the Boso peninsula, and created a synthetic observation data by adding errors. We applied this synthetic data to the inversion analysis. We conducted inversion analysis by using the program based on the inversion method which was introduced by Yabuki and Matsu'ura(1992) that has prior constraints that fault slips distribute smoothly. Evaluating estimated slips and its errors, we estimated the distribution of observatories which can recognize the slips effectively. Referring to the slip area which is estimated in 1996,2002, and 2007(Ozawa et al.2007), we put 4 slips which slip southeastward, 10cm amount and have an extent of 20 square kilometers. In order to recognizing 4 slip regions, we inspected the distribution of observation points which can detect the slip in high resolution with the least number.

3. results

We put 12 observation points as lattice form. Tiltmeter and GPS are already located on the land therefore, we removed the points which are close to the land, and reduced its number gradually. As a result, we realized that 6 observation points at the offshore can resolve the 4 slips sufficiently. However, if we use 6 points, the error of some places will get increase, so we concluded that we recommend another point to put for reducing the error, and put 7 points in total.

Acknowledgments

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Keywords: Ocean bottom pressure sensor, slow slip, obsevation plan, KAP