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Authoring Organization: Del Mar College
Written by: Nate Jennings
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Quiz 4 - Key

1. What is photogrammetry?

Photogrammetry is the science and mathematics behind performing highly accurate aerial image corrections and deriving high quality products to be used for map bases and performing land-based measurements.

2. Briefly describe 4 issues that often result in problems on aerial imagery.

    1. **Differences in scale – scale varies throughout an image**
    2. **Feature Distortion – as a result of image scale and the orientation of the camera and placement of features on the ground, features can appear distorted or leaning**
    3. **Sensor Anomalies – the camera and the camera lens can have distortions that affect the quality of the image being taken at the time of collection. This can lead to measurement and location problems derived from the imagery.**
    4. **Sensor Position – the attitude of the aircraft can affect how features on the ground are imaged. Depending on the flight characteristics of the plane, the recorded image can capture features that have location and other distortions such as building tilt, feature leaning**

3. What are 2 common data sets that commonly result from performing photogrammetry on aerial imagery?

    1. **Ortho images**
    2. **Digital elevation models or surfaces**

4. What is used to determine heights of objects and derive digital elevation models?

    The use of parallax or computing the relative positions of the same object in overlapping images can be used to compute heights of features or elevation throughout the image.

5. What are two information requirements to perform photogrammetry on aerial imagery?

    1. **Aerial images with fiducial marks or have digital image calibration methods applied to fully digital imagery**
    2. **Camera calibration report**
    3. **Digital elevation model (either derived or provided)**
    4. **Overlapping aerial images**

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5. **Surveyed or high quality ground control points**

6. Briefly describe how the following are used to correct problems in aerial imagery.

   a. **Georeference – provides the spatial reference that the resulting imagery will be referenced to**

   b. **Interior orientation – provides the camera calibration and set up characteristics for the aerial image collection**

   c. **Exterior Orientation – computes and derives the aerial image and ground reference relationships for a single image, a flight line strip or aerial image block of images that ultimately provides the correction for the images in the collection**

   d. **DEM extraction – a by-product of the ortho correction process. If the aerial images have enough overlap, a digital elevation model can be derived from the image, otherwise, the digital elevation model must be provided to complete the ortho rectification process**

   e. **Ortho image production – the physical production of the orth correction process using the information from the previous steps to generate the ortho image products. In addition, image matching, color balancing, and image mosaicking may take place as part of the ortho image process to produce the final products and output.**

7. What is the importance of ground control and tie points in photogrammetry?

Ground and tie points are important because they help relate the aerial images to the ground and between different images in the aerial image collection. They are also helpful to derive the digital elevation model.

8. What is the difference between an "ortho" image and a "true ortho" image?

A "non true" ortho image has not eliminated the effects of feature lean or tilt in the resulting imagery. Only the horizontal plane and features that lie within that plane have been corrected. A true ortho image is one that has had the building tilt or feature lean removed from the imagery. This requires additional imagery to be collected so that these anomalies can be eliminated.

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