



Short-wavelength component of the geoid: a possible indicator of the isostatic character

G. Timár (1), K. Kis (2) and A. Kenyeres (3)

(1) Space Research Group, Dept. of Geophysics, Eötvös University of Budapest, Hungary, (2) Dept. of Geophysics, Eötvös University of Budapest, Hungary, (3) Satellite Geodetic Observatory, Institute of Geodesy, Cartography and Remote Sensing (FÖMI), Penc, Hungary

(timar@ludens.elte.hu / Fax: +36 1 3722927)

A comparative study has been carried out between the EGM96 global geoid model (degree and order 360; NIMA-NASA, 1997) and the local Hungarian GPS-gravimetric geoids HGEO99 (Kenyeres, 1999) and HGEO2000. EGM96 expresses the geoid undulation values at every round arc degree. The HGEO99 is based on 300 independent basepoints distributed quasi-uniformly over Hungary (territory about 93,000 km²). The shortest wavelength component in the HGEO99 is about 20 kilometers while the EGM96 has wavelengths down to 100 kilometers. A vertical difference map was derived as a difference between the two geoid models. It can be also interpreted as a map of the residual geoid. The range of these residuals is approximately one meter. The distribution of differences was analyzed and compared with the neotectonic indicators such as the recent vertical crustal movements derived from repeated precised levelling (Joó, 1992), and the thickness of the Quaternary layers. Remarkable correlation has been found between the differences of the geoid models and the known geological structures and their vertical movements, in the territory of Hungary. Maximum residual geoid values occur at the Transdanubian Range, the Mecsek and Bükk Mts., the regions showing higher recent crustal uplift. Minimum is detected along an elongated SW-EN directed zone south of the Mid-Hungarian Line, and at the Aggtelek Mts, the northeast part of Hungary.

References

Joó, I. (1992): Recent vertical surface movements in the Carpathian Basin. *Tectonophys.* **202** (2-4):129-134.

Kenyeres, A. (1999): Completion of the nationwide GPS-gravimetric geoid solution for Hungary. *Phys. Chem. Earth (A)* **24**: 85-90.

NIMA-NASA, National Imagery and Mapping Agency, National Aeronautics and Space Administration GSFC (1997): WGS84 EGM96 (complete to degree and order 360) 1st Edition. NIMA-NASA GSFC, St. Louis, Missouri, USA.