1.4. BUILDING UP THE DTM

The achievement of DTM represents the first step in the construction of any GIS compatible database, by offering the structural frame for storing any kind of other type of gIS compatible data.

1.4.1 DTM on WGS 84 ellipsoid

The first DTM model has been constructed base on the global model of elevations: ETOPO 1.

(http://www.ngdc.noaa.gov/mgg/topo/)

ETOPO1 is a 1 minute arc global relief model of Earth's surface. Figure 4 and 5 show images of 2D and 3D terrain model built using ETOPO1 information for the INSTEC area.

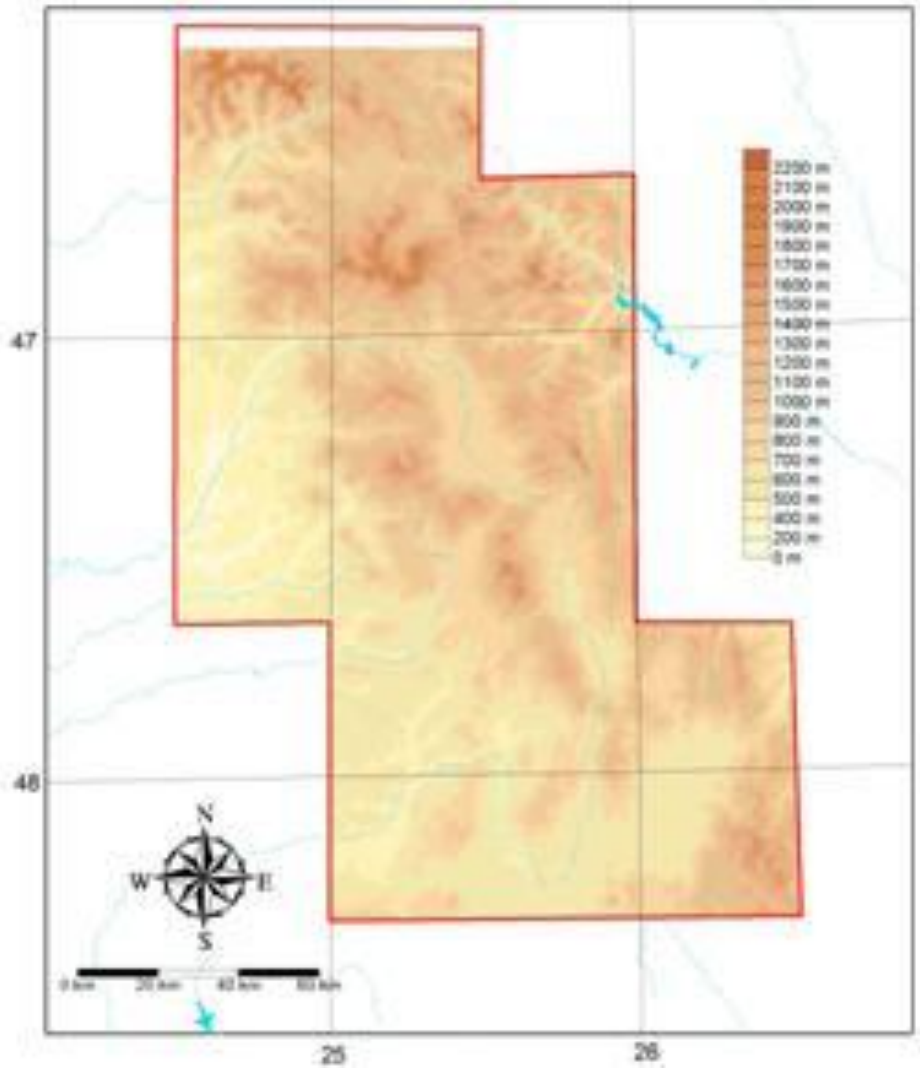

Fig.4. Regional digital terrain model on WGS 84 ellipsoid as derived from ETOPO 1 model

