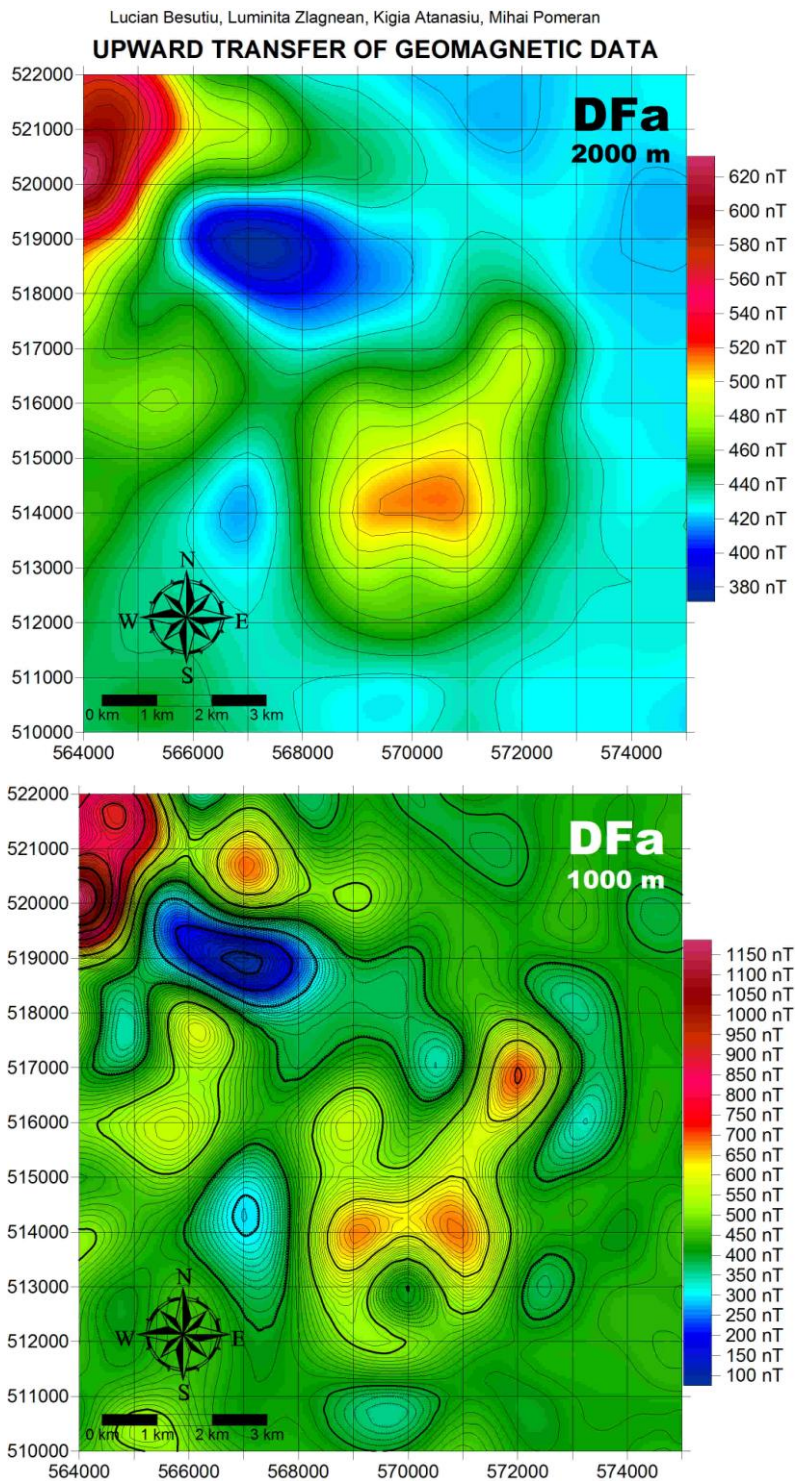
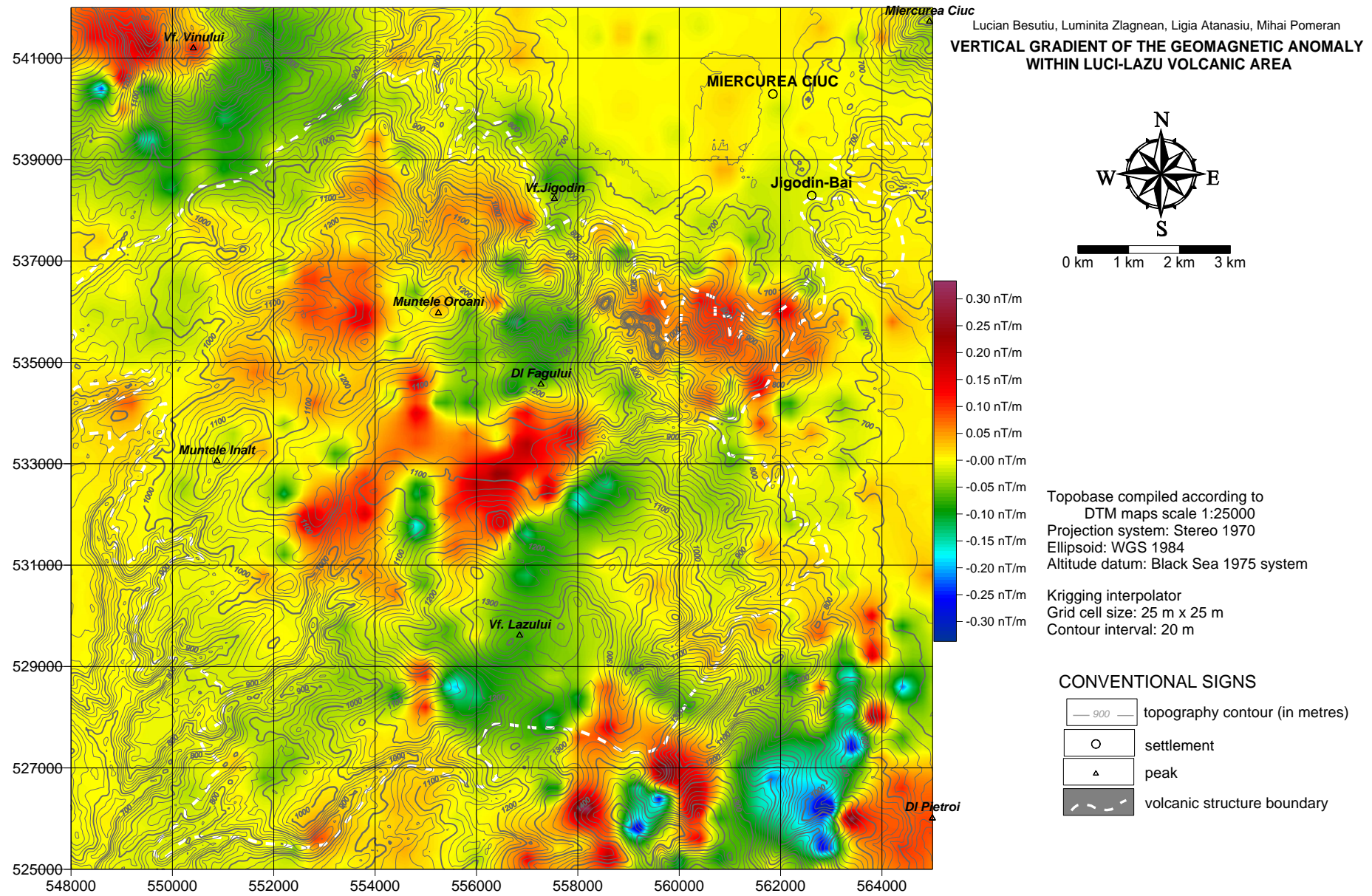


### 3.2.1. GEOPHYSICAL DATA PROCESSING

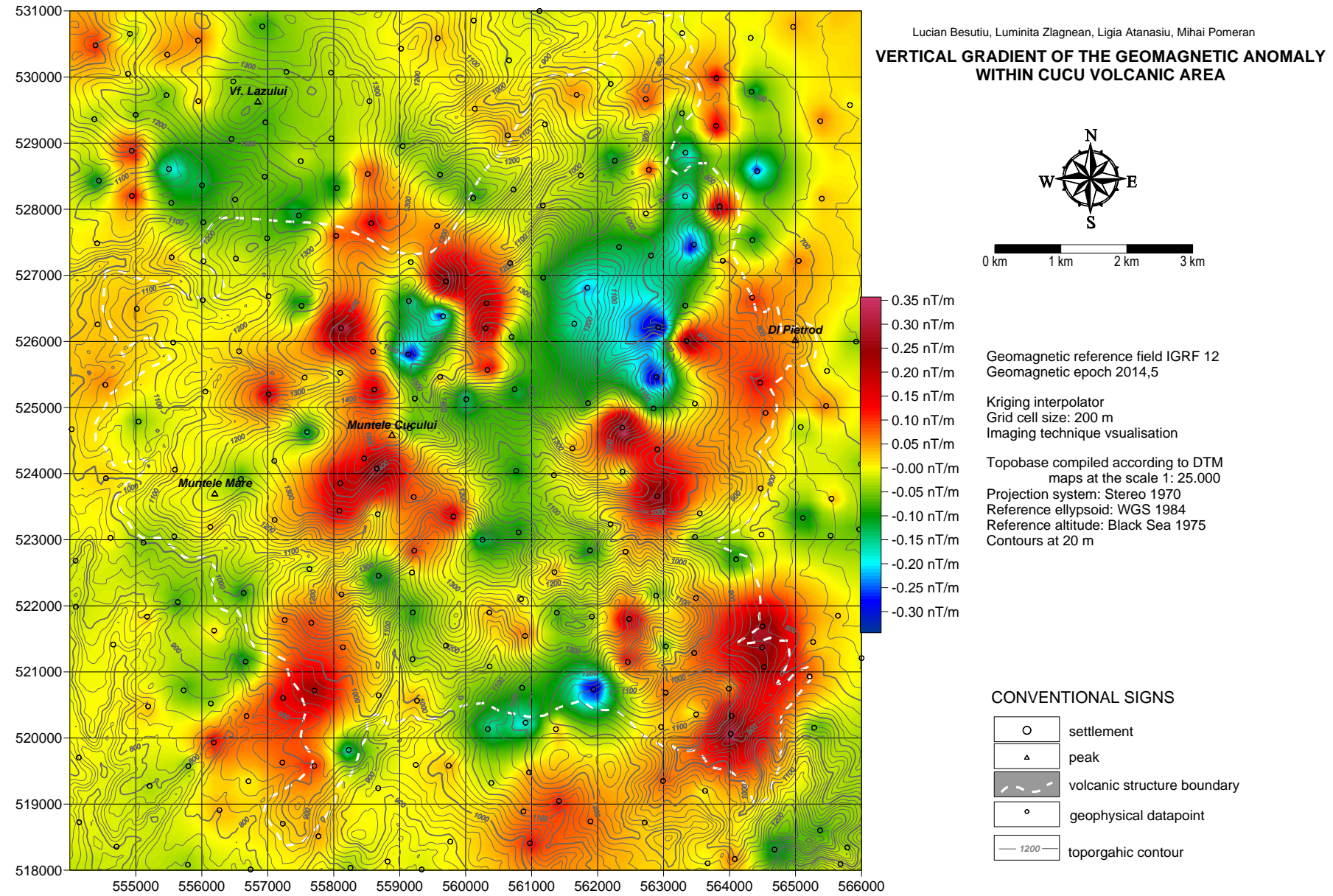
The next step in the geophysical investigations was data processing. In order to ease the geological interpretation, the geophysical data were processed in an advanced manner for providing more intuitive images, helping the interpreter to link them to their geological background. Among the approaches employed it is worth mentioning *upward/downward continuations, vertical gradient, horizontal gradient, reduction to the pole of geomagnetic data, pseudo-gravity, apparent susceptibility*. The following figures provide some examples.



