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Performance Analysis of the Precise Point Positioning Data Online Processing Service and Using for Monitoring Plate Tectonic of Thailand

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Abstract : Precise Point Positioning (PPP) technique is use to improve accuracy by using precise satellite orbit and clock correction data, but this technique is complicated methods and high costs. Currently, there are several online processing service providers which offer simplified calculation. In the first part of this research, we compare the efficiency and precision of four software. There are three popular online processing service providers: Australian Online GPS Processing Service (AUSPOS), CSRS-Precise Point Positioning and CenterPoint RTX post processing by Trimble and 1 offline software, RTKLIB, which collected data from 10 the International GNSS Service (IGS) stations for 10 days. The results indicated that AUSPOS has the least distance root mean square (DRMS) value of 0.0029 which is good enough to be calculated for monitoring the movement of tectonic plates. The second, we use AUSPOS to process the data of geodetic network of Thailand. In December 26, 2004, the earthquake occurred a 9.3 MW at the north of Sumatra that highly affected all nearby countries, including Thailand. Earthquake effects have led to errors of the coordinate system of Thailand. The Royal Thai Survey Department (RTSD) is primarily responsible for monitoring of the crustal movement of the country. The difference of the geodetic network movement is not the same network and relatively large. This result is needed for survey to continue to improve GPS coordinates system in every year. Therefore, in this research we chose the AUSPOS to calculate the magnitude and direction of movement, to improve coordinates adjustment of the geodetic network consisting of 19 pins in Thailand during October 2013 to November 2017. Finally, results are displayed on the simulation map by using the ArcMap program with the Inverse Distance Weighting (IDW) method. The pin with the maximum movement is pin no. 3239 (Tak) in the northern part of Thailand. This pin moved in the south-western direction to 11.04 cm. Meanwhile, the directional movement of the other pins in the south gradually changed from south-west to south-east, i.e., in the direction noticed before the earthquake. The magnitude of the movement is in the range of 4 - 7 cm, implying small impact of the earthquake. However, the GPS network should be continuously surveyed in order to secure accuracy of the geodetic network of Thailand.

Keywords : precise point positioning, online processing service, geodetic network, inverse distance weighting
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