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Accuracy of cultural heritage 3D models by RPAS and terrestrial photogrammetry

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Abstract. The combined use of high-resolution digital images taken from ground as well as from RPAS (Remotely Piloted Aircraft Systems) have significantly increased the potential of close range digital photogrammetry applications in Cultural Heritage surveying and modeling. It is in fact possible, thanks to SfM (Structure from Motion), to simultaneously process great numbers of aerial and terrestrial images for the production of a dense point cloud of an object. In order to analyze the accuracy of results, we started numerous tests based on the comparison between 3D digital models of a monumental complex realized by the integration of aerial and terrestrial photogrammetry and an accurate TLS (Terrestrial Laser Scanner) reference model of the same object.

A lot of digital images of a renaissance castle, assumed as test site, have been taken both by ground level and by RPAS at different distances and flight altitudes and with different flight patterns. As first step of the experimentation, the images were previously processed with Agisoft PhotoScan, one of the most popular photogrammetric software. The comparison between the photogrammetric DSM of the monument and a TLS reference one was carried out by evaluating the average deviation between the points belonging to the two entities, both globally and locally, on individual façades and architectural elements (sections and particular). In this paper the results of the first test are presented. A good agreement between photogrammetric and TLS digital models of the castle is pointed out.

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