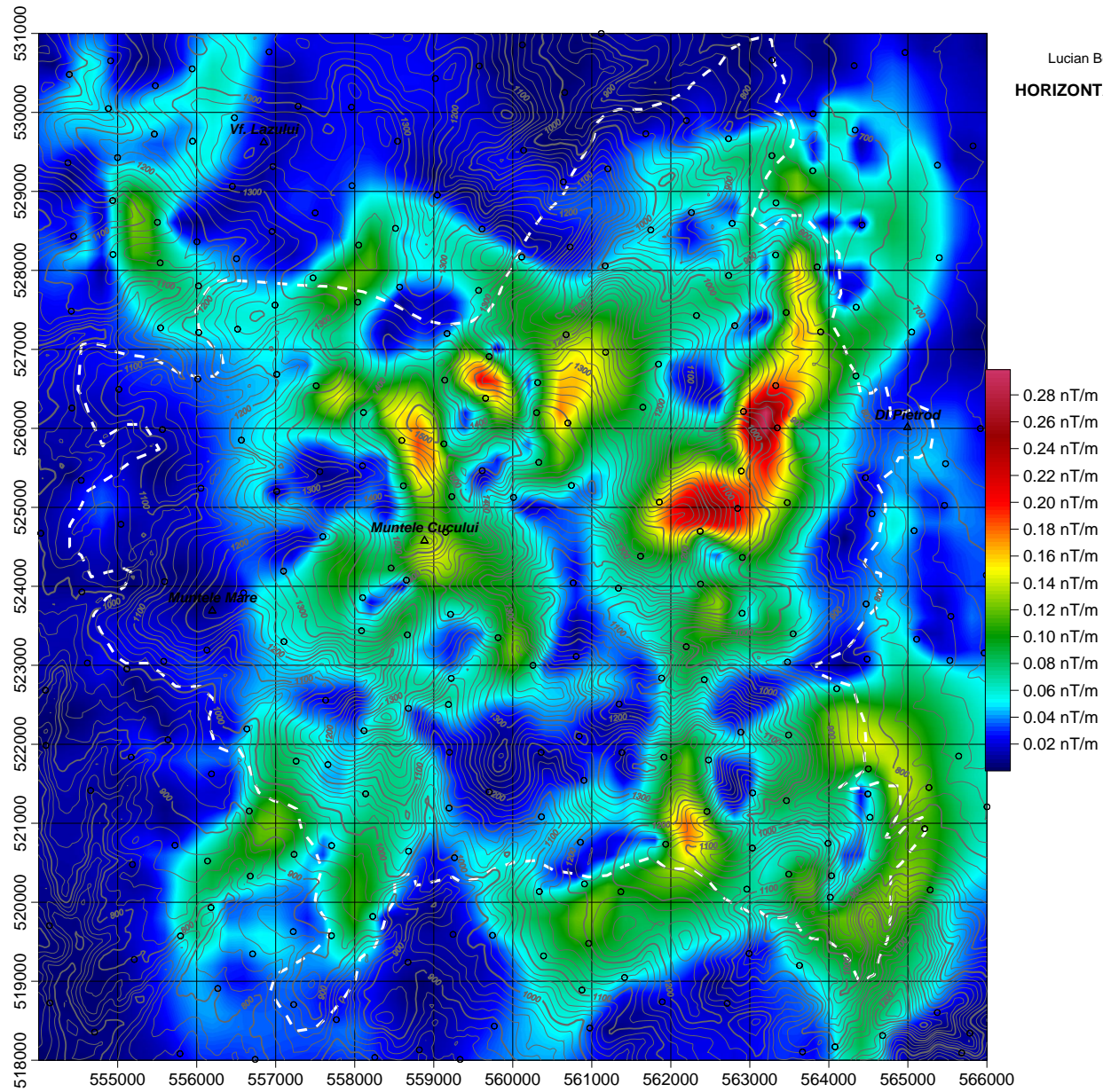
**Fig. 15** Upward transfer of geomagnetic anomaly from 1000 m to 2000 m above the sea level within Ciomadu volcano area



**Fig. 16 Vertical gradient of the geomagnetic anomaly versus topography within Luci-Lazu volcanism area**

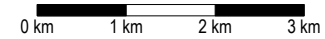
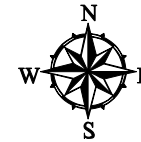


**Fig. 17 Vertical gradient of the geomagnetic anomaly versus topography within Cucu volcano area**



Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran

**HORIZONTAL GRADIENT OF THE GEOMAGNETIC ANOMALY  
WITHIN CUCU VOLCANIC AREA**








Geomagnetic reference field IGRF 12  
Geomagnetic epoch 2014,5

Kriging interpolator  
Grid cell size: 200 m  
Imaging technique vsualisation

Topobase compiled according to DTM  
maps at the scale 1: 25.000  
Projection system: Stereo 1970  
Reference ellipsoid: WGS 1984  
Reference altitude: Black Sea 1975  
Contours at 20 m

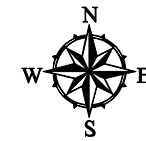
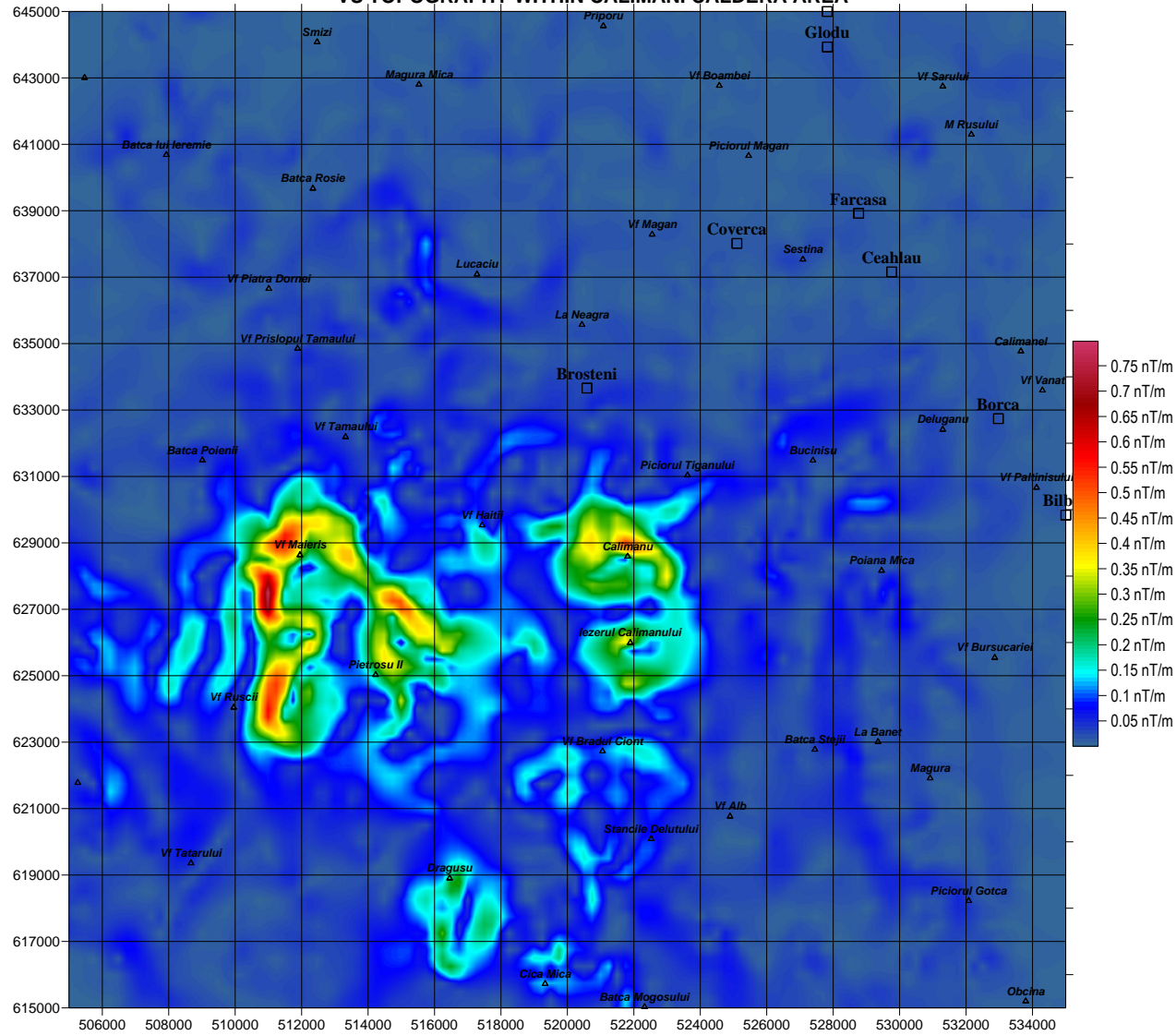
**CONVENTIONAL SIGNS**