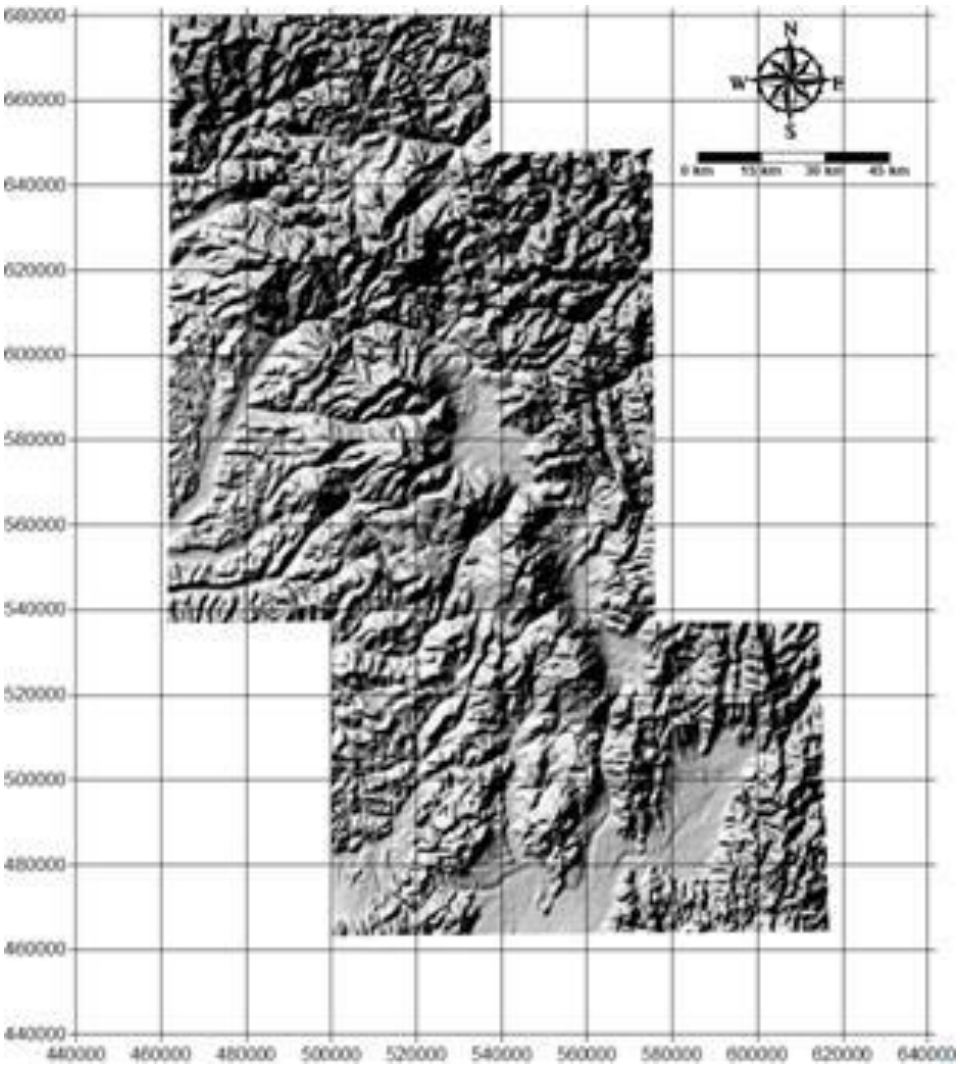

Fig.5. 3D regional digital terrain model on WGS 84 ellipsoid derived from ETOPO 1 model

1.4.2. DTM on Krassovski ellipsoid

Using ETOPO 1 model may cause some problems because of its poor (1 minute) resolution (1-2 km) and the vertical datum reference level, different from that one used for gravity observations. In Romania the points of the (aero) magnetic and gravity works were projected in Gauss-Kruger system and 1978 Black Sea height system.

Figures 6 and 7 shows a comparison between the resolutions of ETOPO 1 model and 1:100.000 Gauss- Kruger map sheets.

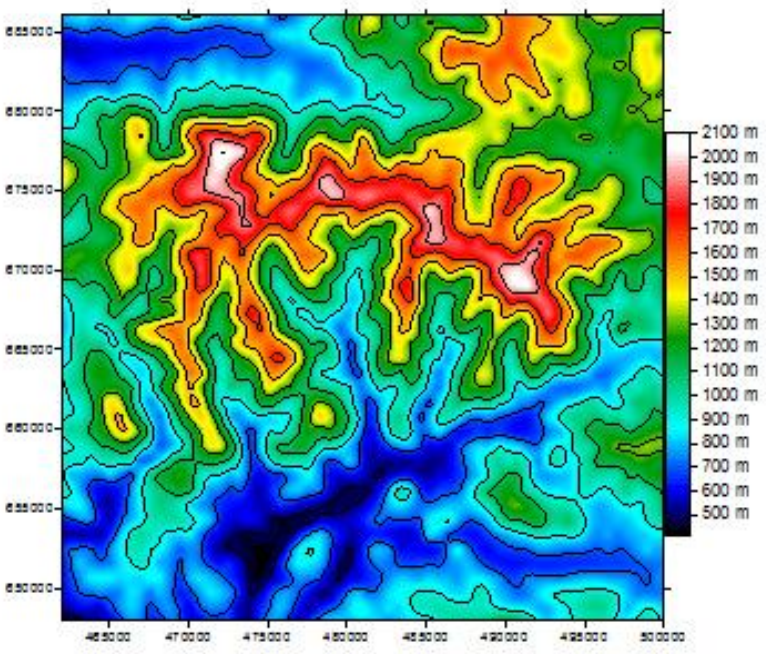

Figure 6. Terrain model for L35-014 map sheet on WGS 84 ellipsoid as derived from ETOPO 1

