The Exterior Orientation of Aerial Imagery Using Existing Orthoimagery and Terrain Models: a Performance Test

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Abstract
In every part of the world the rate of map revision is alarmingly low when compared to the rate of change of many human influenced surface features. There is therefore a requirement to regularly gather up-to-date information about surface features and to incorporate changes in maps both quickly and effectively before it becomes history.

When an aerial photograph is taken, it contains errors one category of which is caused by the aircraft taking the photograph being tilted. This aerial photograph by itself is of little commercial value. Accurate maps cannot be created from it, its use in GIS (Geographical Information System) is limited and correct metric information about ground features cannot be extracted. It requires orientation in order to attain accurate real world information about the location that it represents. This orientation is a time consuming process that does not yield a definitive product. The traditional way to rectify an aerial photograph involves expensive fieldwork in the form of establishing suitable ground control points, which slows the production process down greatly. There now exists a substitute to the information gathered by such field surveys, and it is contained in products created from aerial photography- Orthophotos and Digital Terrain Models (DTMs) where they exist. Other methods of correcting such errors include the use of GPS/INS systems on board aircraft. However, whereas GPS is used on almost every flight taking aerial photography, a combined GPS/INS system is not, as the INS part is still very expensive. Through the use of DTMs and Orthophotos this research shows that the orientation of aerial photographs is possible and can obtain reasonable results compared to GPS coordinates for a set of checkpoints within the project area. X, Y and Z values of control points were extracted using DTMs and Orthophotos, which traditionally would have to be determined by surveyors in the field or by aerial triangulation which also requires ground control. The position, size and local accuracy of different sized Orthophotos and DTMs were examined in order to find which combination produced the most accurate results. Conclusions and future recommendations could then be reached.

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ADS40 Level 0 images are distorted due to pushbroom imaging mode and exterior orientation instability. Specifically, ADS40 Level 0 images are distorted due to pushbroom imaging mode and exterior orientation instability. On the edge of the image, the gaps on the ADS40 Level 1 images are caused by abrupt exterior orientation change. Level 1 images edges. AN-30 L-410. Orthoimagery should be created using nadir images to minimize the influence of DTM errors on the orthoimage accuracy. PHOTOMOD project structure for ADS 40 processing. Since the block adjustment of ADS 40 data is performed by ORIMA, there is no reason to insert the entire block into single PHOTOMOD project. Project structure in the case of stereopair composed of nadir and off-nadir images. Unmanned aerial survey imagery from non-metric cameras was analyzed for suitability, stability, and resolution within a geographic information system. A powered parachute aircraft was designed for the research and used to obtain imagery using two cameras. The exterior orientation directly defines the angular orientation of an image. The elements of exterior orientation are variables of the image position at moment of capture (ERDAS, 2010). The positional orientations include Xo, Yo, and Zo. With the digital terrain model, Agisoft PhotoScan uses a triangulated irregular network (TIN) surface to correct for terrain displacement and exterior orientations for georeferencing and creation of the orthoimage (Agisoft, 2012). Pix4D is both an online service and.