-  settlement
-  peak
-  volcanic structure boundary
-  geophysical datapoint
-  toporgahic contour

**Fig. 18 Horizontal gradient of the geomagnetic anomaly versus topography within Cucu volcano area**

Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran

### HORIZONTAL GRADIENT OF GEOMAGNETIC ANOMALY ON A PLAN LOCATED AT 2000 M ABOVE THE SEA LEVEL VS TOPOGRAPHY WITHIN CALIMANI CALDERA AREA







0 km 2 km 4 km 6 km

Geomagnetic reference field IGRF 12  
Geomagnetic epoch 2014,5

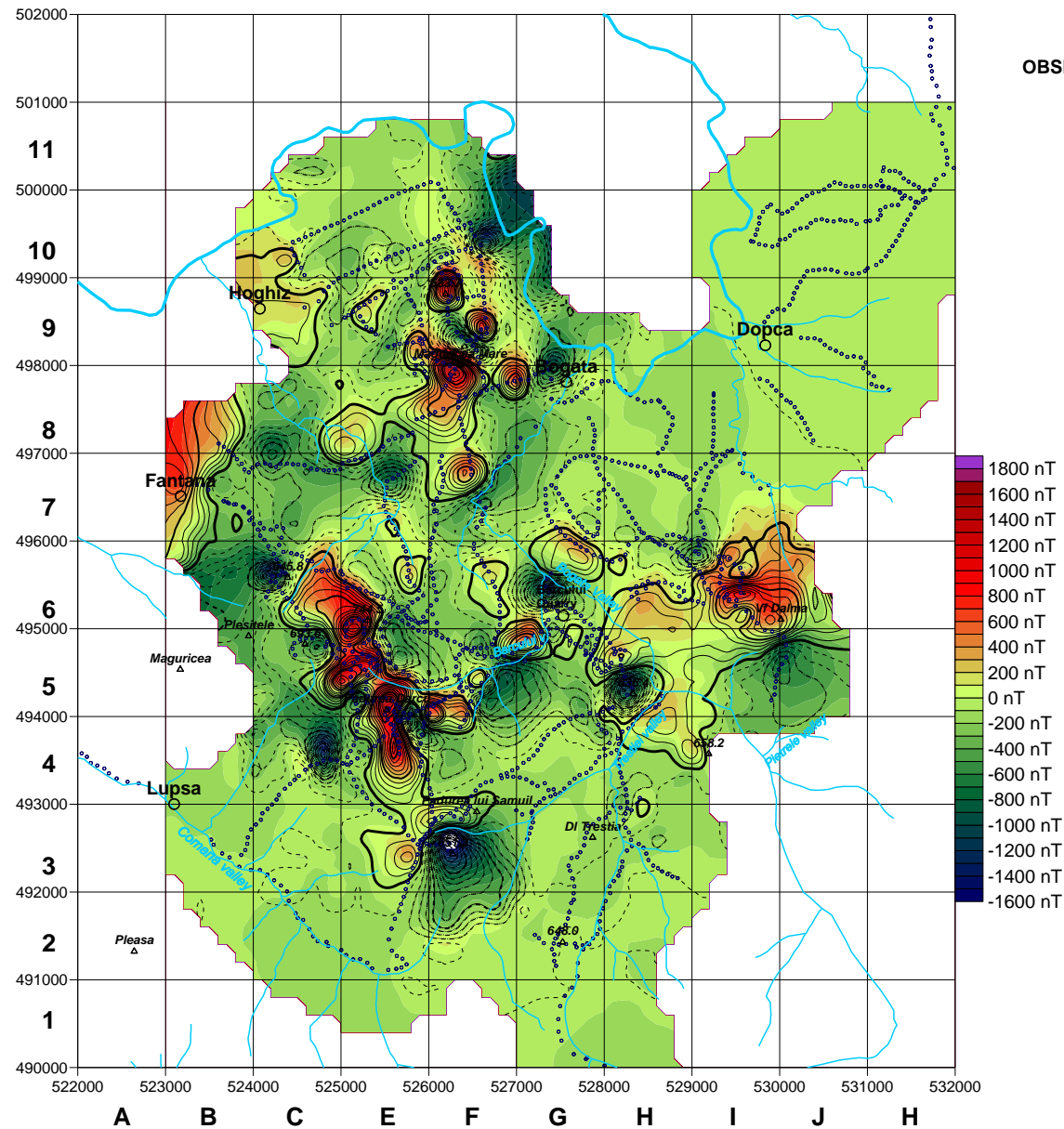
Krigging interpolation  
Grid cell size: 200 m  
Imaging visualisation technique

Topobase compiled according to  
DTM maps scale 1:25000  
Projection system: Stereo 1970  
Ellipsoid: WGS 1984  
Altitude datum: Black Sea 1975

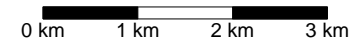
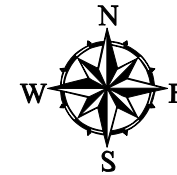
#### CONVENTIONAL SIGNS

-  topography contour
-  settlement
-  peak
-  geomagnetic datapoint

**Fig. 19** Horizontal gradient of the geomagnetic anomaly within Călimani caldera area



Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran  
**OBSERVED VS REDUCED TO THE POLE GEOMAGNETIC ANOMALY  
 WITHIN PERSANI VOLCANISM AREA**









Geomagnetic reference field IGRF 12  
 Geomagnetic epoch 2014,5  
 Krigging interpolation  
 Grid cell size: 200 m  
 Geomagnetic contours interval: 10 nT

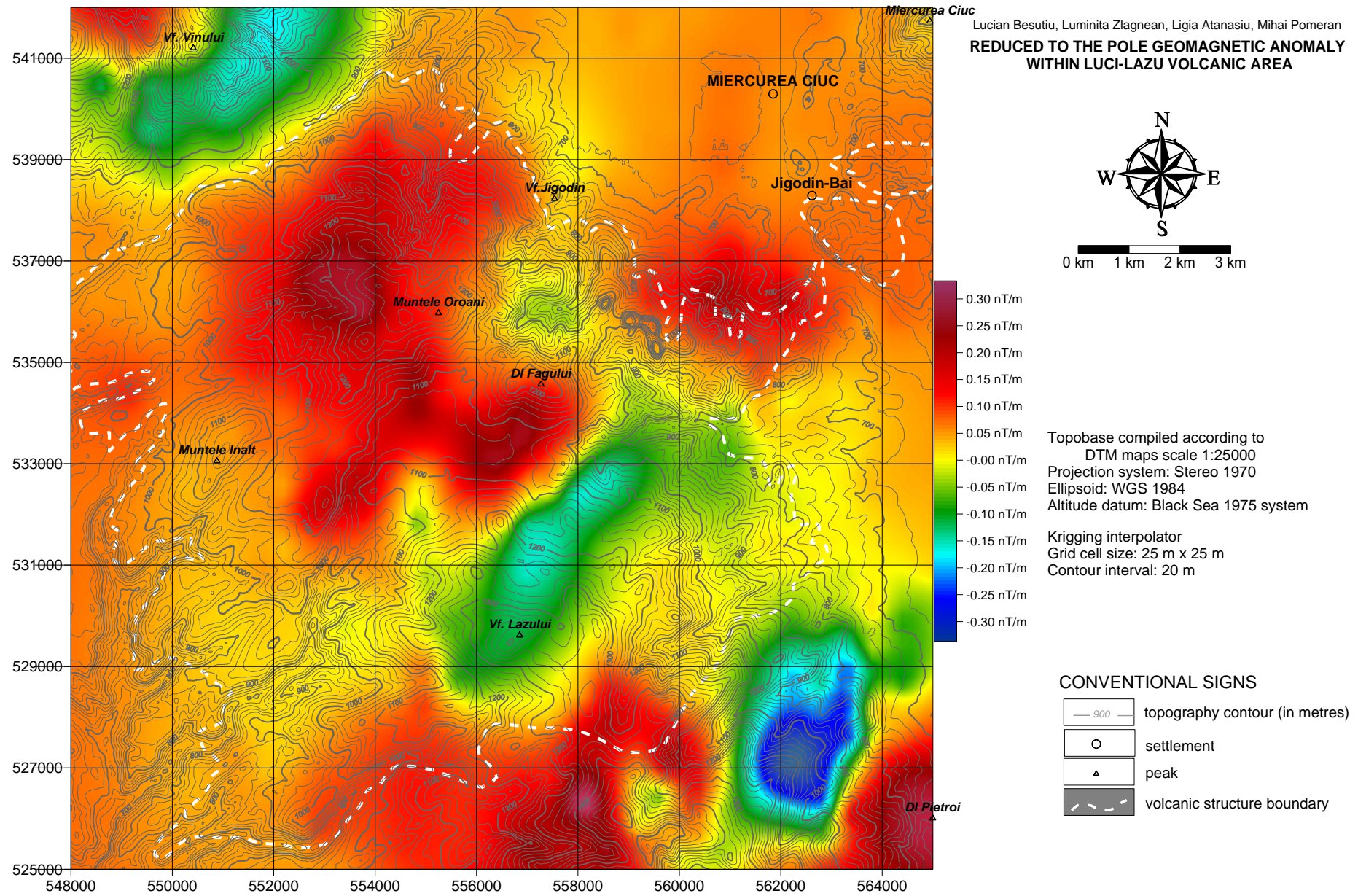
Topobase compiled based on DTM maps  
 at the scale 1: 25.000  
 Projection system: Stereo 1970  
 Reference ellipsoid: WGS 1984  
 Reference altitude: Black Sea 1975

