**DAILY ASSESSMENT FORMAT**

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| **Course:** | IIRS Outreach Program on Satellite Photogrammetry | **USN:** | **4AL16EC030** |
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| **GitHub Repository:** | Karthik-J |  |  |

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| **FORENOON SESSION DETAILS** |
| **Image Section**           **ORTHOPHOTO** An **orthophoto**, **orthophotograph** or **orthoimage** is an [aerial photograph](https://en.wikipedia.org/wiki/Aerial_photography) or [satellite imagery](https://en.wikipedia.org/wiki/Satellite_imagery) geometrically corrected ("orthorectified") such that the scale is uniform: the photo or image follows a given [map projection](https://en.wikipedia.org/wiki/Map_projection). Unlike an uncorrected aerial photograph, an orthophoto can be used to measure true distances, because it is an accurate representation of the Earth's surface, having been adjusted for [topographic relief](https://en.wikipedia.org/wiki/Topography), [lens distortion](https://en.wikipedia.org/wiki/Barrel_distortion), and [camera tilt](https://en.wikipedia.org/wiki/Camera_tilt).  Orthophotographs are commonly used in [geographic information systems](https://en.wikipedia.org/wiki/Geographic_information_system) ([GIS](https://en.wikipedia.org/wiki/GIS)) as a "map accurate" background image. An orthorectified image differs from "rubber sheeted" rectifications as the latter may accurately locate a number of points on each image but "stretch" the area between so scale may not be uniform across the image. A [digital elevation model (DEM)](https://en.wikipedia.org/wiki/Digital_elevation_model) is required to create an accurate orthophoto as distortions in the image due to the varying distance between the camera/sensor and different points on the ground need to be corrected. An orthoimage and a "rubber sheeted" image can both be said to have been "georeferenced"; however, the overall accuracy of the rectification varies. Software can display the orthophoto and allow an operator to digitize or place linework, text annotations or geographic symbols (such as hospitals, schools, and fire stations). Some software can process the orthophoto and produce the linework automatically. **ORTHOPHOTOMAP** An **orthophoto mosaic** is a [raster image](https://en.wikipedia.org/wiki/Raster_image) made by merging orthophotos — aerial or satellite photographs which have been transformed to correct for [perspective](https://en.wikipedia.org/wiki/Perspective_distortion_(photography)) so that they appear to have been taken from vertically above at an infinite distance. [Google Earth](https://en.wikipedia.org/wiki/Google_Earth) images are of this type.  The document (digital or paper) representing an orthophotomosaic with additional marginal information like a title, north arrow, scale bar and cartographical information is called an **orthophotomap** or **image map**. Often these maps show additional point, line or polygon layers (like a traditional map) on top of the orthophotomosaic. A similar document, mostly used for disaster relief, is called a [spatiomap](https://en.wikipedia.org/wiki/Spatiomap).  **ORTHORECTIFICATION ALGORITHMS**  Generally, there are two classes of rectification approaches. The parametric and the non-parametric approaches (Hemmleb and Wiedemann, 1997). Whereas for the parametric approach the knowledge of the interior and exterior orientation parameters is required, non-parametric approaches require just control-points. Non-parametric approaches include polynomial transformation, and projective transformation. A comprehensive comparative study of orthorectification approaches can be found in Novak (1992). **Polynomial rectification**  The simplest way available in most standard image processing systems is to apply a polynomial function to the surface and adapt the polynomials to a number of checkpoints (GCPs). The procedure can only remove the effect of tilt, and can be applied on both satellite images and aerial photographs. One of several polynomial orders may be chosen, based on the desired accuracy and the available number of GCPs. Rosenholm and Akerman (1998) stated that for satellite images with simple geometric conditions, such as, near vertical and/or relatively flat areas, a low degree polynomial can give a sub-pixel result, and that higher degree polynomials are unreliable. Also Novak (1992) concluded that although polynomial rectification algorithm is very easy to use, they do not adequately correct relief displacement. Hemmleb and Wiedemann (1997) observed that it seems to be very dangerous to use higher grade polynomial transformations for the rectification of images, and that the required amount of control points and the risk of an oscillation is growing with the grade of the polynomial. |