3.3. GRAVITY DATA AQUISITION

3.3.1. WORKS LOCATION

High accuracy gravity determinations have been performed within base-stations belonging to the national geodynamic monitoring network along the transect Rastoaca - Tg. Secuiesc (Sânzieni) as well as on the dedicated gravity network for monitoring the geodynamic active zone in the bending area of East Carpathians.

The location of the observation points is shown in Fig.17

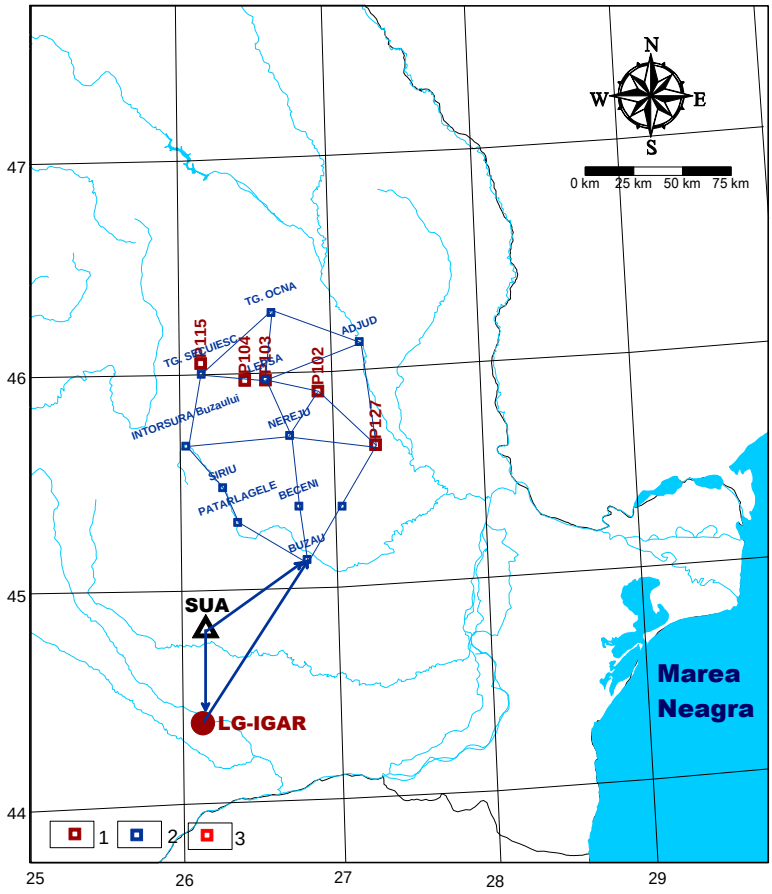

Fig. 17 - Location of measurement points and the design of the gravimetric ties 1, Răstoaca – Sânzieni transect; 2, Vrancea dedicated network; 3 additional locations, LG-IGAR - GRAVITY LAB inside the Institute of Geodynamics ; SUA- central gravity base station of Surlari Observatory.

3.3.2. FIELD OBSERVATIONS

3.3.2.1. Metrological considerations

All gravimetric observations were made using the CG5 Autograv Scintrex gravity meter # 40387 own by DDGT. The gravity meter was purchased in 2008, but returned to the manufacturing company in August 2011, for an overhaul.

Fig.18 - Scintrex CG-5 AUTOGRAV gravity meter

The main technical characteristics of the instrument are:

- assisted by an embedded processor with a Scintrex operating system,
- measuring range of 8000 mgal without prior adjustment,
- 1 µgal accuracy,
- possibility to work automatically under a pre-determined time,
- measurement frequency 6 Hz,
- readings are displayed on a ¼ VGA liquid crystal display ¼ VGA directly in mgal,
- automatic corrections: tilt up to ± 10 msec arc,
- earth tides,
- temperature,
- seismic filter,
- removal of manifestly erroneous readings based on advanced statistical criteria,
- quartz spring system placed in vacuum in a thermostatic chamber,
- unaffected by variations in terrestrial field up to ± 0.5 mT,
- long-term drift compensated automatically up to <0.02 mgal / day,
- supply system that provides 1 day energy independence,
- storage of about 200,000 readings in a flash memory of 12 MB,
- internal clock powered by a lithium battery,