Contours mark the observed geomagnetic anomaly  
 Colour pattern shows the anomaly reduced to the pole

**CONVENTIONAL SIGNS**

-  6. interpretative line
-  5. magnetic anomaly contours
-  4. geomagnetic data point
-  3. settlement
-  2. peak
-  1. water stream

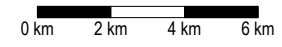
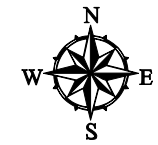
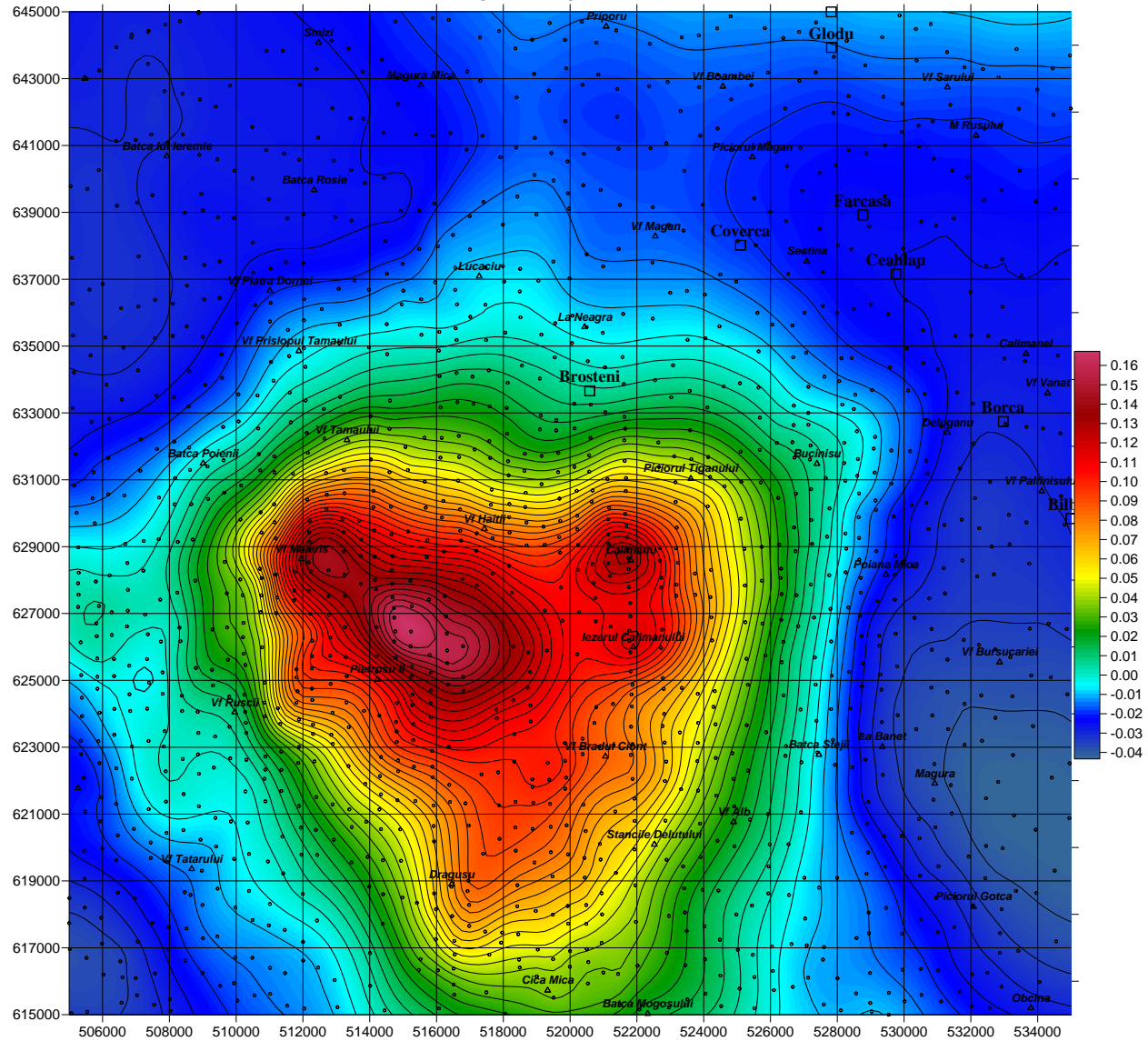
**Fig. 20** Observed (contours) versus reduced to the pole geomagnetic anomaly (colours) within Persani volcanism area



**Fig. 21** Reduced to the pole geomagnetic anomaly versus topography within Luci-Lazu volcanism area

Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran

**PSEUDO-GRAVITY ANOMALY ON A PLAN LOCATED AT 2000 M ABOVE THE SEA LEVEL  
WITHIN CALIMANI CALDERA AREA**







Geomagnetic reference field IGRF 12  
Geomagnetic epoch 2014,5

Krigging interpolation  
Grid cell size: 200 m  
Imaging visualisation technique

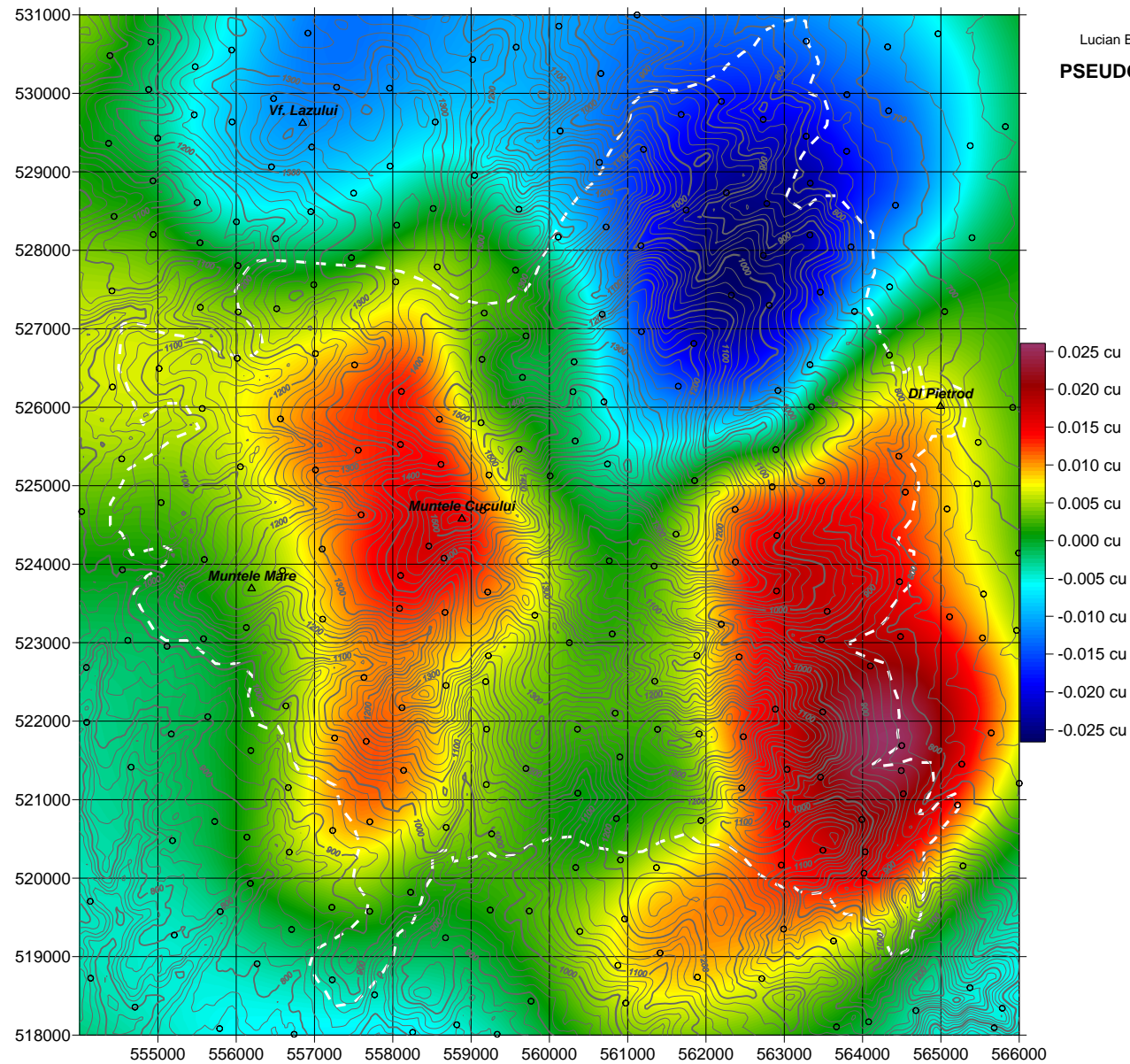
Topobase compiled according to  
DTM maps scale 1:25000  
Projection system: Stereo 1970  
Ellipsoid: WGS 1984  
Altitude datum: Black Sea 1975

**CONVENTIONAL SIGNS**

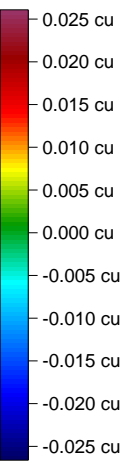
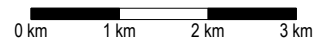
-  pseudo-gravity contour
-  settlement
-  peak
-  geomagnetic datapoint

