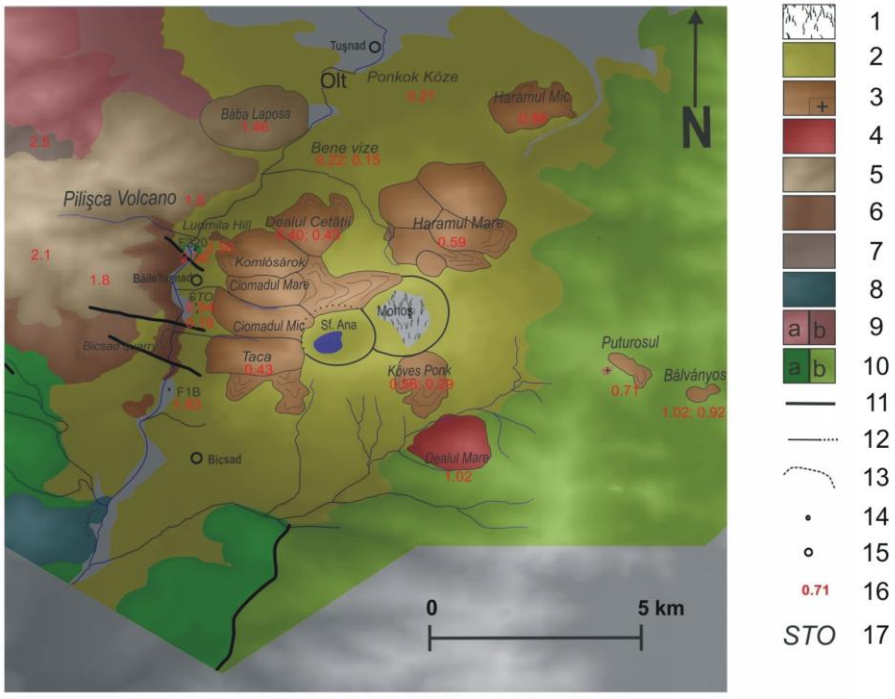
2.3.2. FIELD AND LABORATORY ACTIVITIES FOR NEW GEOLOGICAL AND GEOPHYSICAL DATA AQUISITION IN ORDER TO SOLVE THE RELATIONSHIP BETWEEN TECTONIC AND VOLCANIC STRUCTURAL FEATURES. ROCK SAMPLING FOR SPECIFIC GEOCHEMICAL AND PETROPHYSICAL ANALYSES (I).

(2) 3.2.1. GEOLOGICAL INVESTIGATIONS

The results geological observations obtained during the field campaign have allowed the construction two detailed maps for the southern part of the INSTEC perimeter.

It is about the new geological map of Ciomadul volcano and Persani Mts. alkali basaltic volcanism. The Persani Mts new volcanologic map is shown along the geophysical interpretations in Fig. 19.

We show below a new simplified 3D map of Ciomadul volcano (fig. 24), showing also the published and unpublished K/Ar data that will be published soon in an international journal along with volcanological interpretations:



Geological map of Ciomadul volcano. Legend: 1. Mohoş swamp; 2. Ciomadul volcano - volcaniclastic deposits; 3. Ciomadul dacite domes-; +: intrusion; 4. Andesite dome (Dealul Mare); 5. Pilişca volcano - andesite and dacite domes; 6. Pilişca volcano -andesite with amphibole and pyroxene; 7. Pilişca volcano - basaltic andesite (Mitaci type); 8. Shoshonite (Murgul Mic dome); 9. Cucu volcano: a. andesite with amphibole ± biotite; b. volcaniclastic deposits; 10. Cretaceous flysch deposits: a. Tithonic-Neocomian; b. Barremian-Albian; 11. Faults; 12. Crater outline; 13 Quarry; 14. Drilling; 15. Town; 16. K-Ar age; 17. STO-South Tuşnad Outcrop.

Fig. 26.

(2) 3.2.2. GEOPHYSICAL INVESTIGATIONS

During the second stage, geophysical research have been conducted into two main directions:
- field observations
- lab determinations and data processing

FIELD GEOPHYSICAL ACTIVITIES

New data acquisition have been performed in order to complement the current information and to advance the state-of-the-art knowledge in the investigated area.

As long as the National Agency for Mineral Resources denies the access to the previously obtained information, the role of data acquisition in the project has been considerably increased.

Many areas previously covered by geophysical observations had to be re-surveyed, increasing resources spent for field activities in the detriment of data processing and interpretation.

The much more extended surface to be covered by field activities has determined a thorough planning of the areas to be surveyed each year of the project. The specific scheduling is presented in the next figure.

