

**Hochauflösende Reflexionsseismik im Stadtgebiet von Wien - ein seichtliegender Gasfund**

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In der Stadt Wien wurde im Zuge einer Bohrkampagne für die geplante Verlängerung der U-Bahnlinie 1 eine gasführende Sand- und Grobkieslage in einer Tiefe von 38,0 ? 38,2 m unter GOK angetroffen. Für geplante Tiefgründungen von U-Bahnbauten ist diese Tiefenlage problematisch. Mit Hilfe von geophysikalischen Untersuchungen wurde in dieser Tiefenlage die laterale Ausbreitung dieses Gashorizonts erfasst und dargestellt. Die vorliegenden Ergebnisse dieser Messungen zeigen, dass es mit besonderen Messkonfigurationen möglich ist, einen derart seicht liegenden Gashorizont reflexionsseismisch zu erfassen und dessen laterale Ausdehnung einzugrenzen.

Die seismische Feldmessung (hochauflösende Reflexionsseismik) des rund 150 m langen Profils erfolgte entlang eines Grünstreifens parallel zur Favoritenstraße in unmittelbarer Nähe einer Bohrung. Es wurden verschiedene Messaufstellungen und Auswertungen getestet, um für zukünftig geplante Untersuchungen ein optimales Messprogramm ableiten zu können. Insgesamt wurden über das 150 m lange Profil 147 Aufnahmen registriert. Im Mittel betrug der Abstand zwischen den Schusspositionen somit rund 1 m. Aus der Anzahl der jeweils aktiven Kanäle und dem mittleren Abstand der Schusspositionen resultiert für die Aufnahmen mit den 40-Hz Einzelgeophonen eine mittlere reflexionsseismische Untergrundüberdeckung von rund 57. Auch konventionelle 10-Hz Geophone wurden getestet. Aufgrund des hohen Impedanzkontrastes von gasführenden Schichten zu den umgebenden Gesteinen lassen sich auch geringmächtige Gashorizonte in geringen Tiefenlagen visualisieren.

**Microstructural analysis of deformation processes and reservoir characteristics of carbonate fault rocks (Northern Calcareous Alps)**

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The EW striking sinistral Salzach-Ennstal-Mariazell-Puchberg fault system is a prominent tectonic feature in the Northern Calcareous Alps, and generates characteristic fault rocks in carbonates. Deformation mechanisms and reservoir properties of carbonate fault rocks are of major interest to the hydrocarbon industry, but also for the hydrogeological system regarding filtering and fluid-pathways. However, literature on carbonate fault rocks on a micro scale is scarce. Therefore the current study focuses on the examination of carbonate fault rocks from the Wetterstein Formation to enhance the comprehension of mechanisms that lead to the formation of these rocks, as well as their characteristic reservoir properties. Besides porosity and permeability measurements on samples in the laboratory, thin-sections were analysed by optical microscopy, cathodoluminescence microscopy and electron microscopy using BSE imaging. The analytical methods provide insight on various processes and structures like grain size reduction, cementation, recrystallization and geopetal? structures, and illustrate porosity and permeability differences due to deformation mechanisms and cementation events. Moreover, the study shows that a macroscopic classification of fault rocks in the field does not necessarily reflect micro-structural differences and distinct properties with respect to porosity and permeability, and therefore points out the importance of the micro-analytical approach in such complex fault rocks.

**Detection of polymetamorphism in the Saualpe micaschists by EMP monazite dating and geothermobarometry enhanced with SEM-based automated mineralogical methods**

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The Saualpen-Hauptserie is a Cretaceous eclogite-facies nappe unit in the eastern part of the Austroalpine basement complex. Automated mineralogical methods based on a scanning electron microscope (SEM) equipped with EDS were applied to complete thin sections of micaschists with complex microstructures. This allowed to identify suitable sites with monazite and garnet for quantitative WDS analysis by electron microprobe (EMP). Catalogues of monazites in various microstructures were produced with a SP search mode which is designed to

identify rare phases. A differentiated list of garnet EDS spectra was used to generate semi-quantitative garnet zoning maps in a GXMAP mode. This revealed two generations of porphyroblasts, sometimes within a single sample. The EMP Th-U-Pb monazite dating identified Cretaceous (80-100 Ma), Permian (250-270 Ma) and Carboniferous (310-320 Ma) age groups which are variably distributed in the samples. Cation-exchange and net transfer geothermobarometry of the Mg and Ca rich late garnet porphyroblast generation with low Mn revealed a HP eclogitic stage which can be assigned to the Cretaceous monazite crystallization. Permian and Carboniferous monazites can be assigned to a prograde HP amphibolite-facies crystallization of an early garnet porphyroblast generation with bell-shaped zoning of Mn. SEM-EDS-based automated mineralogy methods resolved the complex combinations of multiple monazite and garnet generations within the micaschist samples.

### **Creation of semiquantitative mineral-chemical zonation maps of garnet porphyroblasts by automated SEM-EDS analysis in polymetamorphic micaschists**

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Automated mineralogical methods based on a combination of scanning electron microscope (SEM) and energy dispersive X-ray element analyser (EDS) are increasingly applied in studies of ore concentrates. Such a SEM Quanta 650 FEG-MLA by FEI was used to study polymetamorphic micaschists from the Saualpe nappe pile in the Austroalpine basement. The GXMAP mode was selected among several automated methods offered by the mineral liberation analysis (MLA) software. This mode produces a narrow grid of 1600 single EDS spectra per square mm from minerals with defined shades of gray (e. g. garnet and biotite) in the backscattered electron (BSE) image. For the classification of the sample EDS spectra, a list of reference EDS spectra from defined parts of several garnet porphyroblasts (core - mid - rim) was collected. These reference spectra were completed by EDS single spot elemental analyses. This revealed strong variations of Mg, Fe, Ca and Mn among the single spot analyses. In a next step, the reference spectra were labelled with the corresponding garnet Mg-Fe-Ca-Mn compositions and arranged in a pretty color scale. The spectra classification in complete thin sections uncovered two generations of garnet porphyroblasts, zoned, unzoned, and with overgrowths. This allowed to select a few typical garnets out of dozens of porphyroblasts as targets for quantitative electron microprobe analysis.

### **Reconstruction of a debris-covered glacier at the eastern margin of the Alps**

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The intention of this work is the reconstruction of paleo-glaciers in the easternmost part of the Alps (Schneeberg mountain) with the main focus on chronology and sedimentology of Quaternary deposits. The area is dominantly made up of limestone bedrock and hence characterized by steep slopes and cirques.

Two juvenile moraine-systems can be deciphered based on geological mapping. The major system is characterized by an up to 60 m high latero-frontal dump moraine with a prominent breach-lobe moraine in a lateral position. It is regarded to represent the Last Glacial Maximum (LGM; Würm Pleniglacial). The other system is much smaller and was formed during the Würm Lateglacial.

The angular to subangular shape of the clasts and the abundant boulders on top of the ridges indicate a high portion of passive, i.e. supraglacial and englacial transport of debris before deposition. Thus the model of a debris-covered glacier is favored to explain both landforms and as well the corresponding sediment facies. For the pleniglacial moraine such an assumption is backed by a low accumulation/ablation area ratio (AAR) of around 1:1 based on the reconstruction of the equilibrium line altitude (ELA) using the maximum elevation of lateral moraines.