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ACCURACY POTENTIAL AND APPLICATIONS OF MIDAS AERIAL OBLIQUE CAMERA SYSTEM

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Abstract. Airborne oblique cameras such as Fairchild T-3A were initially used for military reconnaissance in 30s. A modern professional digital oblique camera such as MIDAS (Multi-camera Integrated Digital Acquisition System) is used to generate lifelike three dimensional to the users for visualizations, GIS applications, architectural modeling, city modeling, games, simulators, etc. Oblique imagery provide the best vantage for accessing and reviewing changes to the local government tax base, property valuation assessment, buying & selling of residential/commercial for better decisions in a more timely manner. Oblique imagery is also used for infrastructure monitoring making sure safe operations of transportation, utilities, and facilities. Sanborn Mapping Company acquired one MIDAS from TrackAir in 2011. This system consists of four tilted (45 degrees) cameras and one vertical camera connected to a dedicated data acquisition computer system. The 5 digital cameras are based on the Canon EOS 1DS Mark3 with Zeiss lenses. The CCD size is 5,616 by 3,744 (21 MPixels) with the pixel size of 6.4 microns. Multiple flights using different camera configurations (nadir/oblique (28 mm/50 mm) and (50 mm/50 mm)) were flown over downtown Colorado Springs, Colorado. Boresight fights for 28 mm nadir camera were flown at 600 m and 1,200 m and for 50 mm nadir camera at 750 m and 1500 m. Cameras were calibrated by using a 3D cage and multiple convergent images utilizing Australis model. In this paper, the MIDAS system is described, a number of real data sets collected during the aforementioned flights are presented together with their associated flight configurations, data processing workflow, system calibration and quality control workflows are highlighted and the achievable accuracy is presented in some detail. This study revealed that the expected accuracy of about 1 to 1.5 GSD (Ground Sample Distance) for planimetry and about 2 to 2.5 GSD for vertical can be achieved. Remaining systematic errors were modeled by analyzing residuals using correction grid. The results of the final bundle adjustments are sufficient to enable Sanborn to produce DEM/DTM and orthophotos from the nadir imagery and create 3D models using georeferenced oblique imagery.

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