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Comparison between different gas bearing structures; indicators, methods and first results

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Gas bearing structures as indicators for tectonic and volcanic elements are well known. Migration of subterrestrial gases has been studied in different fields of geosciences (Etiope and Martinelli, 2002). Characteristic ascending gases are mainly CO_2, He, Rn, CH_4, and N_2 (Sugisaki et al., 1980; Ioannides et al., 2003). Our research group is focused on the detection of recent open fracture zones and post volcanic elements (mofettes and mineral springs) in different locations in Germany and also in the Czech Republic. Because of the different types of gas bearing structures, dry and wet different methods were used.

In addition to the detection on the basis of taking gas samples, the infrared thermography was tested to identify gas bearing zones due to difference in temperature of the gas flow contrary to the background. After detection our aim was to characterise the gas flow type. Therefore the concentrations of helium, Rn and CO_2 and the isotope ratio of He were determined. Additionally to this we investigated the origin of periodic changes of the helium concentrations in gas bearing mineral springs and fracture zones based on monitoring of the gas phase.

Secondary, the phenomena that gas permeable fracture zones encourage site selection for ants (Schreiber et al. 2009) have been born in mind during the investigation of gas bearing fracture zones. In the area of the East Eifel Volcanic Field strong variations of the observed parameter He occur in soil gases and in the free gas phase of mineral waters even over a short time scale. A multi-parameter monitoring station including the parameters He and Rn recorded diurnal small scale variations and stronger fluctuations that show significant correlation to seismic activity in the area.

Periodic changes of the helium concentrations were observed at the North Sea island Amrum. These changes are caused by the ocean load tides which evoke a rise of the helium concentration near by high tide.

References

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