**Fig. 22 Anomaly of the pseudo-gravity within Călimani caldera area**










Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran  
**PSEUDO-GRAVITY ANOMALY vs TOPOGRAPHY  
 WITHIN CUCU VOLCANIC AREA**

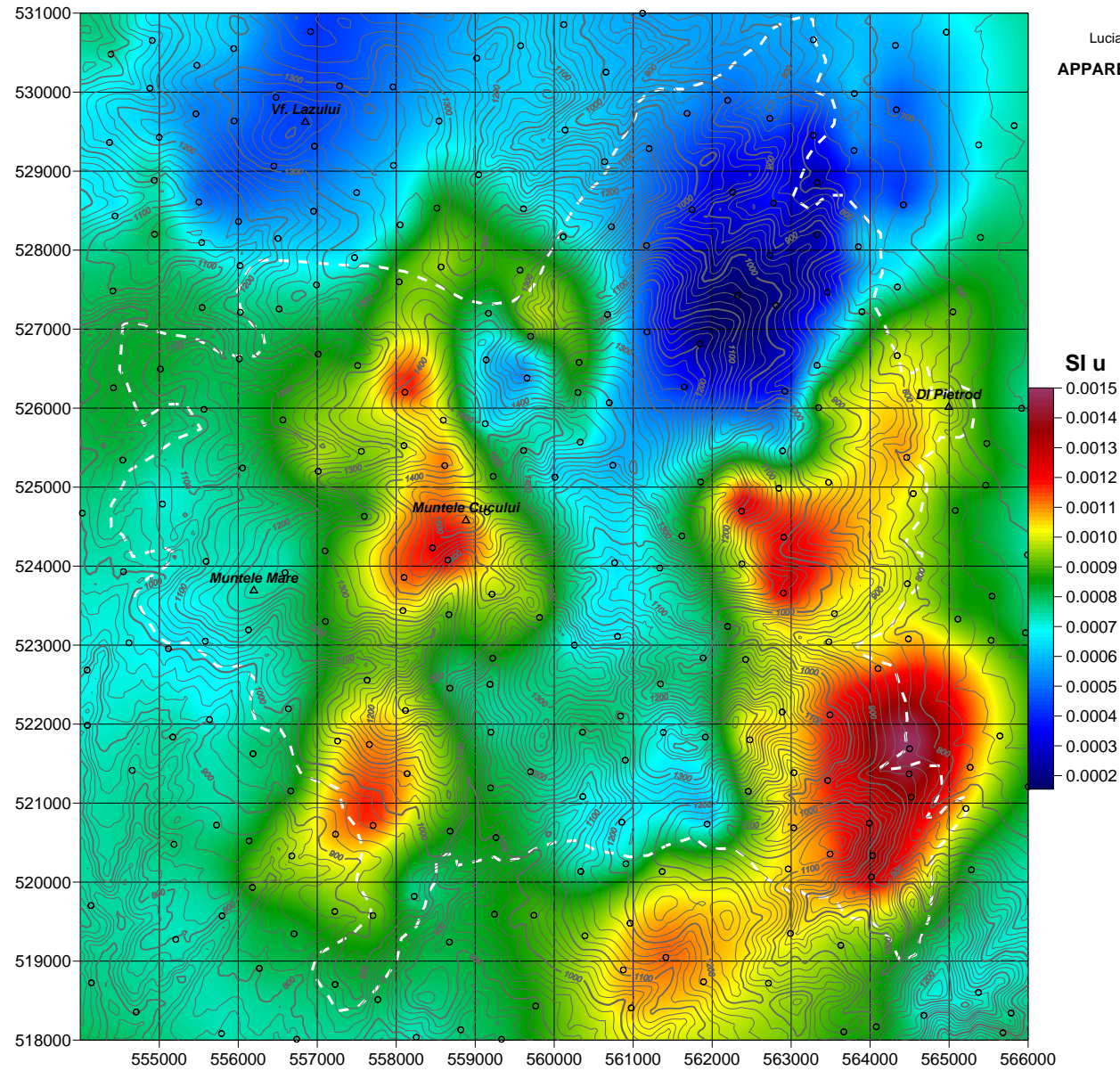


Geomagnetic reference field IGRF 12  
 Geomagnetic epoch 2014,5  
 Kriging interpolator  
 Grid cell size: 200 m  
 Imaging technique vsualisation  
 Topobase compiled according to DTM  
 maps at the scale 1: 25.000  
 Projection system: Stereo 1970  
 Reference ellipsoid: WGS 1984  
 Reference altitude: Black Sea 1975  
 Contours at 20 m

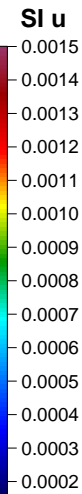
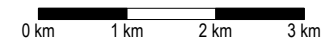
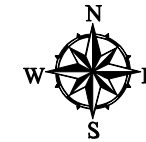
**CONVENTIONAL SIGNS**

-  settlement
-  peak
-  volcanic structure boundary
-  geophysical datapoint
-  topographic contour

**Fig. 23 Anomaly of the pseudo-gravity versus topography within Cucu volcano area**



Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran  
**APPARENT MAGNETIC SUSCEPTIBILITY vs TOPOGRAPHY  
 WITHIN CUCU VOLCANIC AREA**








Geomagnetic reference field IGRF 12  
 Geomagnetic epoch 2014,5

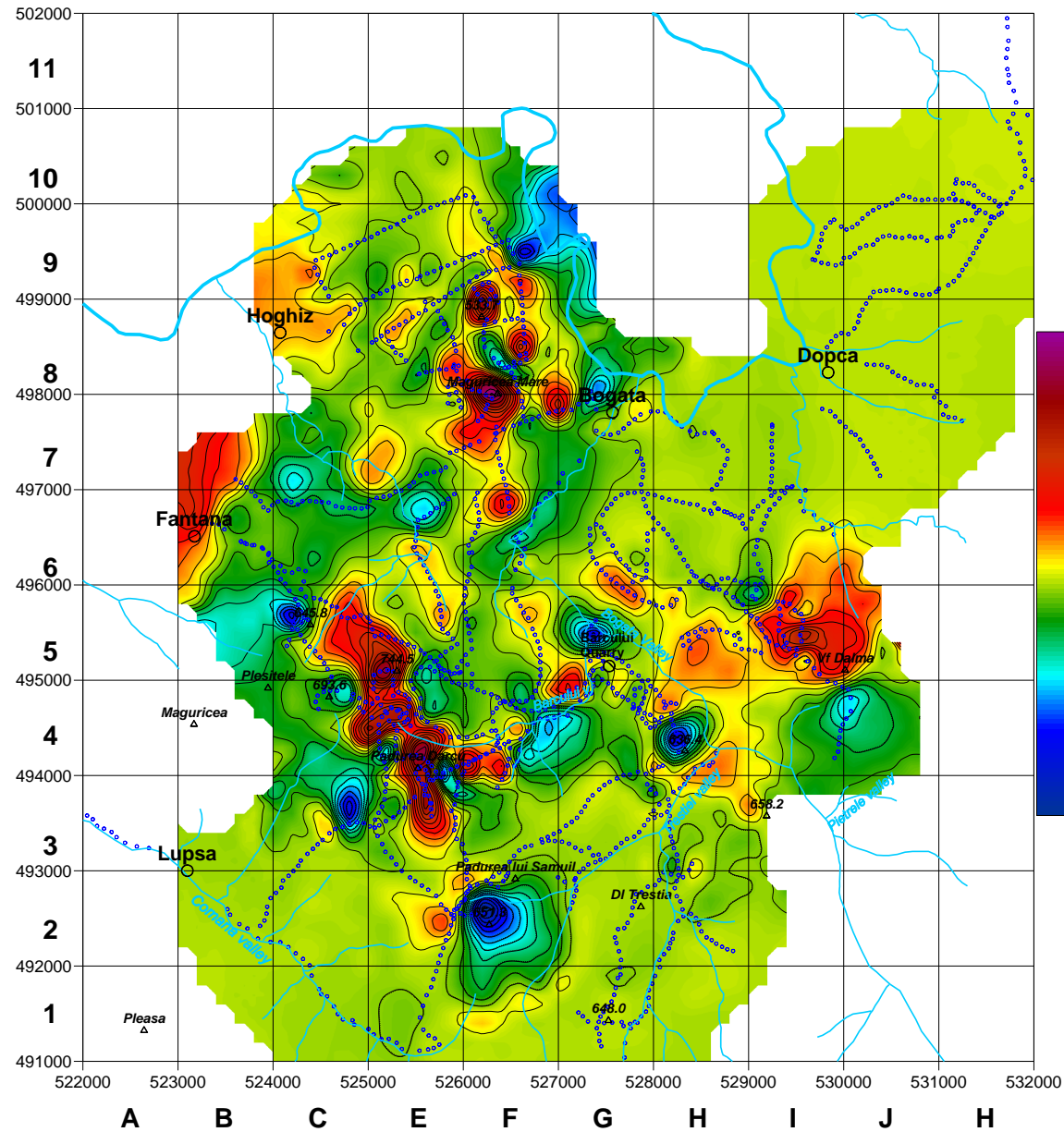
Kriging interpolator  
 Grid cell size: 200 m  
 Imaging technique vsualisation

Topbase compiled according to DTM  
 maps at the scale 1: 25.000  
 Projection system: Stereo 1970  
 Reference ellipsoid: WGS 1984  
 Reference altitude: Black Sea 1975  
 Contours at 20 m

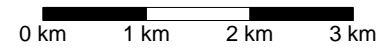
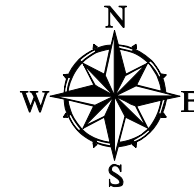
**CONVENTIONAL SIGNS**

-  settlement
-  peak
-  volcanic structure boundary
-  geophysical datapoint
-  topographic contour

**Fig. 24** Apparent susceptibility versus topography within Cucu volcano area



Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran  
**APPARENT SUSCEPTIBILITY WITHIN PERSANI VOLCANISM AREA**








Geomagnetic reference field IGRF 12  
 Geomagnetic epoch 2014,5  
 Krigging interpolation  
 Grid cell size: 200 m  
 Contours interval: 0.01 conventional units

