Isotopic analysis were performed using an automatic Kiele II line Analytical precision is 0.1 for both $\delta^{18}O$ and $\delta^{13}C$.

The Pectinides shells of *Gigantopecten nodosiformis* show $\delta^{18}O$ values in range of –3 to 0‰ (PDB). At that time salinity variations due to continental fresh water input are considered minimal and the large intrashell variability of 3‰ is interpreted to indicate significant seasonal induced temperature variations. The data suggest that the climate in southern Austria during the early Badenian time was subtropical with pronounced seasonality. Moreover the $\delta^{18}O$ profiles indicate that the shells growth in c. 2-3 years. In contrast, the $\delta^{18}O$ data from a brachiopod (Terebratulidae indet.) from the clastics deposits of the Upper Lagenid Zone indicate cooler middle annual temperatures with weak seasonal variations.

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The genesis of the gold–arsenopyrite mineralisation Strassegg, Styria: evidence for local fluid flow during late Cretaceous extension

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The Strassegg area is located in the NE of the Paleozoic of Graz, within the Schöckl nappe. The lithological sequence includes from top to bottom the following formations: 1) limestones and dolomites (Hochschlag); 2) black shales (Waitzbauer); 3) volcaniclastic, sedimentary material and massive volcanogenic rocks (Pramerkogel); 4) metapelitic rocks (Heilbrunn). There is a metamorphic gradient from sub–greenschist facies in the Hochschlag to metamorphic conditions of 450 to 500 °C and ~6 kbar in the Heilbrunn formation. The general strike of the rocks is NW-SE. Veins are common in all units but mostly widespread in the more competent rocks. The most abundant veins strike NW-SE as the foliation, and cut this at a low angle. Veins are occasionally folded and boudinaged together with the foliation planes. The structural relationships indicate that veins pre-date folding. Both veins and schistosity are cut by NW-SE trending semi-ductile normal faults. Vein mineralogy is controlled by the composition of the host rocks, and is different between the lithological units. In the carbonatic Hochschlag formation, there are only calcite or dolomite veins crosscutting the host rocks. Veins in the black shale and greenschists mostly contain both quartz and dolomite/calcite. In contrast, veins in metapelites from Heilbrunn formation contain only quartz.

The rocks of the Pramerkogel formation host a vein type gold–arsenopyrite mineralisation. The ore parageneses show a two-stage mineralisation: Arsenopyrite and pyrite dominate the first stage and galena, Pb-sulfosalts, tetrahedrite, chalcopyrite, and minor Cd-, Ni- and Te-phases form the second one. Gold is commonly associated with pyrite and arsenopyrite. The Arsenopyrite geothermometer gives temperatures in the range of 350 to 450 °C. The majority of fluid inclusions in vein quartz contain H_2O-CO_2-NaCl and show two or three phases at room temperature. Calculated salinities of the fluid inclusions from 3.4 to 7 wt%. Inclusions homogenize to liquid between 270 to 355 °C. The various rock types preserved isotopic values comparable with the signatures of the precursor rocks: ~22 ‰ $\delta^{18}O$ for carbonatic rocks, ~7 ‰ $\delta^{18}O$ for basic metavolcanics, and ~15 ‰ $\delta^{18}O$ for metapelites. Within specific lithological units $\delta^{18}O$ values of vein quartz are remarkably constant and are related to the $\delta^{18}O$ values of the host rock. Within the Pramerkogel Formation, the $\delta^{34}S$ values of vein sulfides are close to 0 ‰, indicating a homogenous, magmatic source. In contrast, $\delta^{34}S$ of pyrites from Waitzbauer Formation have a large range suggesting biogenic reduction of sulfate. For the studied area within the north-eastern Paleozoic of Graz the main points are as follow: (1) Gold mineralization is restricted to greenschists of the Pramerkogel Formation and precipitated in discordant veins that cut the foliation at low angles. Veins and foliation are folded by a later deformation event. (2) Stable isotope and mineralogical data show that veins and ore mineralisation were formed in a rock buffered fluid regime as a result of dehydration processes during metamorphism. Veins and mineralization precipitated from metamorphic water in equilibrium with the average local rock. 3) Most likely gold mineralization was related to fracturing, depressurization and progressive cooling from peak metamorphic conditions. The regional tectonic regime is interpreted as general shear conditions during NE-SW extension when veins were opened and progressively folded. Vein formation and mineralization are considered to be related to Late Cretaceous extension, metamorphism and related fluid flow. This work is supported by the FWF-project P12180 -TEC.