LiDAR and RGB airborne orthophotos coverage and visualization and automatic recognition of archeological findings in Kephissos /Phokis and Aigeira

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Abstract

In the context of research on the existence of archaeological foundings,Phokis and Aigeira -areas with significant archeological interest in Greece- were covered with LiDAR and RGB aerial images.In this study, instead of the classic survey mapping which is timeconsuming, especially for such large areas, was implemented an advanced photogrammetric method capable of providingcorresponding accuracy.The visualization, recognition and interpretation gave valuable information on new finds of human made structures (urban, fort, man-made and horizontal fields).All imagery products were processed into a photogrammetric workflow in order to produce ortho-images, while for the aerial triangulation of the images and the horizontal (X,Y) and elevation (Z) validation of the LiDAR data, in situ field GCPs measurements were conducted. For the needs of ortho-rectification, accurate reference DTM was created by utilizing the LiDAR point clouds.This exploitation maximizes the resulting accuracies as the measured LiDAR points provide the best Ground surface model available. The complete preprocessing task list of our workflow includes:- raw files conversion into *.las format, - strip alignment procedure and - classification of the point clouds. Regarding the classification, morphological criteria of the areas of interest were examined and evaluated and thus the parameters of the classification procedure were selected.When the classification was finished, it was able to use the points depicting the ground to produce the DTM and subsequently the orthos. The mosaic generation procedure includes many radiometric and geometric filling processing steps for the best optimized result. The resulting orthomosaic tiles and LiDAR point clouds were then combined to produce the final RGB-Coloured point clouds, coming to 500x500m map sheet blocks.The point clouds were subsequently processed to various DEM-based derivatives of 1x1 km size, most notably Multi-Hillshade and Simple Local Relief, and all the informations including the orthoimages, the rectified historical aerial photos etc. integrated into a GIS. Thus, the presented LiDAR processing workflow offered in some cases>2.700 anomalies possibly

relevant to archaeological features, most of them unknown and difficult to see via regular ground surveys due to dense vegetation or other physical barriers.