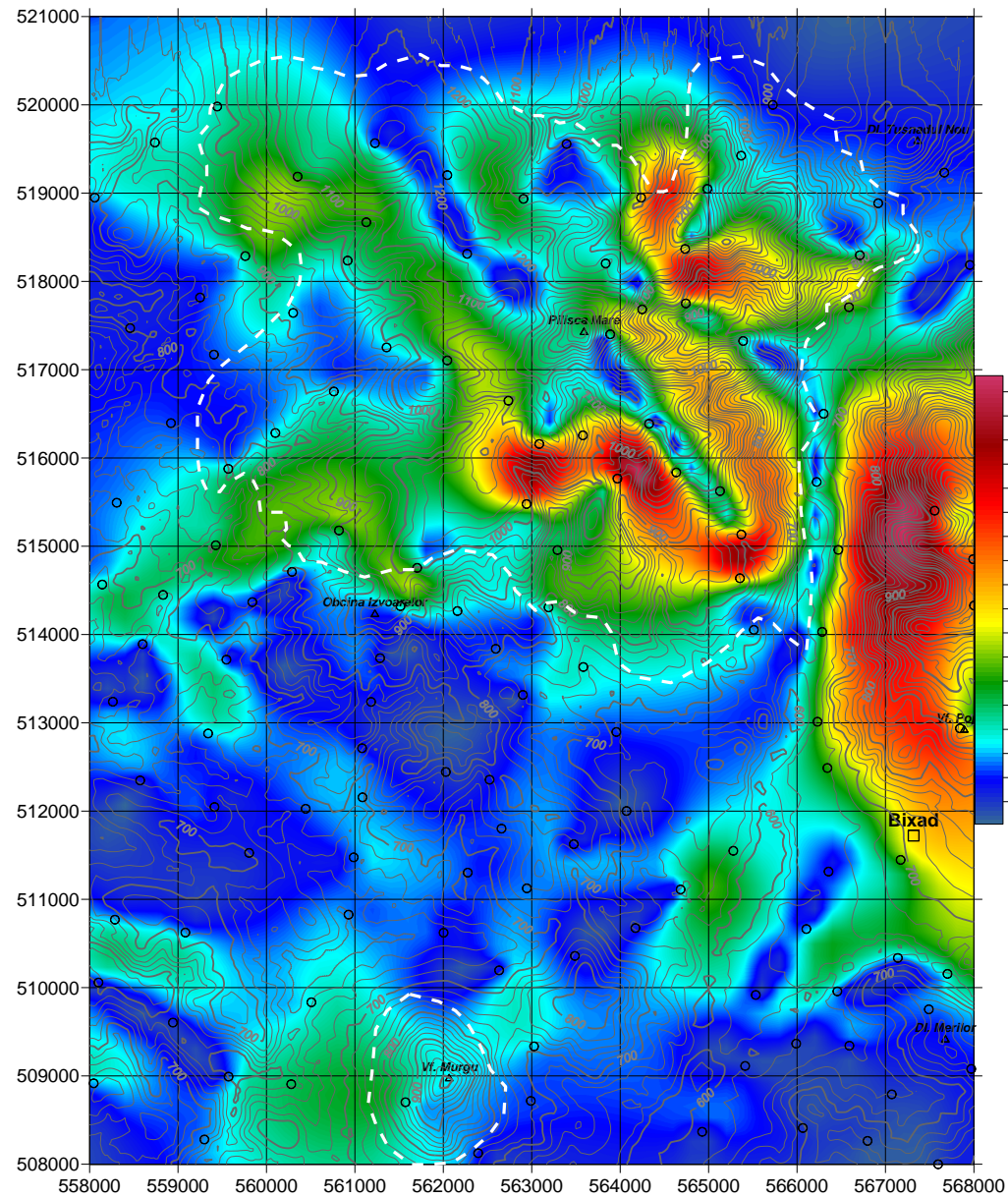
Topobase compiled based on DTM maps  
 at the scale 1: 25.000  
 Projection system: Stereo 1970  
 Reference ellipsoid: WGS 1984  
 Reference altitude: Black Sea 1975

Geological elements according to Seghedi et al, 2014

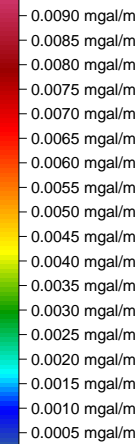
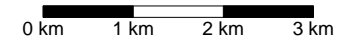
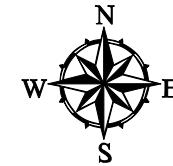
**CONVENTIONAL SIGNS**

-  5. apparent susceptibility contour
-  4. geomagnetic data point
-  3. settlement
-  2. peak
-  1. stream

**Fig. 25** Apparent susceptibility within Persani volcanism area








Lucian Besutiu, Luminita Zlagnean, Ligia Atanasiu, Mihai Pomeran  
**HORIZONTAL GRADIENT OF THE BOUGUER ANOMALY  
 WITHIN PILIȘCA VOLCANIC AREA**  
 reference density 2.67 g/ccm



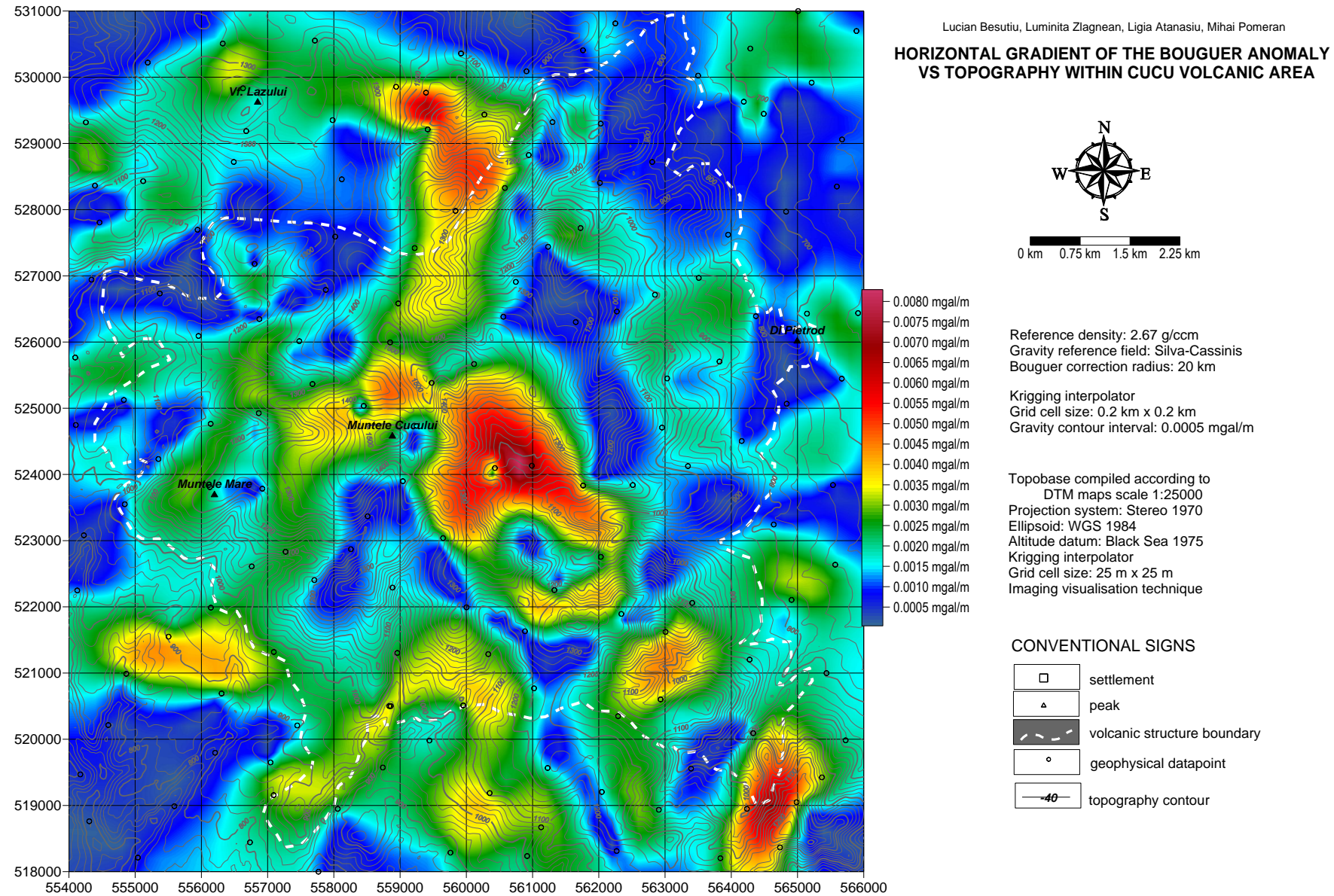
Topobase compiled according to  
 DTM maps scale 1:25000  
 Projection system: Stereo 1970  
 Ellipsoid: WGS 1984  
 Altitude datum: Black Sea 1975 system

Krigging interpolator  
 Grid cell size: 25 m x 25 m  
 Contour interval: 20 m

**CONVENTIONAL SIGNS**

-  geophysical data point
-  topography contour (in metres)
-  settlement
-  peak
-  volcanic structure boundary

**Fig. 26 Horizontal gradient of the Bouguer anomaly (reference density 2.67 g/ccm) and topography within Pilișca volcanism area**



**Fig. 27** Horizontal gradient of the Bouguer anomaly (reference density 2.67 g/ccm) and topography within Cucu volcanism area