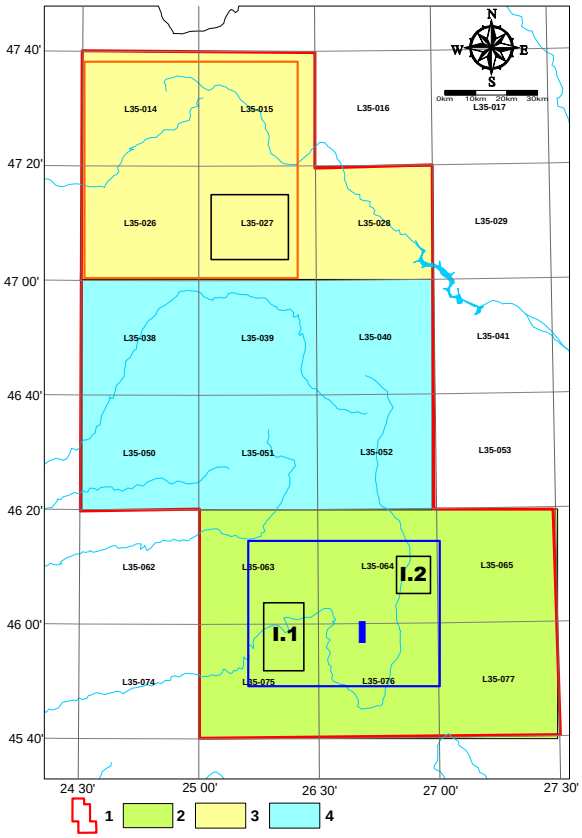


Fig. 27 - SCHEDULING FIELD SURVEYS WITHIN THE INSTEC PROJECT
1, INSTEC overall perimeter; 2, area covered during 2014 field campaign; 3, planned works during 2015 field campaign; 4, area to be covered during 2016
I, INSTEC-SUD perimeter; I.1, Perşani sub-perimeter; I.2. Ciomadu sub-perimeter

From the methodological point of view, research performed can be grouped into:

- gravity survey
- ground magnetics

GRAVITY SURVEYS

Gravity observations has been performed by employing a Canadian gravity meter Scintrex CG-5 AUTOGRAV (1 microgal accuracy).

a) preparative activities: consisted of checking-out operations for gravity scale and drift factor

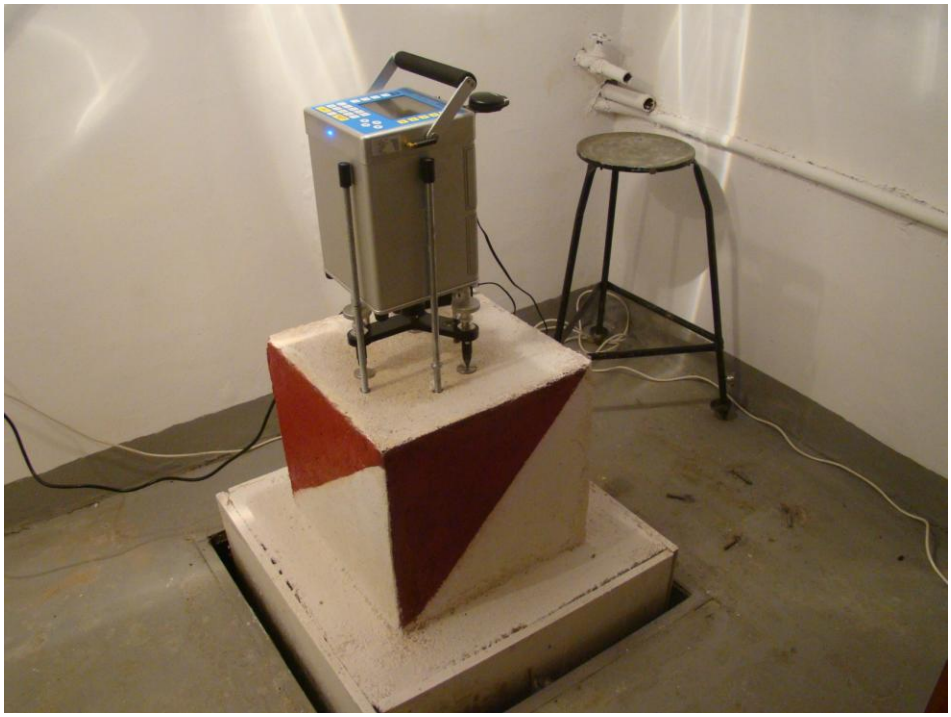


Fig. 28 - CG-5 AUTOGRAV METER OPERATED IN THE SEDD GRAVITY LAB FOR DRIFT FACTOR DETERMINATION

b) observations on the gravity reference network for transferring absolute gravity values

Fig. 29 - CG-5 AUTOGRAV METER OPERATED ON THE P116-SANZIENI (TG. SECUIESC) PILLAR OF THE GRAVITY REFERENCE NETWORK

c) current survey in the study area

Fig. 30 - CG-5 AUTOGRAV METER OPERATED IN THE CENTRAL BASE-STATION OF THE 2014 SURVEY: LEPSA FROM THE 2nd ORDER GRAVITY NETWORK OF ROMANIA

Fig. 31 - CG-5 AUTOGRAV METER OPERATED IN A CURRENT STATION IN THE FIELD

GROUND MAGNETICS

Geomagnetic field observations have been performed by using two types of instruments own by the Solid Earth Dynamics Department (SEDD):

a) proton magnetometer Geometrics G856 AX (10^{-9} T accuracy) - usually employed in current field survey

Fig. 32 - MAGNETICS TEAM OPERATING THE G856 AX IN THE DOPCA BASE-STATION

B) optical-pump magnetometer Scintrex SM-5 NAVMAG (10^{-12} T accuracy) mainly employed for the determination of the effect of the external sources of the geomagnetic field.

