P-030

DIGITAL TERRAIN MODEL ACQUISITION OPPORTUNITIES

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In background since 2006 till today Latvian Geospatial Information Agency (LGIA) have been using data from stereoscopic plate obtained TIN for terrain acquisition.

The entire territory of Latvia are ensured by the DTM with 20 m grid. So far, the DTM are produced by stereoscopic edited TIN, and the Soviet era topographic maps are used as consumable material. Data quality is not even, DTM are obtained at different periods from different aerial scenes, and their quality varies. It takes a long period and human resources to mark TIN for all territory of state for DTM acquisition. As the data is also used in topographic maps, then the debt hydrography and road swelling are corrected intentionally using vector data. To correct a wider area, they are divided into blocks, but then there are problems with block edges and because of the height differences they do not match.

In LGIA requirements of terrain accuracy for cartographic use do not exceed 1.5 m, because those terrain models are used to obtain contour lines. From LiDAR they are more accurate and detailed, so requirements could be increased. For topographic maps in different scales there are different requirements with different detalization needs for contour lines.

The data are used for land use and topographic maps as material. There are requirements for surface data for flood modeling, but the quality of existing data is insufficient.

To improve data quality it is planned to obtain and use LiDAR data for all territory of Latvia starting from year 2012. On present only for small areas laser scanning data are available and there vertical accuracy is higher than 0.2 m (see Figure 1) and to decide on use of LiDAR data there have been made some studies on data comparing.

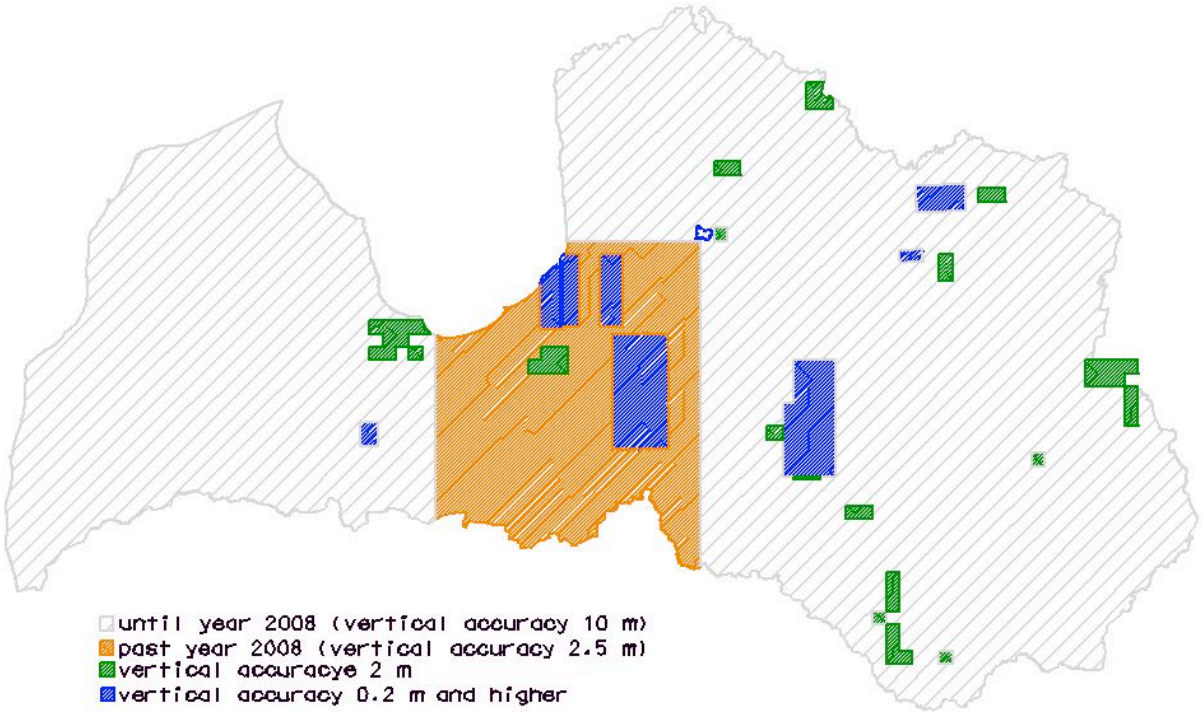

Figure 1. Accuracy of DTM's in Latvia

The studied plot size was 1925 ha in Latvia's North urban territory Cēsis. To compare digital terrain models gained from LiDAR and stereoscopic corrected TIN, since 2008 there were LiDAR data used with point density ~3 p/m2 processed in TerraSolid Application based on MicroStation and stereoscopic gained data on PHOTOMOD in 2008 from aerial photographs gained before year 2008 in 350% extension with point density ~ 0.063 p/m2.

On each surface there were 71 pitch marks located on the well bores, road junction, hill tops, benchmarks, pastures, rare woods, coniferous forests and deciduous forests in the same location to compare accuracy of

both surfaces the mean square error was 1.3709 m. But each difference need to be discussed separately, because in each spot they are caused by different reason. Stereoscopic gained data in different modes height placing step vary from 0.4 to 1 m. So there were analyzed points with difference more than 2 m.

Modeling surface from stereoscopic gained data, obtained surface precision depends on measuring method, technical means, stereo operator quality and other factors. The result is more uncertain than terrain gained from LiDAR data, because the vegetation in Latvia is very dense and in forested areas it is difficult to obtain data in stereoscopic mode.

The aim of this study was to make sure that for terrain models and contour lines LiDAR data quality and accuracy is more precise, faster processing and effective than stereoscopic gained data. That is why for terrain processing LiDAR is more profitable to use. We try to update DTM in period 3 years, but when it is done the information is already outdated. Since the LiDAR data are more accurate, it would not be necessary as often restore the terrain information and the acquisition of DTM would take much less time with less human resources.

If there were scanned the whole territory of Latvia with a point density 2-3 p/m2, it would be possible to create a DTM with 12.5 m grid step for the whole territory of state for topographic maps in scale 1:10000 and for major cities up to 2.5 m grid step for topographic maps in scale 1:1000. In future acquiring to laser scanning data quality there would be possible to build some flood simulation that would be useful for territory planning or use LiDAR data in air traffic to determine obstacles for landing fields. Already there are requirements for DTM's with higher quality for flood modeling or situation modeling.