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Thermal correction at a tsunami frequency of ocean bottom pressure gauges of real-time observatories around Japan

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In-situ ocean bottom pressure (OBP) records obtained from data acquisition system of Hewlett-Packard, Inc. (hereafter HP) are known to include significant, spurious pressure signals correlated to output changes of the mounted thermometer. The data acquisition system of OBP is mostly adapted to cabled, real-time seafloor observatories around Japan. We reported overall dependency of the OBP records on the temperature changes in broad frequency bands from a secular change to a tsunami range (Inazu et al., 2010, Meeting of Seismological Society of Japan). In this paper, effects of rapid temperature changes ($> 0.003\text{deg.C/min.}$) on the OBP records at the tsunami period range ($< 30\text{min.}$) are evaluated and corrected. Similar investigation was conducted by Hirata and Baba (2006) for the station data off Kushiro under JAMSTEC. In this study, OBP data derived from the HP acquisition system at six stations of the off Cape Muroto system (JAMSTEC) and the off Kamaishi system (ERI/Univ. of Tokyo) in addition to the off Kushiro system. The correction suggested in the present study can reduce spurious pressure signals correlated to the rapid temperature changes by millimeters in amplitude at the tsunami period in which representative standard deviation of OBP is around 1 mm. The correction is especially necessary for the OBP records obtained at one station of the Cape Muroto system (MPG2). Because the rapid temperature changes occur most frequently ($O(1/\text{day})$) at the MPG2 station while such temperature changes are found to occur less frequently ($< O(1/\text{year})$) at other stations.

Keywords: ocean bottom pressure, tsunami, temperature, correction