# 重錘形圧力天びんを用いた海底水圧計のドリフト特性評価と実海域データへの適用

# Evaluation of long-term drift characteristic of the OBP based on the laboratory experiment with the high accuracy reference pressure balance and apply it to the actual observation data

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Ocean bottom pressure gauge (OBP) can continuously observe the vertical deformation in the sea-floor. Especially, OBP sensors are expected to capture the relatively slow crustal deformation such as the slow slip event (SSE). In contrast, the OBP record show the clear instrumental drift which can explain the combination of exponential and linear function (e.g. Watts and Kontoviannis, 1990). This long-term drift is the one of the serious problem to understand the precise long-term crustal deformation such as the SSE. Thus, understanding of the quantitative characteristic of the drift is extremely important. Based on these background, Tohoku University and National Institute of Advanced Industrial Science and Technology (AIST) have been conducting joint research since 2016, to understand the long-term drift characteristic based on the laboratory experiment data.

We adopted the high accuracy reference pressure balance in AIST for the laboratory experiments. The pressure of 70MPa was applied to three Paroscientific sensors (S/N: 113933, 113928, 63524) (from 2016/11/28-) and the pressure of 40MPa was also applied to other two sensors (S/N: 113928, 86529) (from 2017/6-). The stability of the applied pressure by the high accuracy reference pressure balance is 10 ppm or less.

The sensor of S/N: 113933 was installed ADM1A, which located close to the Japan Trench at 6903 m depth (approx. 70MPa), just before the laboratory experiment. Thus, we can compare the drift characteristic under the similar pressure environment. Firstly, we estimated the optimum function for the time series in the laboratory experiment for the extraction of the drift characteristic. We assumed the function which is superposition of exponential and the polynomial part. The order of the polynomial function was estimated using Akaike’s Information Criterion. Secondly, we removed the long-term drift from the actual OBP record in the depth of 6,903m based on the laboratory experiment result.

The long-term drift estimated by the laboratory experiment explained the observation data well. We evaluated the linear trend of the residual time series between the 11th October 2015 to 23rd September 2016, which is removed the initial part of the observation. The linear trend of the residual time series showed the very small value (12 ±0.063 mm/year). If the laboratory experiment can reproduce the long-term drift correctly, the residual time series should reflect to the vertical crustal deformation. In that case, the obtained vertical crustal deformation is almost zero. In the presentation, we will shows the result of other sensors, and more quantitative discussion of the long-term drift characteristic will be held.

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