FIG. 33 - SCINTREX SM-5 NAVMAG OPERATED FOR DIURNAL ACTIVITY SERVICE

MAIN RESULTS

The results obtained during the field campaign have allowed the construction of several models of the gravity/geomagnetic field in the study area such as:

- regional-scale geomagnetic images for INSTEC-SUD area
- semi-detailed images were obtained for the CIOMADU and PERSANI sub-perimeters

REGIONAL-SCALE IMAGES

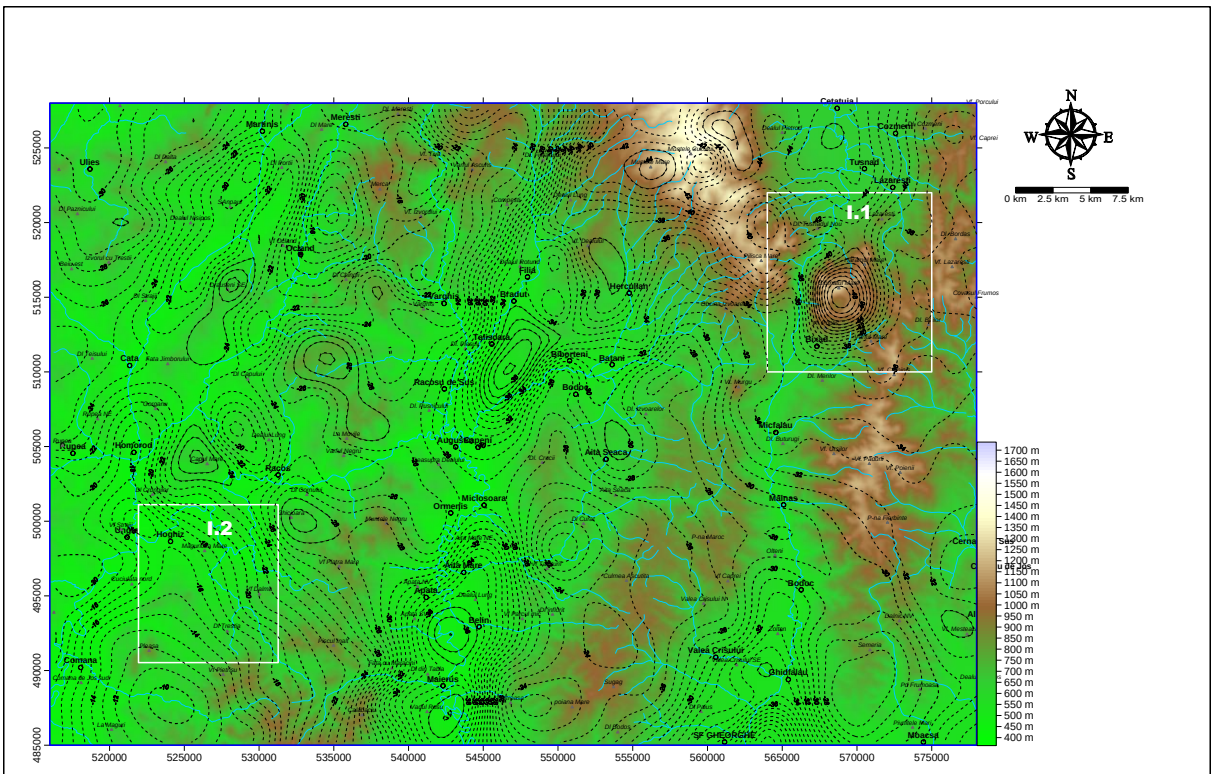


Fig. 34 - INSTEC-SUD: Bouguer anomaly for a reference density of 2.67 g/ccm

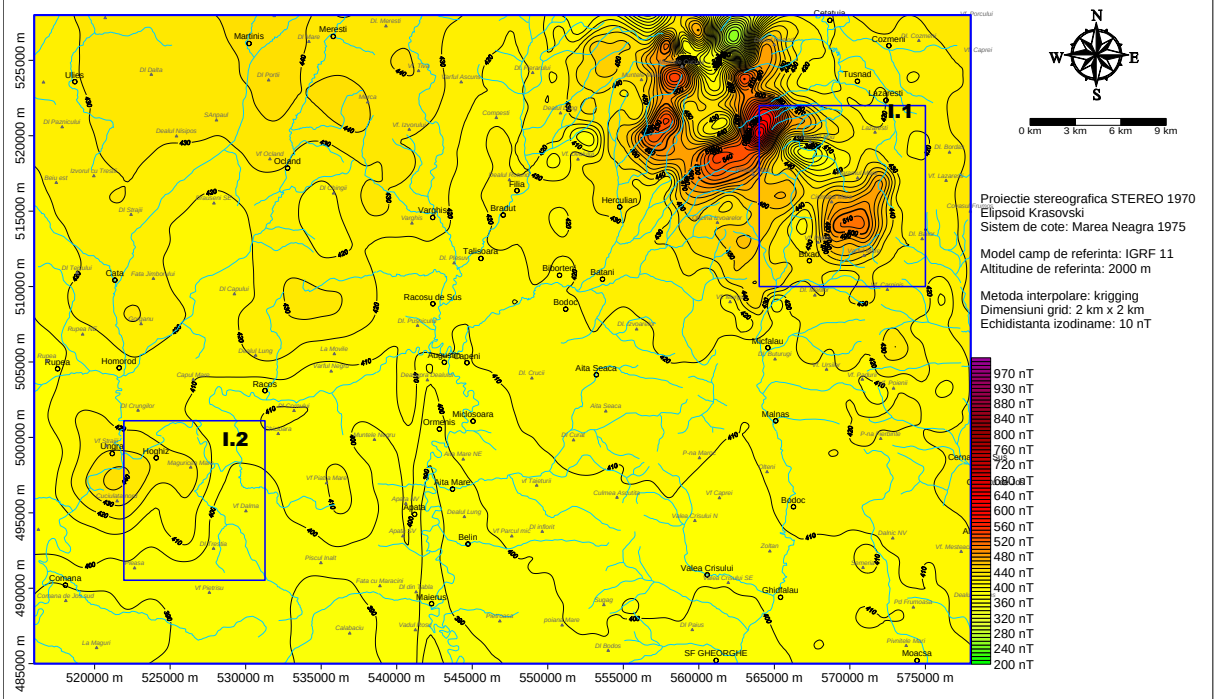


Fig. 35 - INSTEC-SUD: Total intensity scalar geomagnetic anomaly on a plan located at 2000 m altitude