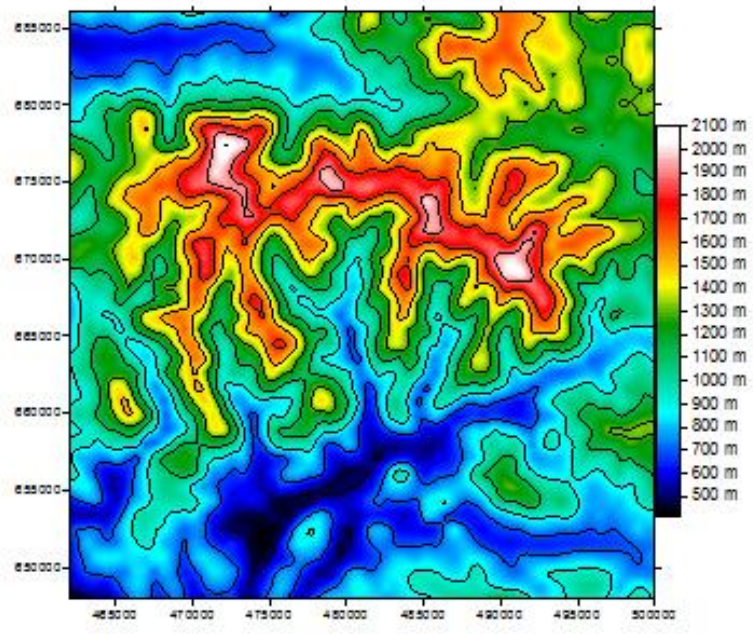

Figure 7. Terrain model for L35-014 map sheet on Krasovski ellipsoid and Gauss – Kruger projection

The appropriate advanced processing and interpretation of geophysical information require similar positioning systems with those employed during data acquiring. Especially the height system plays an important role.

This is why it has been decided to build up a DTM by digitizing the 1:100.000 Gauss-Kruger map sheets. These models have also a better resolution. Figure 8 illustrates two models with different resolutions for L35-014 map sheet.

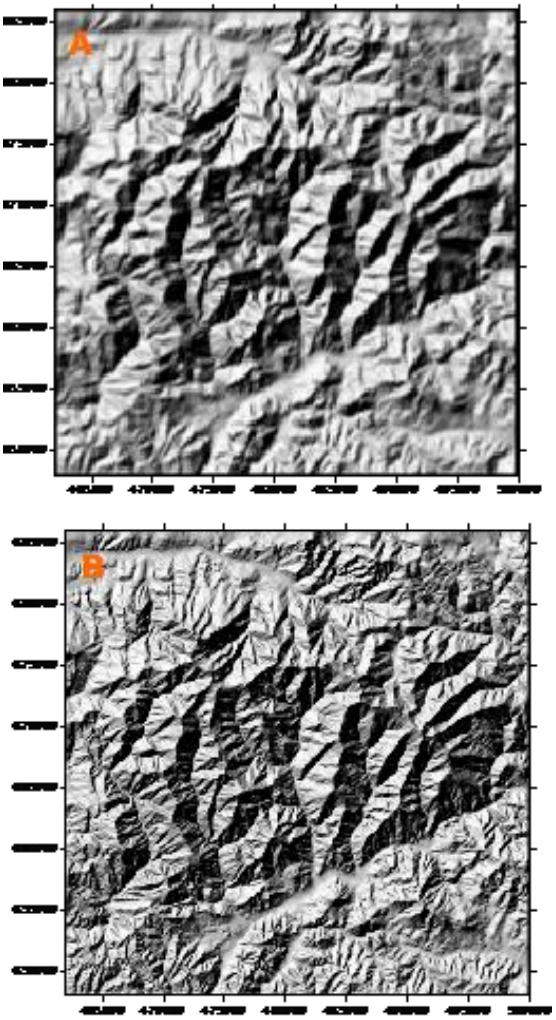

Fig. 8. L35-014 map sheet: the effect of model resolution. Models created with A. a cell grid of 200m x 200m; B. a cell grid of 50m x 50m.

