

PREPARATION OF ORTHOPHOTOS FROM IKONOS IMAGERY FOR CADASTRE BASE MAPPING OF NAKHCEVAN AUTONOMOUS REPUBLIC TERRITORY

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ABSTRACT

In 1996 Azerbaijan had started process of the scaled land reforms after legal base establishment. On the first stage 2020 former collective farms and state farms with 19000 sq. km of agricultural lands were broke up. Small part of the total state farms was kept as state property for the pedigree seeds and animals. As a result of first Land Reform first stage 870247 families became proprietors of the 3426239 of land parcels. Next stage of Land Reform continued by privatization of rural settlements. After municipal property law acceptance Total Land Fund of 86600 sq km has been divided to: State form of property – approx. 38'000 sq km (44,2 %), Municipal – approx. 27'000 sq km (31,4 %), Private - approx. 21'000 sq km (24,4 %).

1. INTRODUCTION

The main objectives of the research is preparation of Orthophotos, Stereo and Digital Terrain Models in WSG84 and the local coordinate reference system by means of most modern softwares and developed applications for Cadastre Base Mapping. The object of the research was the territory of Nakhcevan Autonomous Republic. Total area of the territory is 5 363 sq. km where more than 60% of territory is above 1000m.

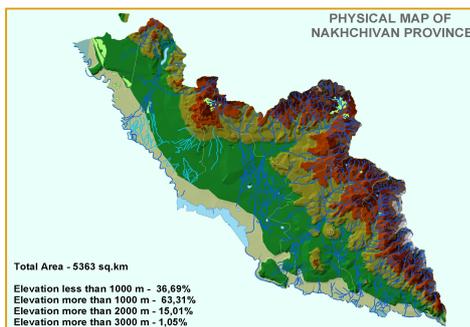


Figure1. Dynamic of Relief in Nakhcevan

Source materials used for orthophotos, stereo models and DTM preparation are represented below:

Standard Stereo (EPIPOLAR) - Pan-Sharpned Multispectral (PSM) RGB – True Color (3 bands, 1 file); Standard Stereo (Map Projection: UTM38N) - Panchromatic; Standard Stereo (Map Projection: UTM38N) - Pan-Sharpned Multispectral (PSM) gray-scale files (4 files, 4 bands)

For preparation of DTM and stereo features extraction were used epipolar standard stereo products which were previously triangulated to reach Horizontal – 1 m and Vertical – 2m accuracy by means of SocetSet MST software RPC (geometrical model of Ikonos2 sensor) correction. As a result of first triangulation were acquired correct stereo models (precision stereo). Further DTM is being generated by means of SocetSet ATE software and edited by SocetSet ITE and Erdas Imagine Stereo Analyst Application. Afterwards acquired DTM is going through special sophisticated mosaic and quality control process based on ArcObjects developed application. DTM characteristics: Resolution - 5 m, Horizontal Accuracy – 5m, Vertical accuracy – 2m.

On the forth stage of the process so called Map Projection product consisting of Multispectral bands (including red, green, blue and near infrared bands), covering the same area as epipolar is being triangulated by the same GPS measured ground control points and orthorectified by means already prepared and checked DTM. Orthorectification process is being performed by SocetSet Orthorectification module. Above mentioned developed applications let check ortho-photo accuracy too. Horizontal accuracy of Ortho-photo – 1m (RMSE). As a result, all ortho-photos and DTMs are being reprojected to local coordinate system. In addition DTMs are being recalculated from WCS 84 to Baltic Sea vertical datum. Final stage is the partitioning of Ortho-photos by 10000 map sheet where mosaic process for orthophotos has very significant role.

2. CONCLUSION

Ortho-photos, Stereo and Digital Terrain Models are the important source of extraction, update and comparison of data in daily functioning of Cadastral Information Systems, taking into account the usage of Multispectral Ortho-photos for visual identification of property and calculation of its 2D geometrical parameters. Advantage of the multispectrality for better classification/identification of the property and land use information gives possibilities for Land Management Purposes too. Use of DTM and its derivatives for quality, cost evaluation and hydrological aspect. Stereo models give additional capabilities for visual identification of the properties and calculation of 3D geometrical parameters of buildings, fences with 1m accuracy. Approximately 210,000 land parcels and 72,000 house plots are transferred from existing legacy reference onto the base maps.

REFERENCES

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