LOCAL-SCALE IMAGES

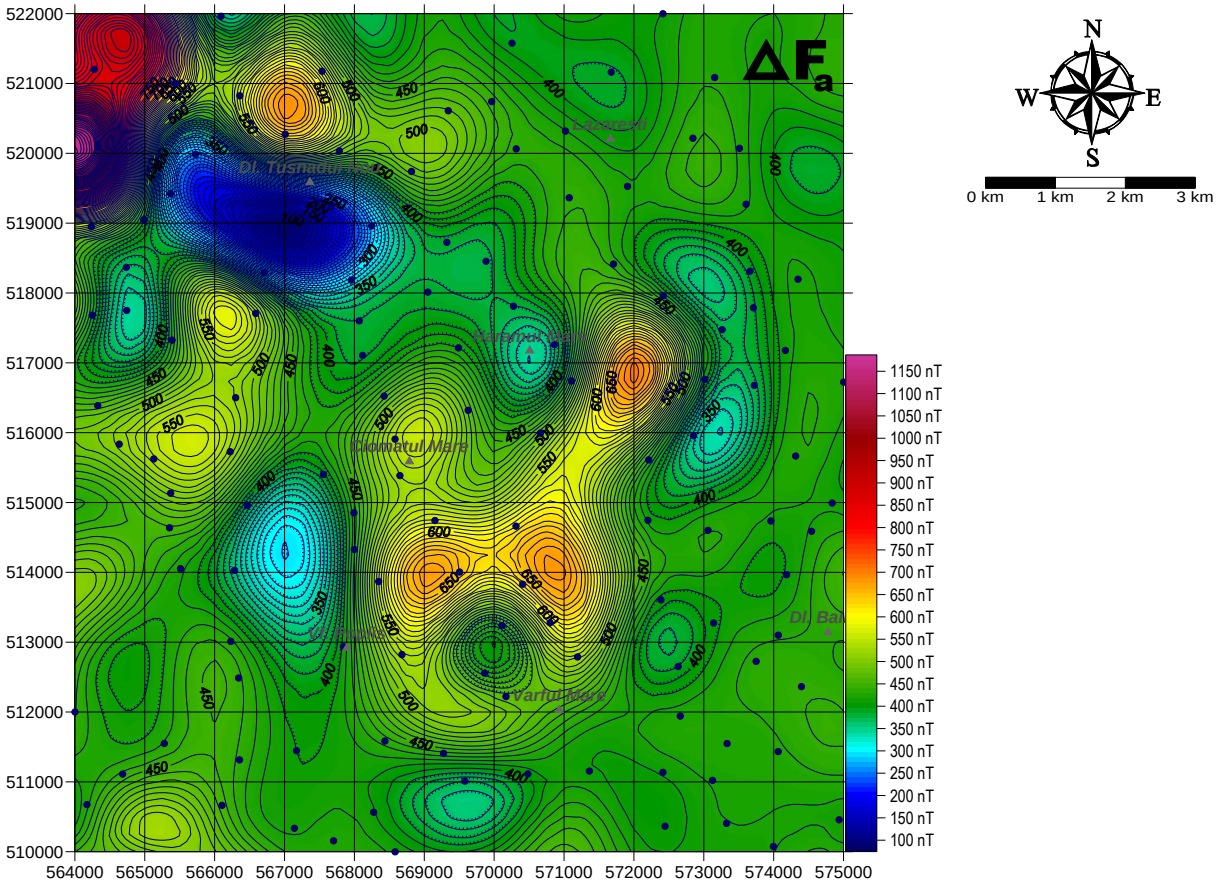


Fig. 36 - CIOMADUL AREA: Total intensity scalar geomagnetic anomaly on a plan located at 1000 m altitude