## GEOPHYSICAL DATA MODELLING

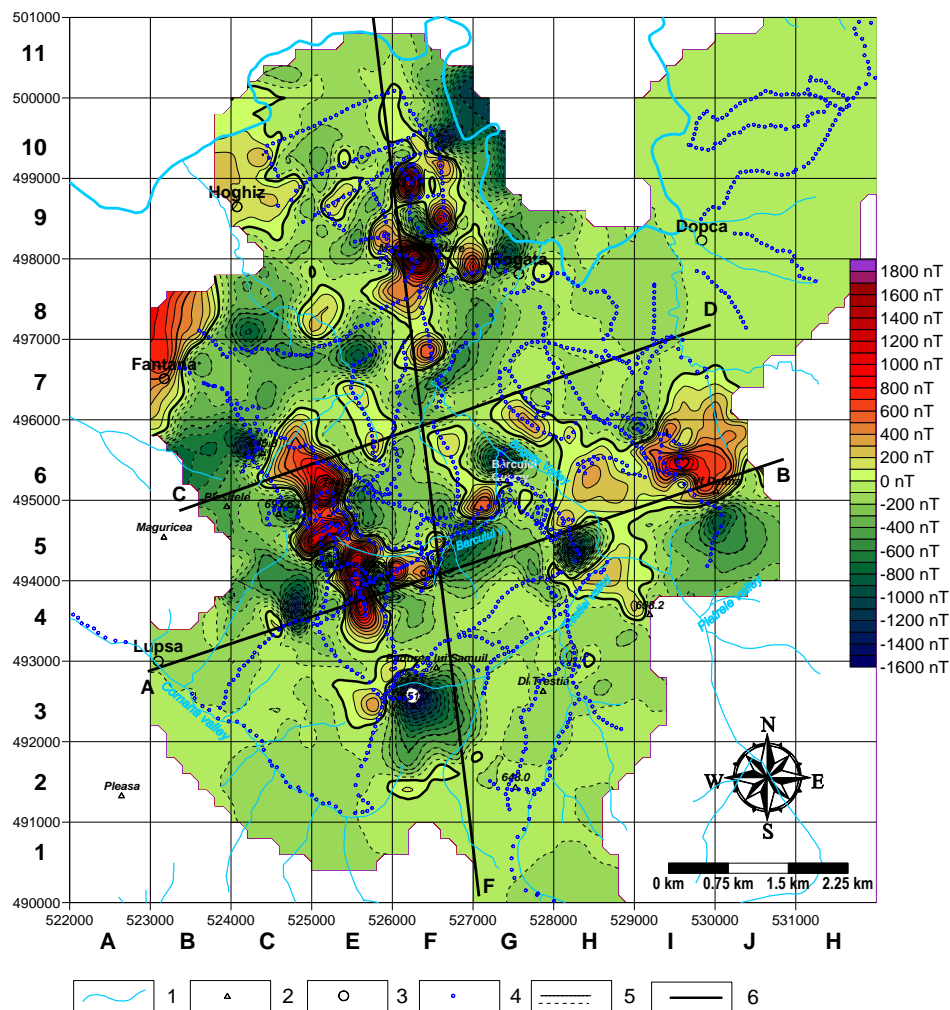
To help advancing knowledge on the in-depth extent of the volcanic structures within the study areas, some attempts to construct geological models based on the quantitative interpretation of the geophysical data were conducted.

Basically, 2D modelling algorithms have been used along several interpretative lines located within the Perşani and Ciomadu areas. For Ciomadu volcano, preliminary 2D models have been constructed for preparing the implementation of a 3D approach.

The GM-SYS 2D software run on OASIS platform has been used for practical implementation.

### Perşani area

Within Perşani area, 2D models have been achieved based on the interpretation of geomagnetic data. Fig. 28 shows the location of the interpretative lines.



**Fig. 28** The reduced-to-the-pole geomagnetic anomaly and location of interpretative lines within Persani area. 1, water stream; 2, peak; 3, settlement; 4, data point; 5, isoanomal; 6, interpretative line

Fig. 29 and 30 show the results obtained along the interpretative line CD, and EF.

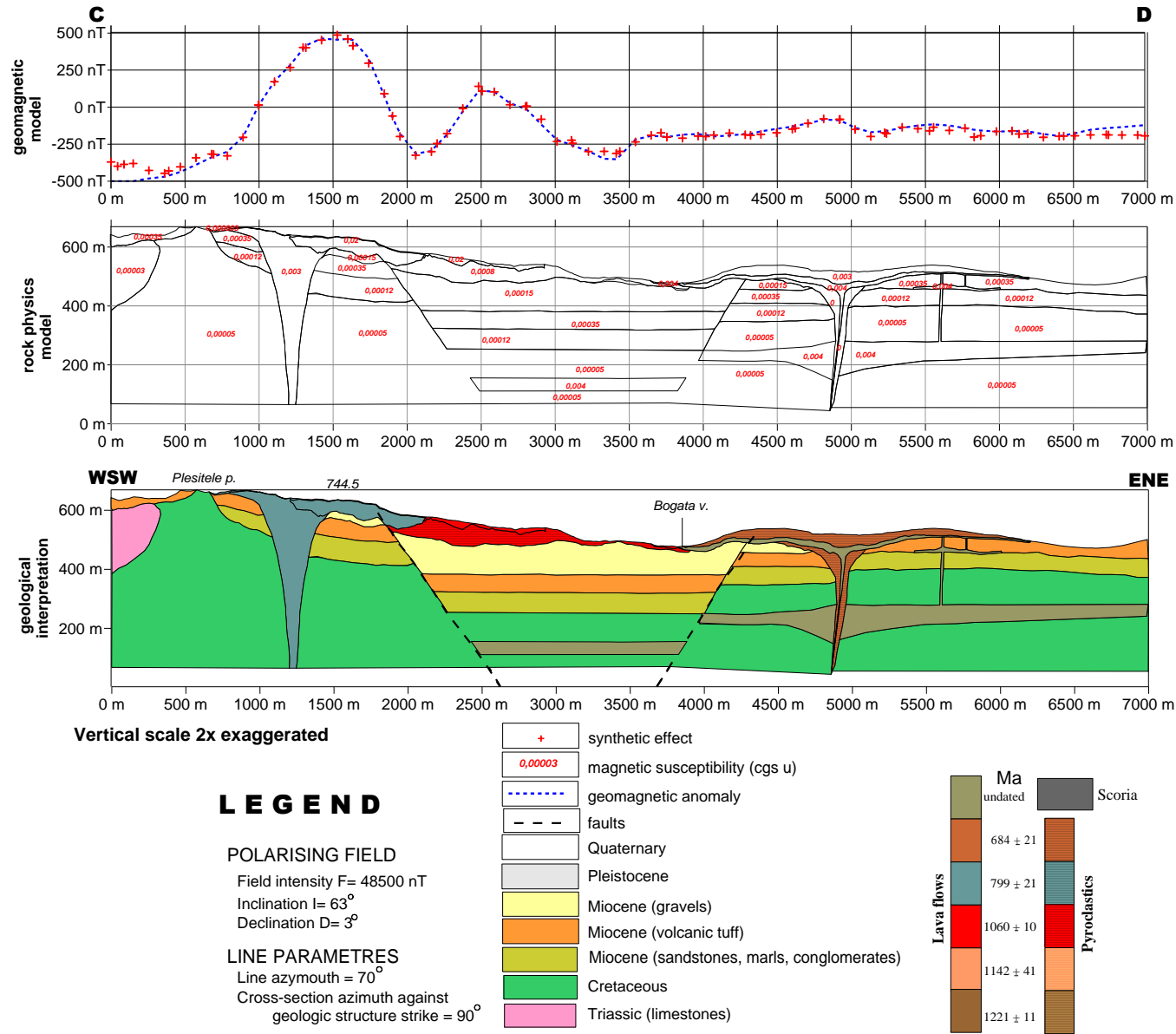


Fig. 29 2D modelling attempt within Perşani area along the CD line, based on the interpretation of geomagnetic data