- built-in GPS receiver connectable to an external antenna,
- possibility to download recorded data via RS-232 or USB ports in different formats:
- *.SGD (Scintrex proprietary format)
- *.TXT (ASCII with headers)
- *.XYZ (ASCII as worksheets)
- *.SMP (only for primary values), etc.

Sensitivity of the gravity meter is ± 1 µgal.

Repeatability (as indicated by the manufacturer): ± 5 µgal.

Tests conducted after 2011 overhaul seem to confirm these constructive parameters, even though for longer cycles, repeatability seems to be slightly below the range stated by the manufacturer.

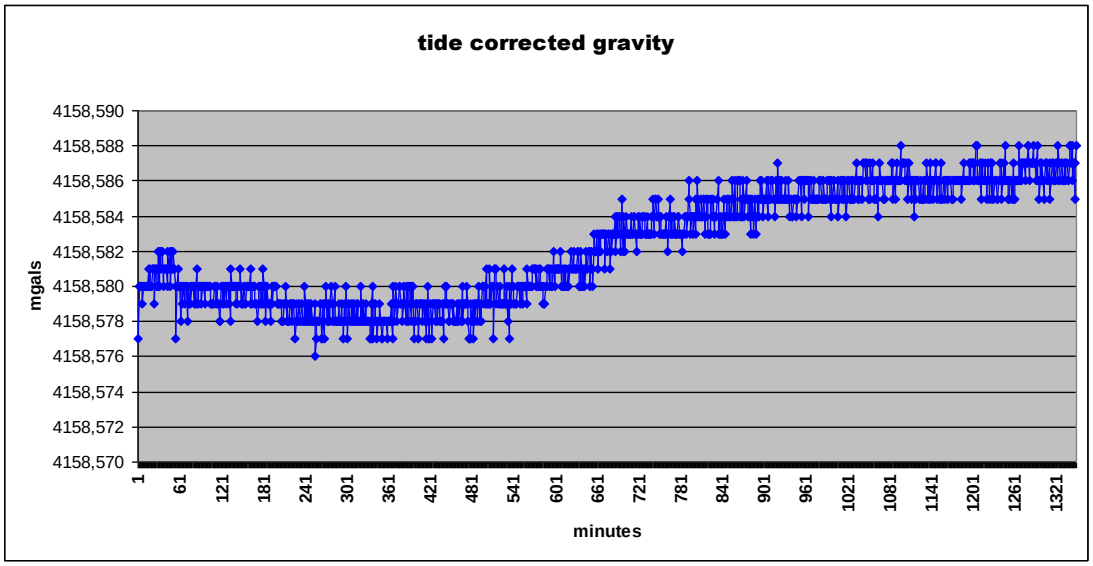

Fig. 19 - Reproducibility of readings at fixed point within 24 hours. Gravity determinations were done in the DDGT laboratory. There is a slight increase probably due to a residual effect of drift.

Figure 20 illustrates a test with residual effect removal, which improves the performance of the instrument. The instrument tilt records after two mutually perpendicular axes (Tilt X and Tilt Y) during these testing are presented.