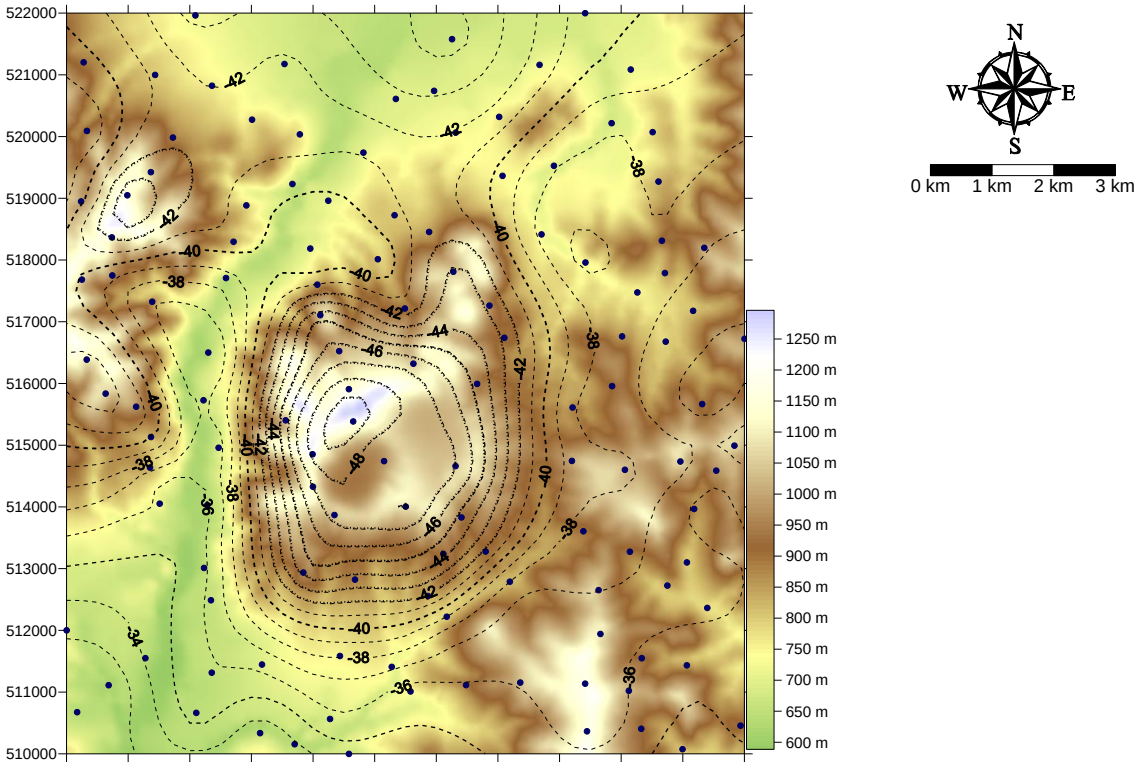


Fig. 37 - CIOMADUL AREA: Bouguer anomaly for a reference density of 2.67 g/ccm

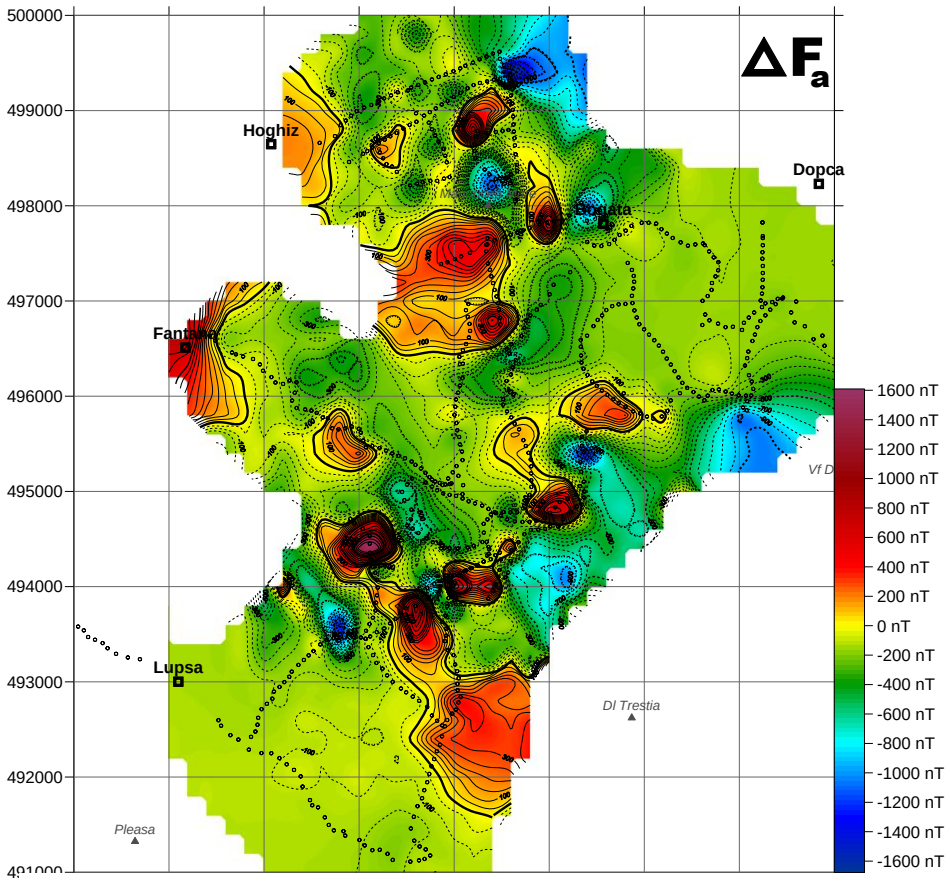


