



Comparison of types of unmanned aerial vehicle (UAV), sensors and ground control points (GCPs) surveying techniques for photogrammetric documentation of archaeological excavations

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In our times, the UAV photogrammetry became standard tool for creating orthophotomaps of archaeological sites. This provides several benefits in archaeological prospection. For this reason more and more photogrammetric products are created, but the appropriate accuracy in geographical reference of produced maps may still bring some challenges. The coordinates of the ground control points (GCPs) can be determined by different techniques and with different accuracy what affects the proper georeference and integration of orthomosaics. GNSS receivers as well as traditional total stations are commonly used for that purpose. The paper presents the dependence of the quality and accuracy of final photogrammetric products on GCPs surveying method. The research was performed on the Błędów Desert (Poland). The coordinates of GCPs were measured by GNSS receiver working in RTN mode, what provides the accuracy up to 3 cm horizontal and 5 cm vertical. Comparative data set was created by measuring this points with precise total station, with angle measurement accuracy of 1" and distance accuracy of 1 mm +1.5 ppm. Measurements were followed by two photogrammetric flights above the measured object. Two different UAVs were used for this purpose: DJI S1000 with a Sony Alfa A7R camera (full-frame camera) and DJI Mavic Pro with camera equipped with a 1/2.3 inch image sensor. This allowed to compare the quality and the accuracy of material obtained from the amateur, but cheap and light UAV with products generated on the basis of images taken from the professional, but expensive and heavy device.