

An improvement of the antenna installation mechanism for satellite communication of the GPS tsunami meter

*Yukihiro Terada¹, Sin'ichi Yamamoto², Naohiko Iwakiri², Tadahiro Iwasaki³, Naokiyo Koshikawa³, Mitsuo Tada⁴, Akira Wada⁵, Teruyuki Kato⁶

1.Kochi College, National Institute of Technology, 2.National Institute of Information and Communications Technology, 3.Japan Aerospace Exploration Agency, 4.Yuge College, National Institute of Technology, 5.Hitachi Zosen Corporation, 6.Earthquake Research Institute, The University of Tokyo

The tsunami observation system using GPS buoys succeeded to detect 11th March 2011 Tohoku-Oki earthquake tsunami. Through this experience, we recognized the problems to be solved. One of these problems is that the real-time monitoring of the tsunami data stopped suddenly after the highest wave was observed. Since the data of all GPS buoys installed in this area stopped at once, it was thought that the cause was interception of the communication network by electric power loss. Then, a satellite data transmission will be the solution. If satellite data transmission is possible, the data have not to be sent to the area nearest to the coast, which allows us that the data can be safely recorded without interruptions due to earthquakes and/or tsunamis. The Japanese engineering test satellite (ETS-VIII) was used for the purpose of data transmission. The data that was obtained on the buoy was transmitted to the land base and was shown on a webpage in real-time, successfully.

However, the data transmission capability is still a problem as it varies depending on the wave height. As we used a planer antenna for single transmission and acquisition, it has a directional property depending on zenith angle. If the buoy inclines larger, the gain of signal gets lower and the frame error rate increases. The antenna installation mechanism for making this change small was made as an experiment, and a small change compared with the fixed mechanism. As the effective function having been checked by this experiment, a practical apparatus is due to be taken. The experiment was supported the budget of the head of Earthquake Research Institute of the University of Tokyo.

Keywords: GPS tsunami meter, ETS-VIII, satellite data transmission