



Gravity surveys on large ice-covered lakes in Estonia

T. Oja (1), A. Ellmann (2), A. Bloom (1), and A. Gruno (1)

(1) Estonian Land Board, Mustamäe tee 51, Tallinn, Estonia (Tonis.Oja@maaamet.ee), (2) Tallinn University of Technology, Department of Civil Engineering, Ehitajate tee 5, Tallinn, Estonia

In winter 2009 gravity campaigns were carried out on large ice-covered lakes Peipsi and Võrtsjärv in Estonia. Relative gravimeter Scintrex CG-5 in combination with GPS RTK positioning was used for determining gravity values and precise position (± 10 cm) of the survey sites. Despite bad weather conditions and unstable observation base of the gravimeter on the ice, the uncertainty of gravity values about ± 0.1 mGal (10^{-6} m/s²) was achieved from the least squares adjustment. The built-in options of CG-5, like the automatic tilt correction, raw data recording and seismic noise filter, proved to be useful functions (complements, supplements) during field work in such a harsh environment. For instance, the raw 6 Hz data (6 readings per second) of CG-5 gravimeter were continuously recorded to study the effect of oscillating elastic ice sheet (can be regarded as a non-inertial reference frame). The investigation of high frequency data of CG-5 revealed the noise signal with frequency below 0.1 Hz which is lower than the frequency of regular background microseism (0.2 Hz). The results of this study indicated that the built-in filter of CG-5 alone might not be enough for suppressing the ice-related noise and getting unbiased gravity values on ice. Therefore we tested some signal processing techniques on raw gravimeter's data to separate the signal from noise more effectively than CG-5 filter.