

Digital Photogrammetric Systems Application to the Forest Management

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The main feature of forest management maps is dual basis of its initial data: topographic maps and aerial and space imagery.

Aerial images of central projection should be transformed into orthogonal projection for further processing. This procedure is executed by digital photogrammetric systems. One of them is well known internationally PHOTOMOD software system developed by Racurs Company and used in Sevzaplesproekt for forest management maps production.

PHOTOMOD system technology provides the following workflow.

On the first stage the initial images (or their negatives) are scanning then their geometric and color correction is executing. Then camera parameters and ground control points catalogue are input. All this data is included to the new project for aerial block triangulation executing. Interior orientation is provided for each image. Then tie points' measuring between images and strips is performing. All surveyed strips are combining into blocks according to the forestry parcels. After images block forming you can start block adjustment.

Adjusted photogrammetric model is a raster background for vector mapping. At that the vectorization could be executed both in mono and in stereo modes, that allows to improve visual analysis of the raster image. It is important that on vector map there is an information not only about plane object coordinates X and Y but also height Z. This data is used afterwards for digital elevation model building - that is the key stage of object orthomaps creation.

Thus, traditional processing of airborne and space survey by simple visual analysis and optical devices is gradually substituting by digital computer technology of orthophotomaps producing. Forestry digital orthomap is digital raster image oriented relatively geodetic coordinate system and with rectified relief and image distortions. Digital orthomapping includes the following steps:

- digital elevation model (DEM) creation;
- orthomaps creation using separate stereopairs (single orthoimages);
- forestry orthomaps producing.

Forestry orthophotomap along with taxation parcels contours in vector layers is importing to GIS for further editing.

Besides photogrammetric processing of aerial images and orthophotomapping digital photogrammetric system is intended for solving another important industrial task in cameral forest management – forest inventory interpretation.

Interpretation of raster aerial images acquired by scanning of negatives or positives is executing on PC screen in mono or stereo mode. Cartographic and forestry taxation materials are used in this process. Clearly recognizable contours are vectorized in PHOTOMOD VectOr module in mono mode; otherwise PHOTOMOD StereoDraw module is used for stereo extracting. At that landmarks forest parcels grid and output scale are using in this process.

The methodology was developed in Sevzaplesproekt enterprise in application to the regions with high-intensity forest industry. The methodology was industrially tested on two objects in Leningradskaya and Kaliningradskaya oblasts. Now the methodology is applied in industry and will be used on forestry management objects of Leningradskaya oblast in 2004–2006.