1.4.3. Topography data transfer on electronic support

The published maps have been scanned and digitized, and information referred in the stereographic projection system STEREO 1970 by the help of the commercial computer application DIDGER (©Golden Software).

The following operations are necessary:

- scanning the information provided on the paper support

- setting-up the frame for the transfer to STEREO 1970 system

- digitising altitude information

- digitising planimetric details

All the above-mentioned operations are time-consuming and must be carefully implemented, especially in the mountain areas.

This is why the last stage is represented by the validation of the data.

The state-of-the-art in the achievement of the DTM is shown in Figure 9. The study area was almost fully covered, the only exception being L35-052 map sheet which will be validated till the end of 2013.

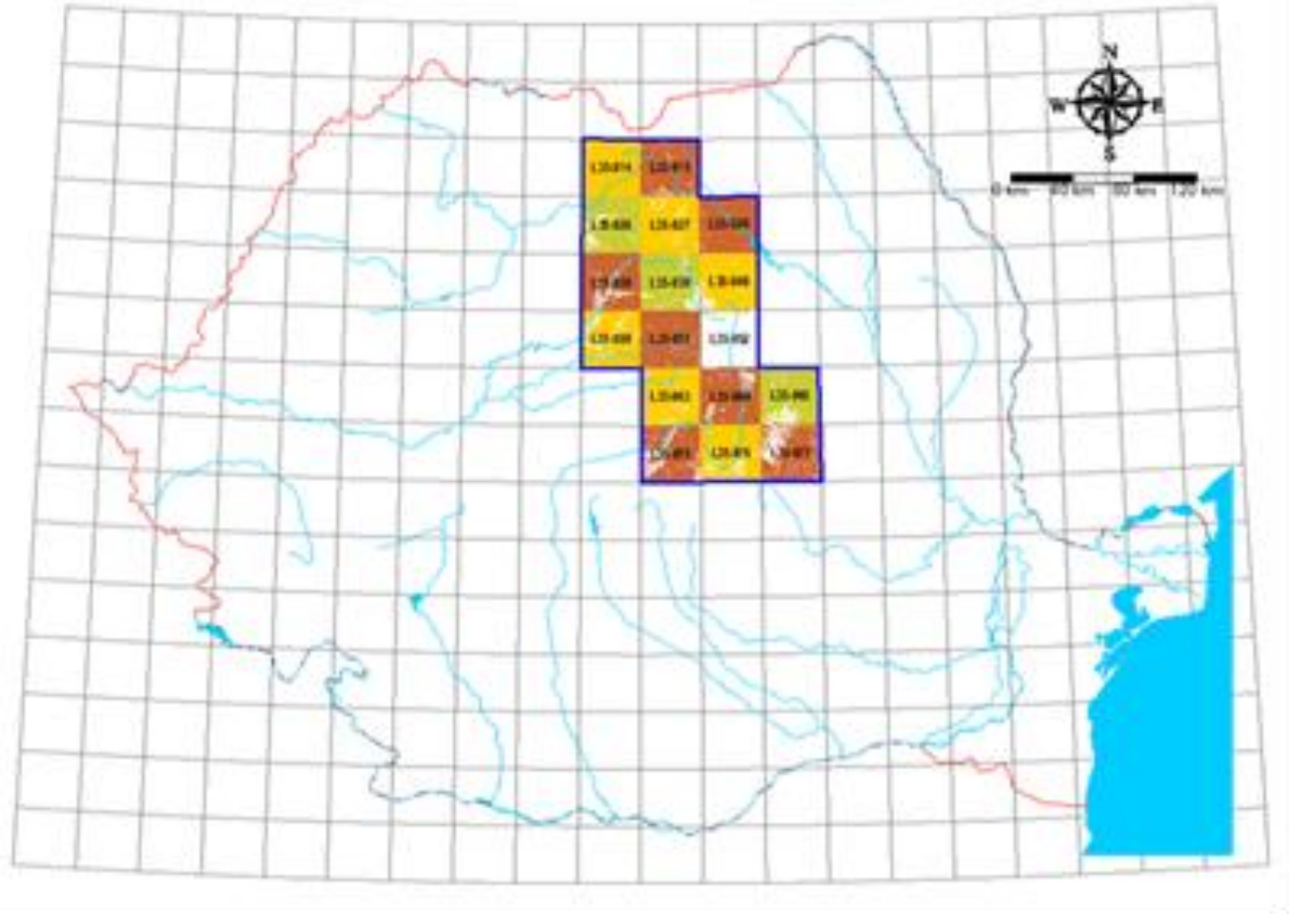

Figure 9. Current state of topographic data transfer on electronic support