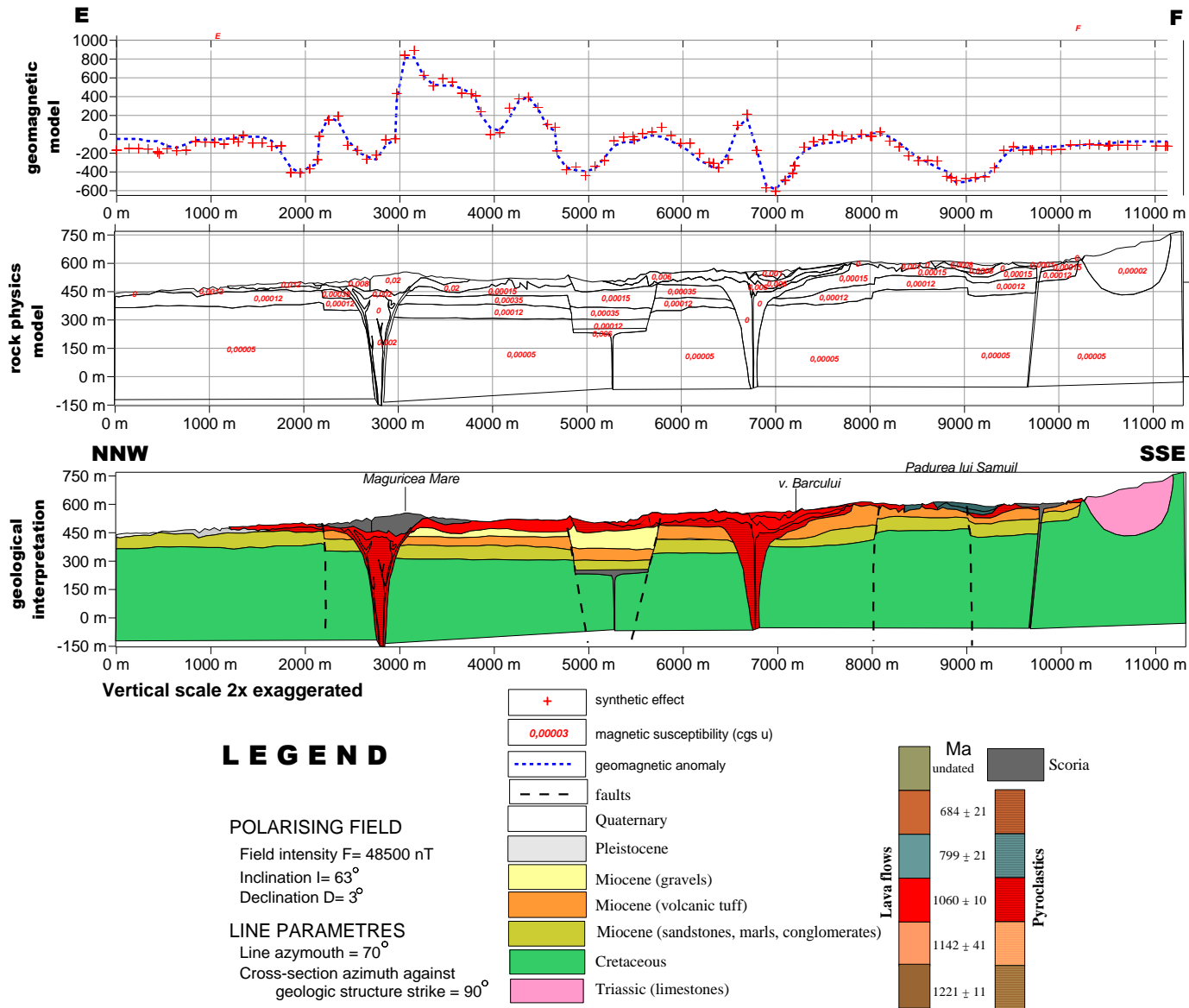


Fig. 30 2D modelling attempt within Perşani area along the EF line, based on the interpretation of geomagnetic data



## Ciomadu volcano

In the attempt to construct a 3D model of the Ciomadu volcano structure, some preliminary 2D models were achieved at this stage, based on the integrated interpretation of the geomagnetic and gravity data, under the constraint of the rock physics information (Fig. 31-32).

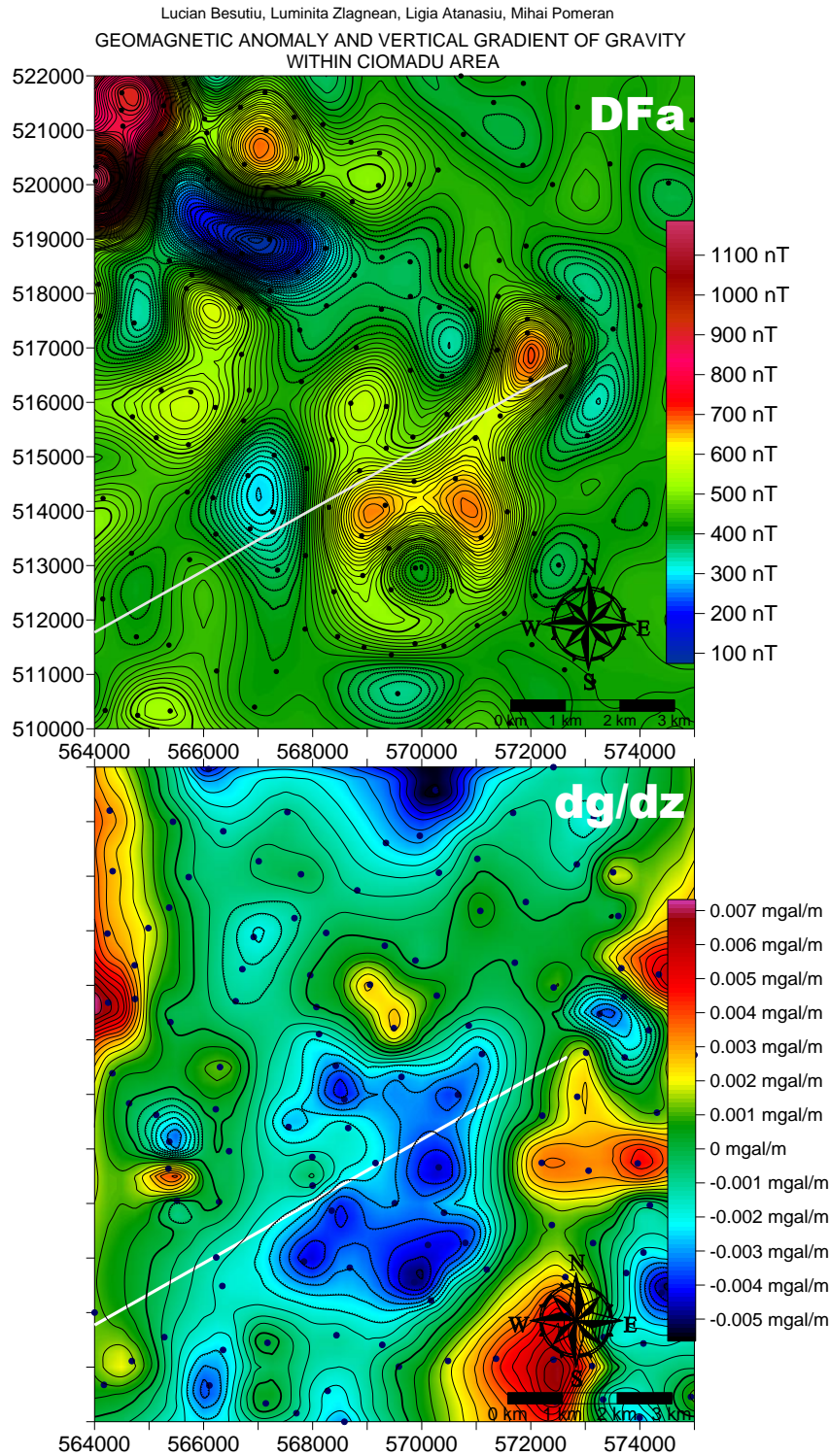
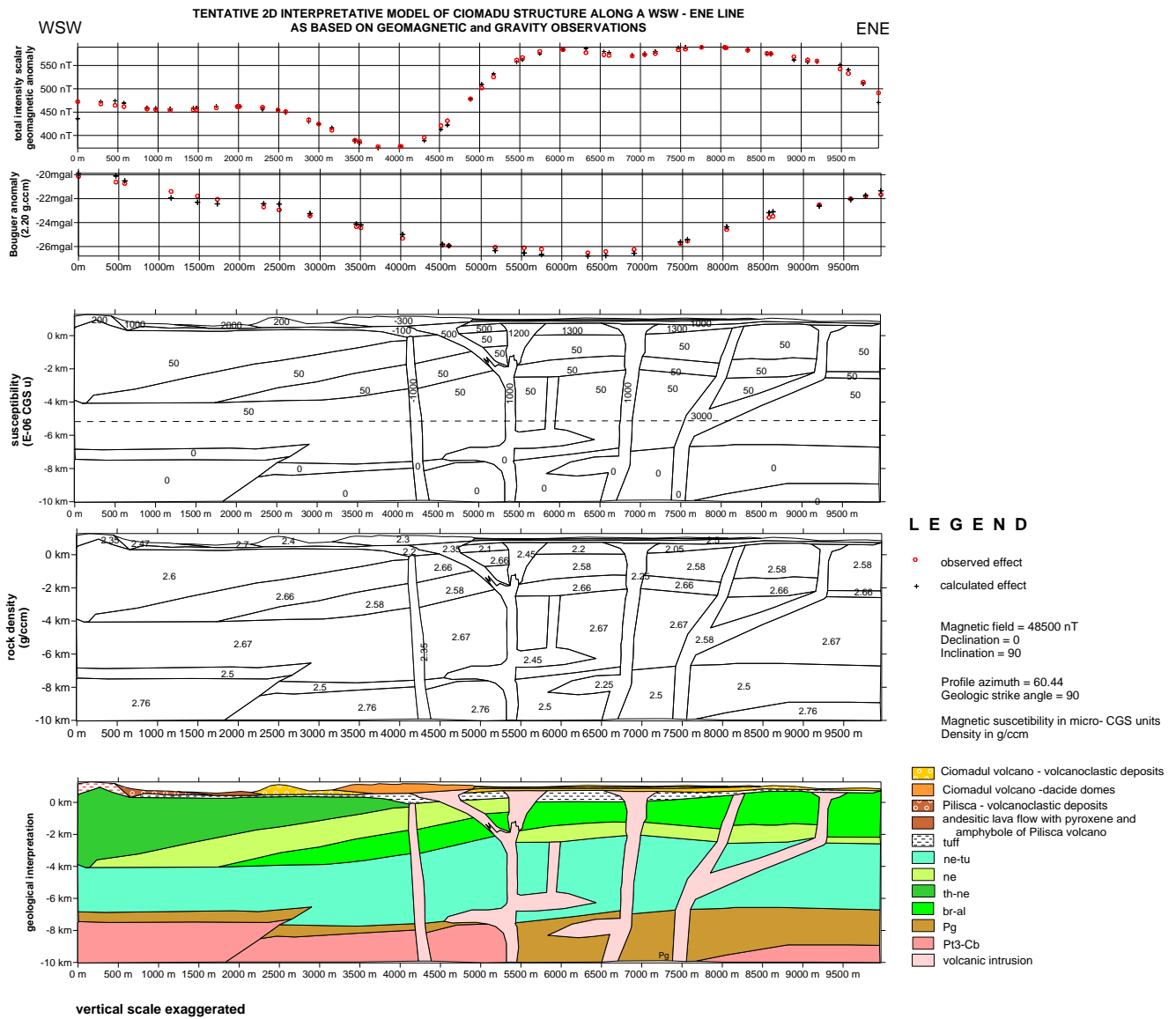


Fig. 31 Geomagnetic and gravity data within Ciomadu area and location of the interpretative line



**Fig. 32 Tentative 2D modelling of the geological structure of Ciomadul volcano across the StAna lake and Mohos swamp based on the integrated interpretation of geomagnetic and gravity data**