Fig. 38 - PERSANI AREA: Ground total intensity scalar geomagnetic anomaly

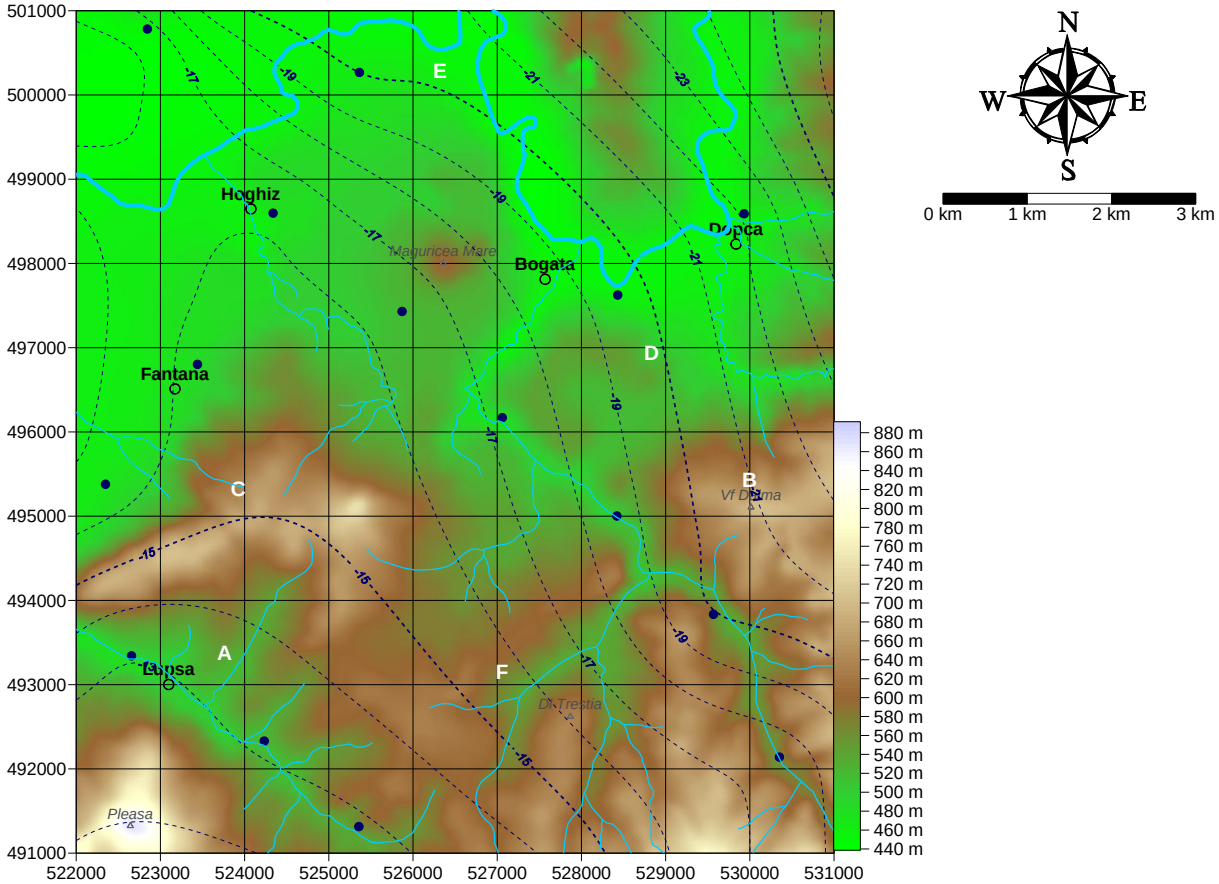


Fig. 39 - PERSANI AREA: Bouguer anomaly for 2.67 g/ccm reference density versus topography

