



## **IMPORTANCE OF EÖTVÖS TORSION BALANCE MEASUREMENTS AND THEIR GEODETIC APPLICATIONS**

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There is a long tradition of research on geodetic applications of Eötvös torsion balance measurements in Hungary. In the last century more than 60000 torsion balance measurements were made in Hungary, so this country has the most torsion balance measurements all around the world. At present serious efforts are going on for rescuing the former torsion balance measurements, the staff of Loránd Eötvös Geophysical Institute are entering the data of old original hardly legible fieldbooks on computer database. At present 20132 torsion balance measurements are available for further processing in computer database.

Previously the horizontal gradients of gravity were used for prospecting of mineral resources by geophysicists. In geodesy there is a good possibility partly to interpolate deflections of the vertical, and to compute geoid heights applying astronomical leveling from curvature gradients of gravity.

Deflections of the vertical, geoid heights and gravity anomalies can be computed applying collocation technique through suitable covariance functions determined from horizontal and curvature gradients of gravity measured by torsion balance.

The most recent and important possibility of geodetic application of torsion balance measurements is connecting to GOCE (Gravity and Ocean Circulation Experiment) starting in 2006, because it can serve very important data to the gradiometric measurements of GOCE satellite. The unique Hungarian torsion balance measurements give a very good possibility to convert these gravity gradients from the Earth's surface to the satellite height of 250 km by analytical upward continuation, which will be

comparable to the gradients measured by GOCE gradiometer. Hereby an opportunity presents itself to calibrate GOCE measurements by real gradiometric data measured on the Earth's surface.