Real time and in-situ analysis of the gas-emissions of the Eastern Carpathians: results and perspectives
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1. INTRODUCTION

Although the volcanic eruptions are very uncommon in the Carpathian-Pannonian region today, however the frequent earthquakes in the Carpathian-bend zone, the numerous appearance and intense manifestation of gas-emissions in the southeastern areas of the region and many petrochemical and geochmical, volcanologic studies as well, indicate that the area is likely not completely inactive. The gas emissions investigated by us may be directly related to these complex geodynamic processes, according to the geological context [1,2].

The Eastern Carpathian Cilău-Săcălu-Harghita Neogene-Quaternary volcanic chain and its neighbouring zones (Transylvanian Basin, Carpathian flysch formations) contain most of the carbon dioxide rich gas-emissions in Romania, which also occur in the form of natural fumaroles and bubbling pools. They can appear in frequently populated settlements more often in cellars and other public-not supervised areas, which puts the inhabitants in direct danger due the lack of information in the public knowledge.

The Multi-Gas was used during several field surveys between September 2018 and December 2019 across the Eastern Carpathian area, where a total of 214 gas emissions were investigated for their CO2, CH4 and H2S concentrations.

3. RESULTS AND PERSPECTIVES

3.1. THE CO2

The CO2 concentrations varied between 0.96 and 100 %. The highest values were measured in the the Quaternary dormant volcanic area of Comăd, and also in the neighbouring thrusted and folded area of the Carpathian Flysch, which suggests a tectonic related control over the appearance of the gas emissions on surface.

Composition of the different gas-species varied according to the geological context. The Multi-Gas proved to be useful tool in the in-situ investigation of cold gas emissions of the Eastern Carpathians, being efficient especially for the measurement of the H2S concentrations that are very sensitive for oxidation processes. In the area of Eastern Carpathians is possible a relation between the structural geological features (folds, faults) of the zone and the manifestation, concentration of gas-emissions.

3.2. THE CH4

The CH4 concentrations ranged between 0.27 and ~0.7% (above the detection limit) and were higher at hydrocarbon-prone areas, such as the sedimentary deposits of the Transylvanian Basin and Carpathian Flysch zone. In these cases the CO2 concentrations were low (up to 4.5%).

3.3. THE H2S

The H2S concentrations varied between ~0 (lower than the detection limit) and ~200 ppm (above the detection limit). According to our knowledge, there are the first H2S in-situ measurements in the gas emissions of the study area. The concentrations of H2S were higher at the volcanic area of Comăd which can be related to volcanic degassing, the values reached above the detection limit (~200 ppm).

5. CONCLUSION

The motivation of our work is to gather quick, real time and in-situ information with the help of Multi-Gas instrument about the CO2, H2S and CH4 composition of the gas-emissions across the Eastern Carpathians and to create a high resolution geological map from the measured sites in the mentioned area above. Furthermore, we would like to clarify if there is any relation between the tectonic characteristics of the study area and the manifestation, concentration of gas-emissions.

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