Electrical Signature of Groundwater - Students' Geophysical Quest (ESG)

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SEG Foundation 2014-2015 Field Camp

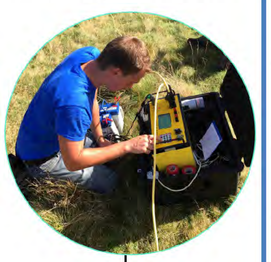
Universitatea din București – Virtute et Sapientia

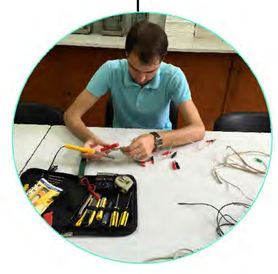
Project Summary

The SEG/TGS Field Camp had as a main base the border region located between Covasna and Harghita Counties, Romania. In this geological outstanding area, Field Camp participants could execute geophysical measurements in the most recent extinct volcano craters from the East Carpathians range, visit the National Reservation – Mohos Peat-Bog developed in a former volcanic crater, discover the groundwater diversity as well as the cooling-magma degassing effects at the earth surface. For the geophysical prospection of this areal, a total number of **27** participants from **3** countries were actively involved. For the SEG/TGS Field Camp 2015, a total number of **18** portable equipment's for geophysical and geochemical investigation of the area were used on the field, being provided by 3 academic institutes and Society of Applied Geophysics from Romania (SGAR).

Field Work

Equipment





Geophysics

In the framework of the SEG/TGS FIELD CAMP, geophysical measurements (electrical resistivity tomography, vertical electrical soundings, radon measurements, total and vertical gradient of magnetic field, electromagnetic measurements) were executed in 7 locations. Considering the geophysical background of the participants as well as the terrain characteristics (complexity of geological structure, terrain topography, presence of the obstacles or geophysical noise, hydro-geological induced effects) the locations were classified as medium (4 sites) to high difficulty (3 sites) for a young geophysicist.

Types of Field equipment	Measurements	Numbers of equipment on field
Electrical Resistivity Meter	Electrical resistivity using VES and ERT techniques	2
Conductivity Meter	Electrical Conductivity and Magnetic susceptibility	1
Magnetometers	Total Field and Vertical Gradient	3
Kappameter	Magnetic Susceptibility	2
Radon Detector	Determination of ^{222}Rn concentrations (soil, water, air)	2
Portable Geiger Counter	Alpha, beta, gamma and x-ray radiation	1
Turbidity meter	Water samples turbidity	1
TDS metter	Total dissolved solids	1
Portable Multi-parameter for water samples	pH, Eh, salinity, O2, temperature and Electrical Conductivity	4
Flux samples acquisition system	CO2 and CH4 measurements	1

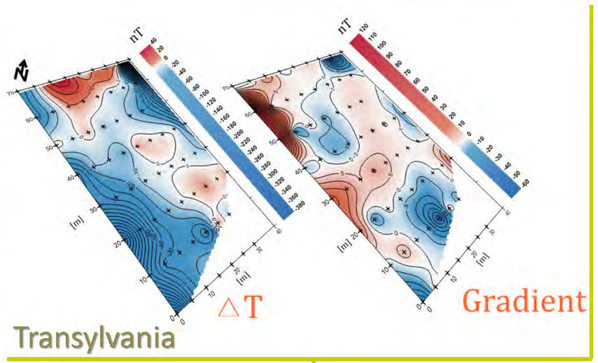
Geochemistry

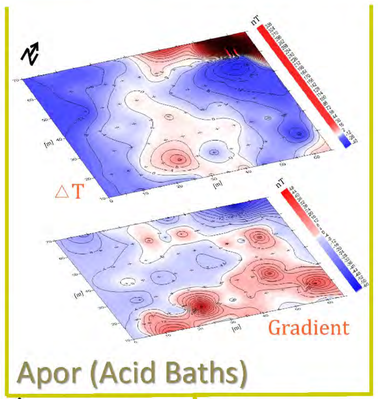
During the Field Camp we mapped **56 water outflows.** It was revealed that the electrical conductivity of groundwater is extremely variable in this area, ranging from 52µS/cm (pH=3.75) to 41 000 µS/cm (pH = 6.6), thus being one of the most challenging areal for a geophysicist to find drinkable water.

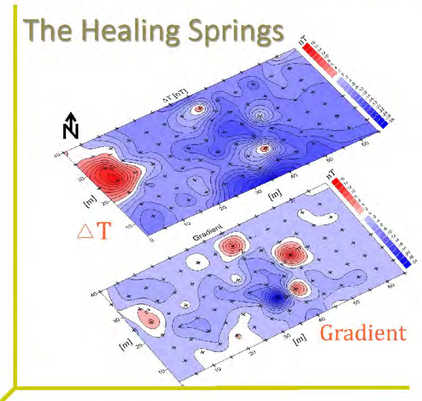
CO_2 and CH_4 flux emission measurements were made for **48 sources** at which the "bubbling" effect was noticed.

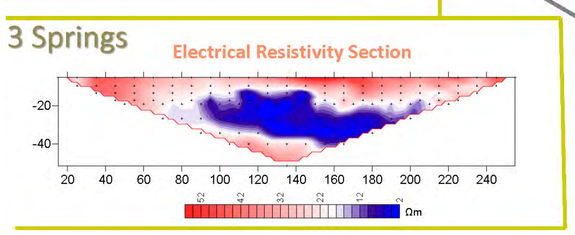
Water radioactivity (^{222}Rn) was also tested for **40 sources**

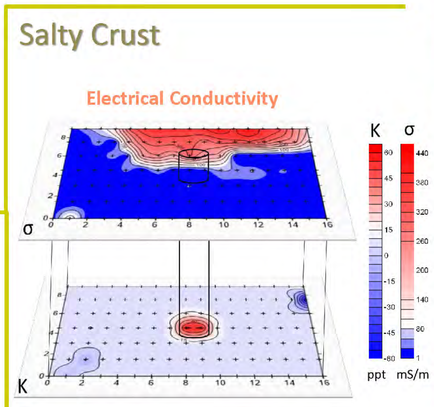
Water chemical composition (main ions) was studied for **30 sources**. Stable isotopes ^{18}O and ^{2}H measurements of water samples will be further analyzed in laboratory, with student's participation.







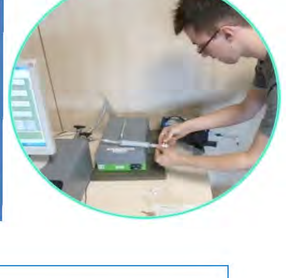




This is just a glimpse of what we've done. More to come.....

- GIS platform development and buildup of geochemical maps for general use
- Advanced training on chemical analyses of water samples for students who applied for thesis in the ESG project related subjects.
- Advanced training on Electrical Resistivity Method for groundwater resources evaluation and testing the limits of the technology.
- Mineral water sources monitoring program
- Scientific papers with student's participation
- Good results at exams

Lab Work



Networking

Acknowledgements

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TGS · SEG Foundation · Society of Exploration Geophysicists · Romanian Society of Applied Geophysics SGAR Societatea de Geofizica Aplicata din Romania · SRG · University of Bucharest · BSC Bucharest Student Chapter

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