F

ROCK SAMPLING AND PRESERVING

During the geophysical surveys within the Persani area, additional activities for sampling outcrops were conducted.

In the next figure, blue stars mark location of the sampled outcrops.

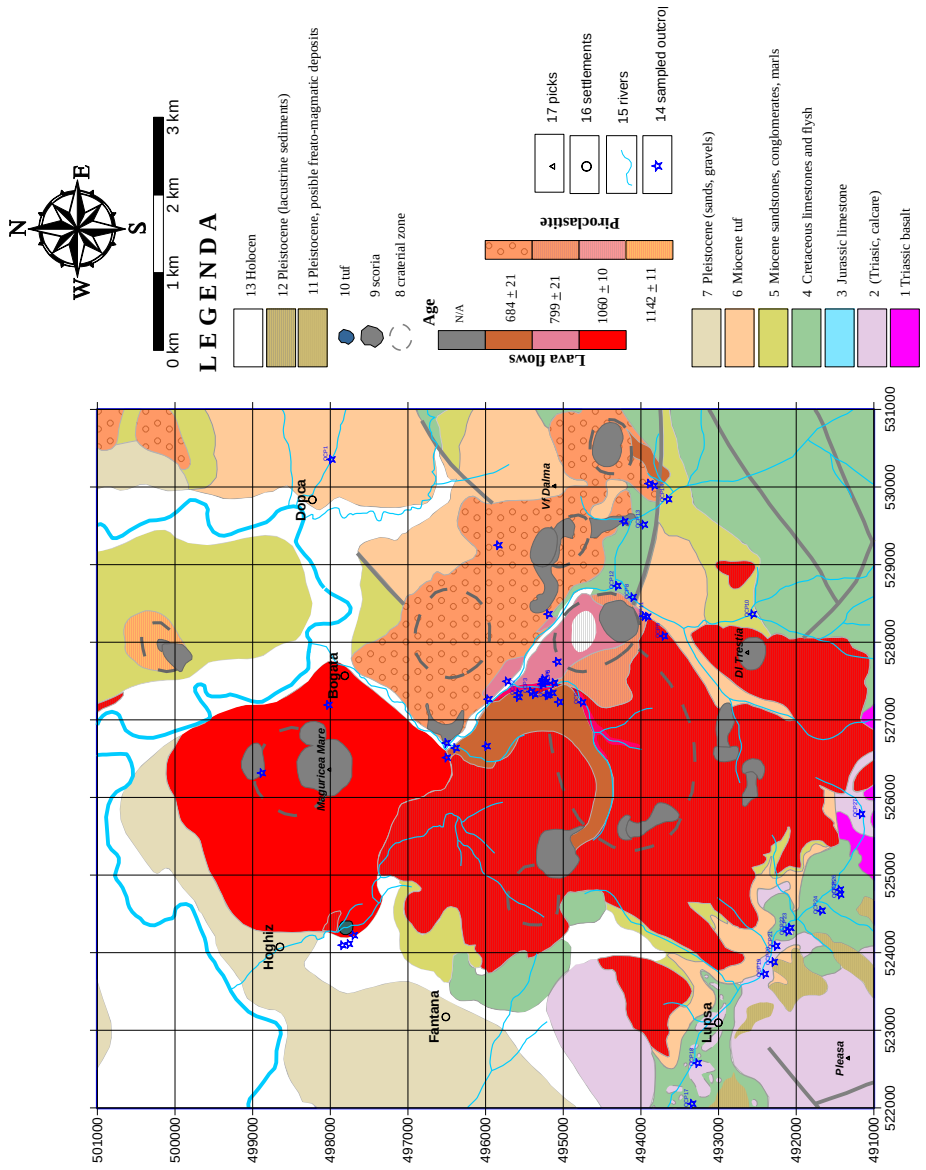


Fig. 40 - PERSANI AREA: Location of the sampled outcrops for rock-physics determination

Samples collected by the geophysical team are stored in the especially designed DDGT warehouse, and prepared for specific weight and magnetic susceptibility determinations.

Fig. 41 - DDGT ESPECIALLY DESIGNED DEPOSIT FOR PRESERVING ROCK SAMPLES AIMED AT ROCK PHYSICS DETERMINATIONS

SPECIFIC WEIGHT DETERMINATIONS

Specific weight determinations were conducted in the DDGT rock-physics lab by the double-weighting (air/water) methodology using a high accuracy analytical ballance.

