

## Value change of ocean bottom pressure gauge (Paroscientific depth sensor) by inclination of the sensor

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### Introduction

Ocean bottom pressure gauges (OBP) using depth sensor of Paroscientific Inc. are used for observation of up-down crustal movement at ocean bottom (e.g. Inazu et al., 2012). Observation error of this sensor is about 0.5 hPa (about 5mm in water) (e.g. Kono et al., 2012). So, this sensor is expected to detect coseismic movements and movements with large slow slip events such as the Boso slow slip events. But, it is known that this sensor shows incorrect values when the sensor is inclined. This suggests the possibility that this sensor can not obtain correct value because OBP itself may be inclined by coseismic crustal deformation. This presentation shows measurements of value change by inclination of the sensor, and discusses limits of inclination based on the observation error.

### Measurements and results

We used an intelligent depth sensor 8CB2000-I, Paroscientific Inc. We set the sensor upright, then incline it, hold it for some time, then return it upright. We measured differences of the values between upright position and inclined position. We found that if we incline the sensor very fast, it shows very large transient values after inclined. So, we need slow inclination (a few ten seconds per 10 degree inclination) of the sensor. After the measurements, we fit the data using a spherical harmonic function.

The observed data show 2 hPa at 10 degree inclination, 6 hPa at 20 degree, and 12 hPa at 30 degree. The data is not symmetrically with respect to the upright position, but symmetrically at a point which is inclined about 15 degree from the upright position. The reproducibility of the values for inclination is within about 0.3 hPa (STD). From this result, inclination limit of OBP is about 5 degree if OBP sits on the ocean bottom flat. If OBP touches down at steeper inclined bottom, the limit become narrower. If OBP is inclined at 20 degree, the limit is about 2 degree.

Keywords: Pressure gauge, inclination correction, Paroscientific Depth Sensor