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Investigation of the impact of degassing geogenic CO_2 on the grass *Deschampsia cespitosa* in a mofette area

K. Mangelsdorf (1), K. Wohlfart (2), H. Kämpf (1) and H. Pfanz (3)

(1) GeoForschungsZentrum (GFZ) Potsdam, Section 4.3 Organic Geochemistry, Telegrafenberg B423, D-14473 Potsdam, Germany, K.Mangelsdorf@gfz-potsdam.de, (2) University of Bremen, Dept. 5 Geosciences, Bibliothekstr. 1, D-28359 Bremen, (3) University of Essen, Institute for Applied Botany, D-45117 Essen

The Cheb basin (western Eger rift, Northwest Bohemia) is characterised by a network of wet and dry CO_2 seeps along local fault zones, whereas the wet seeps are partly used as commercial mineral springs. A further specific characteristic of this area are periodically occurring earthquake swarms having strong impact on the composition and dynamics of the outflowing gases.

From a biogeochemical point of view these CO_2 seeps are interesting and unique life habitats for plant communities forming natural sites with locally extremely high ground level and soil CO_2 concentrations. Thus, the aim of the current study was the investigation of the impact of degassing CO_2 on the indigenous plant community at a dry CO_2 seep (mofette) located in the Plesna valley near the small village of Hartousov (Northwest Bohemia, Czech Republic) using botanical, isotope geochemical and biogeochemical approaches. To address this topic, the leaf material of the ground level growing grass *Deschampsia cespitosa* was examined concerning its plant biomarker composition and carbon isotope signature. The $\delta^{13}C$ signal of the degassing CO_2 in the study area is -2 per mill (atmospheric CO_2 about -8 per mill).

Deschampsia cespitosa was present within the field of diffuse CO_2 degassing as well as in the surrounding, adjacent reference area. The concentration of degassing CO_2 was determined in 10 cm soil depth. CO_2-concentrations ranged from 0.2% at the periphery of the mofette field to 100% in the centre. *Dechampsia* plants from the mofette area were smaller in size and showed partly yellow patches on the leaf material in contrast to the copiously grown leafs with its luscious green at the reference sites. Main components in the aliphatic compound fractions of the leaf material were the long chain n-alkanes with a strong odd over even carbon number predominance and a maximum at n-C_{31}, which is typical for grass material. Leaf samples from the reference site contained significantly higher amounts of n-alkanes, which is most likely related to the obviously better growth conditions at the periphery of the mofette field.

The bulk-C-isotope signal of the leaf material from *Deschampsia* plants growing near the CO_2 seeps was with values of ca. -24.4 per mill about 2 per mill heavier than those from an adjacent reference site with ca. -26.6 per mill. *Deschampsia* leafs with intermediate CO_2 exposure showed isotope data between these two isotope values. The same trend could be observed when investigating the carbon isotope signal of individual plant leaf n-alkanes using gas chromatography isotope ratio mass spectrometry. These results indicate that within the CO_2 mofette field the marker plant *Deschampsia cespitosa* appears to incorporate at least a part of the geogenic CO_2 into its biomass. In a first estimate only the geogenic CO_2 proportion is assessed to about 37%. Thus, these results concomitantly point to a direct geo-bio-interaction in this interesting geological setting. However, overall the high CO_2 level within the centre of the mofette area inhibits a prolific growth of the indigenous mofette plants.