

Verification of usefulness of Trimble RTX technology in archaeological research

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The global navigation and positioning systems are evolving and developing for the needs of modern world. They are also modified due to different working conditions. The result of such an evolution is among others Real-Time eXtended (RTX) technology. It was developed by Trimble in 2011 and it is a combination of RTN and PPP techniques. It is based on data from a global tracking station network and it is using pioneer computational algorithms. There is no need to use ground reference stations. Thanks to accurate corrections of satellite orbit and satellite clock as well as other information supporting more accurate positioning, this technology - as manufacturer assures - allows to achieve 2 cm horizontal accuracy and 5 cm vertical accuracy (RMSE). The unquestionable advantage of the RTX is the possibility of achieving real time high positioning accuracy using only one receiver - no base station is required. There are two ways of transmitting the corrections to receiver nearly worldwide: via Internet or via satellite (using receiver equipped with L-Band antenna). As a result, the coordinates of surveying points in the global coordinate system are obtained in real time.

In this paper, the authors focused on the use of the RTX technology in archaeological research conducted in cooperation with the Institute of Archeology of the Jagiellonian University (Cracow, Poland). The research was carried out in archaeologically little-known region of Jordan. Objects of measurements were the remains of the ancient city of Tuwaneh and the Roman fort in Dajaniya. Spectra Precision SP60 GNSS receiver equipped with L-Band antenna was used in this study. The measurements carried out helped to determine the coordinates of the archaeological objects and the points of the control network established for the needs of the research in the global coordinate system. The RTX technology supported conducting other modern surveys, such as terrestrial laser scanning or measurements of characteristic points where panoramic photos were taken in order to create virtual tours of the documented objects. Additionally, test network was created. The coordinates of three points of this network were determined based on the static PPP technology. Next, with reference to these points the coordinates of other points of the test network were determined using total station. Then the RTX technology was used to measure all points of the network. This measurement was repeated several times. The results of the measurements helped to verify the accuracy of the Trimble RTX technology and analyze the impact of external factors on the accuracy obtained.