

3D Shoreline Mapping Using an Unmanned Aerial Vehicle

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Key words: Coastal Zone Management; Hydrography; Photogrammetry; Positioning; Unmanned Aerial Vehicle (UAV), Shoreline Mapping, Hydrographic Surveying

SUMMARY

Hydrographic surveys are carried out for many different type of project mainly the determination of underwater features and the water bottom surface of water-covered areas such as the sea, lakes, ponds, and dams, as well as to define the shoreline. Although the boundary of this kind of study is generally restricted to the shoreline, the topography of the land strip should be surveyed above the shoreline. There are various methodologies in use nowadays to carry out this land survey, depending on the field conditions and the size of the area to be surveyed.

Unmanned Aerial Vehicle (UAV) are widely used in many different areas including coastal studies because of their economic and ease of application, and their accuracy for many applications.

In this study, 3D map making operations using a UAV in the Obruk Dam, which is located in the Çorum province with the largest reservoir area in this region, were mentioned.

Photogrammetric mapping studies were carried out on the reservoir area of the dam body and the reservoir area above the water level and up to the crest level by using a DJI Phantom 3 Pro UAV.

In the study, vertical aerial photographs were taken at an altitude of 100 m from the average terrain surface with 4.77 cm of ground sample distance, 75% of side-overlap and 70% forward-overlap rates. Approximately 1,000 photographs using the appropriate conditions for the working area were used for data evaluation. Ten ground control points with known coordinates with high accuracy in GNSS measurements were used.

Photos taken with the UAV were evaluated with Pix4D Mapper Pro software and the 3D point cloud, Digital Surface Models (DSM) and orthophotos of the working area were produced. With

this data, Digital Terrain Models (DTM) were also produced.

In order to determine the positional accuracies of the orthophoto and Digital Surface Model (DSM) obtained, clear and sharp details on the taken photographs were selected and the coordinates of these points were taken from the images. The coordinates of these points were also obtained very accurately with conventional measurement methods and compared to image coordinates. The results implied that UAVs can be used for many different types of mapping studies very easily and conveniently within dm level of accuracy.

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FIG Congress 2018

Embracing our smart world where the continents connect: enhancing the geospatial maturity of societies
Istanbul, Turkey, May 6–11, 2018