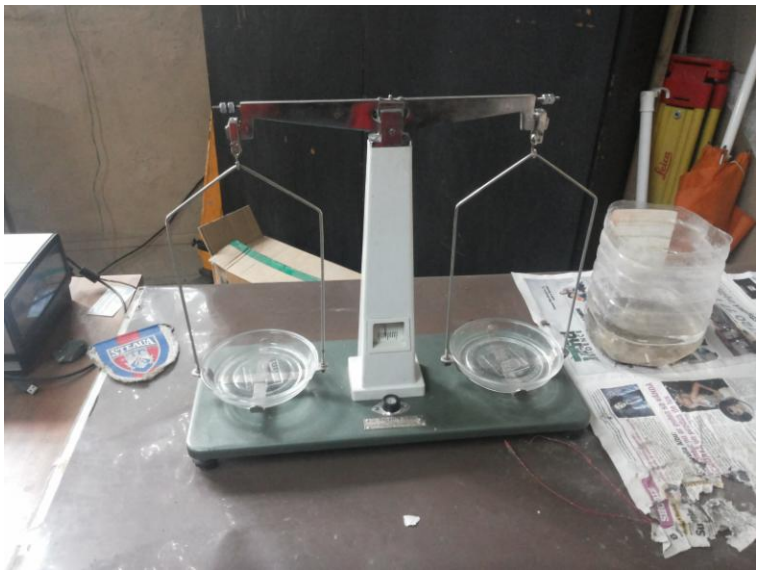


Fig. 42 - ANALYTICAL BALLANCE FOR SPECIFIC WIGHT DETERMINATIONS

DETERMINATION OF ROCK MAGNETIC PROPERTIES

Rock sampling for paleomagnetic observations

About 50 special rock samples from Neogene volcanic rocks were employed for paleomagnetic determinations.

The study area corresponds to Persani Mts. (Racos quarry, Racos – Heghes, Comana, Valea Stanciului, Valea Saratii, Maguricea, Hoghiz, Valea Barc, Valea Bogata, Gruiu - Valea Stanii, Valea Pietrele).

Rock samples core of 2.5 cm diameter have been extracted by the help of a portable drilling device. The orientation of the core samples has been determined by employing a Brunton compass and a solar compass (see the next figure) where possible.

Fig. 43 - ROCK-SAMPLING FOR PALEOMAGNETIC DETERMINATIONS

Localisation of outcrops – Latitude (^{o}), longitude (^{o}) and altitude (m). Location of the sampled outcrops has been determined with a portable GPS Magellan Explorist 600.

Fig. 44 - GPS -Magellan Explorist 600

Paleomagnetic determinations were conducted in the Paleomagnetism Laboratory of the Bucharest University by the courtesy of Professor Cristian Panaiotu.

The lab has state-of-the-art facilities for the determinations of rock magnetic properties.

Determination of the magnetic susceptibility (K)

The observations on the magnetic susceptibility of the rock samples were performed by employing the MFK1A (AGICO) device (see the next figure)

Fig 45 - MFK1A (AGICO)

Determination of the natural remnant magnetisation (NRM)

NRM determinations have been conducted by the help of the spin magnetometer JR-6A (AGICO) credited with an accuracy of $2x10^{-6}$ A/m

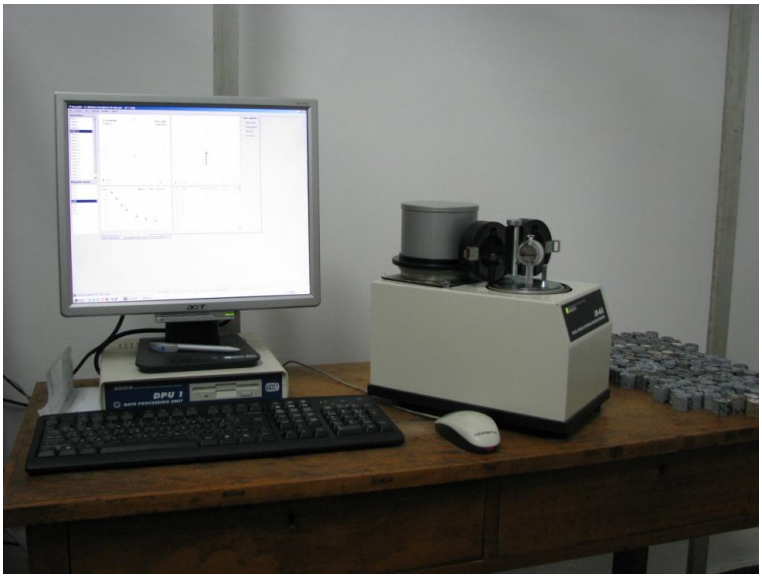


Fig. 46 - SPIN MAGNETOMETER JR-6A