

Assessment of the non-tidal component contributions to the ocean bottom pressure time series around Japan

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Ocean Bottom Pressure-gauge (OBP) is extremely important sensor to detect the continuous vertical deformation in the sea-floor. The obtained OBP time series, however, will contain not only the crustal deformation but also the other contribution such as tidal component, non-tidal component, and sensor specific sensor drift. Thus, the appropriate removal of these contribution is essentially important to extract the crustal deformation signal. Especially, the contribution of non-tidal component is one of the obstacles to interpret the OBP time series. To remove the non-tidal component, Inazu et al. (2012) developed the method which calculate the sea-floor pressure change caused by the motion of the sea-water using a global barotropic ocean model forced by synoptic atmospheric disturbances. In this study, we assessed the ability of the model proposed by Inazu et al. (2012) based on the application results using the various OBP network and OBP sites.

As the preliminary analysis, we assessed the ability of the model using the three-node in the S-net (S4N21, S4N22, S4N25) and OBP sites using free-fall/pop-up system which were operated by Tohoku University in 2017. Ocean tides were accounted for by harmonic analysis using the BAYTAP-G model of Tamura et al. (1991) and removed from the OBP time series. The model by Inazu et al. (2012) were applied to the obtained residual time series. We calculated the RMS (Root Mean Square) of each time series before and after the model applying, and the calculated the ratio of the decreasing of the RMS to assess the ability of the model.

The OBP in S4N22 node, the RMS decreased 11.5% by the model. The S4N21, however, showed the only 1.4% decreasing the RMS value which may be caused by the larger noise level compared with N.S4N21. In contrast, the results from the free-fall/pop-up type OBP showed the better noise reduction (7.3% to 23.5%) by the model, and this suggest that the existence of other factor of pressure change (Kubota et al., 2020 JpGU). In the presentation, we will show the more comprehensive analysis for the many OBP time series around Japan, and the assess the ability of the model proposed by Inazu et al. (2012) and discuss the quality of the OBP time series in each OBP network and OBP site.

Keywords: Ocean Bottom Pressure-gauge, non-tidal component, S-net, DONET, performance evaluation