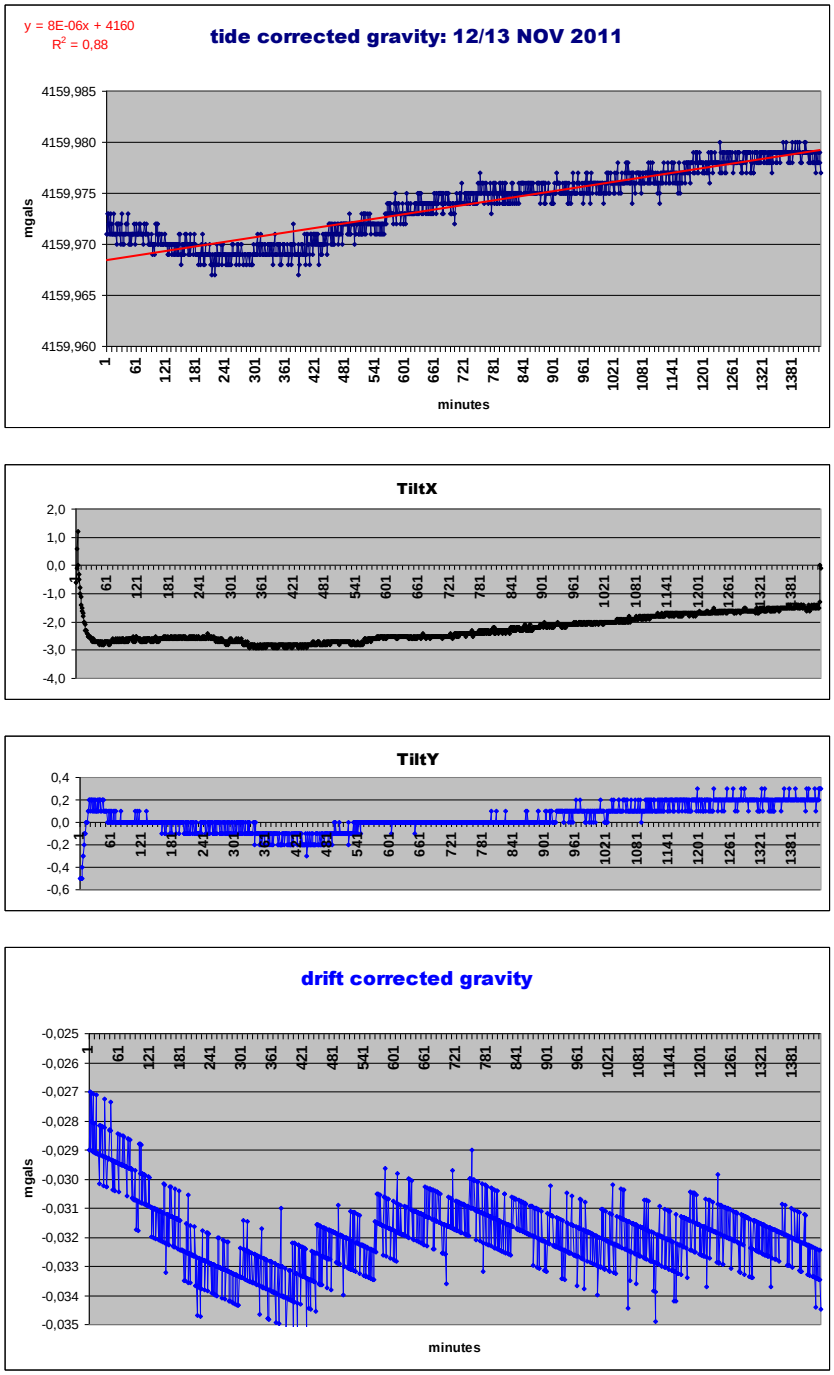

Fig. 20 - Improving the reading reproducibility of Scintrex CG-5 gravity meter by introducing the additional drift correction. Tilt X-inclination along Ox, Tilt Y – inclination along Oy. Tests conducted in DDGT gravity lab.

Following the tests it has concluded that the instrumental error of CG-5 gravity meter # 40387 exceeds the threshold of ± 5 µgal, the instrument exhibiting instrumental errors up to 10 µgals.

For this reason, repeated observations showing deviation of the results in two distinct measuring cycles greater than ± 10 µgal were repeated.

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