concentrations suggest that GDGT concentrations in lacustrine sediments might be used to detect periods of euthrophication.

The TEX_{86} index values record the lake surface temperatures (LST) reasonably when applying the POWERS et al. (2010) calibration. TEX_{86} -derived temperatures in the deeper parts of the water column of both lakes suggest mixing of exported and *in situ* produced GDGTs or the presence of older isoprenoidal GDGTs, reflecting different temperature regimes. In Lake Brienz, reconstructed mean LST matched the instrumental record, until soil-derived OM input increased in the latter half of the 20th century, evidenced by increased BIT indices. In lake Lugano, the TEX_{86}-based temperatures exhibit a -4 °C offset. This is at the edge of the calibration error, but can also be interpreted as a springtime temperature record, or an annual record that is influenced by GDGT production in deeper and colder water.

BIT index values in Lake Brienz sediments (~0.4) were significantly higher than water column values (~0.1), most probably because terrestrial run-off events were not captured during the water sampling. In Lake Brienz the brGDGTs appear to be genuinely soil-dervied, but, based on their distribution through the water column and the calculated MBT/CBT proxy, the brGDGTs in Lake Lugano appear to be at least partially produced *in situ.*

Overall, the data presented in this paper appear to validate the new TEX_{86} calibration for lacustrine sediments, but also show that this can only be done after careful examination of the sources of archaeal GDGTs. This is even more true for the sources (i.e. soil versus lacustrine) of the brGDGTs, and the use of the MBT and CBT proxies.

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Preliminary observations on the mineralogy magmatic rocks and of sulphates from evaporite mélanges from the central Northern Calcareous Alps

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The evaporite mélanges of the Haselgebirge Formation exposed in the central Northern Calcareous Alps comprises a wide variety of mainly chlorides and sulphates (SCHAUBERGER 1986) as well as a wide range of decimeter- to meter-sized tectonic blocks and boudins comprising partly altered plutonic and volcanic rocks and of their metamorphic equivalents (e.g., KIRCHNER 1979, VOZAROVA et al. 1999). No detailed chemical data from minerals of all these rocks are available up to now. An extensive microprobe survey has been started in order to constrain (1) the mineralogical composition of magmatic and metamorphic minerals in above mentioned magmatic clasts from gypsum quarries like Moosegg and (2) compositional variations of sulphates (anhydrite, polyhalite) from various mines.

Few metagabbro clasts contain a partly altered magmatic mineral assemblage including plagioclase and clinopyroxene. For illustration, we describe here a particular sample from which white mica was dated as early Variscan (SCHORN et al. this volume). The clinopyroxene comprises a patchy composition, with cores of $Wo_{40.2}En_{47.6}Fs_{12.2}$ and rims of $Wo_{36.4}En_{44.2}Fs_{19.4}$. The rims are partly replaced by a fine-grained mixture of chemically unresolvable amphiboles, opaque and other minerals. The metamorphic assemblage of other pseudomorphs contains phengitic white mica containing Si of 3.55 to 3.65 per formula unit and Na-rich amphiboles. Because of missing foliation, the metamorphism represents rather ocean floor metamorphism than high-pressure metamorphism.

Samples of meta-biotite-diorite contain plagioclase, kaersutite, and biotite as primary minerals, and actinolite, chlorite and epidote as metamorphic assemblages. Magmatic biotite grains are rich in TiO_2. In some of these rocks, we also found a magnesio-hornblende/actinolite + opaque minerals in the core of kaersutite.

Sodium-rich amphiboles (mainly magnesio-riebeckite) are particularly important in many metamorphic rocks as well as infill of extensional gashes, particularly in dolomite lenses. Their origin is unclear. As a working hypothesis we postulate formation of sodium-rich amphiboles by interaction between a brine and rock at elevated temperature.

In summary, these data indicate a magmatic phase, which is dominated by mildly alkaline rocks. The phengitic white mica of metagabbro indicates a phase of blueschist metamorphism.

Polyhalite compositions have been investigated from different microfabric types from the Altaussee mine. The samples are the same as used for $^{40}Ar/^{39}Ar$ age dating (LEITNER et al. in prep.). The main microstructural types of polyhalite (from coarse-grained vein, medium-grained anhydrite-polyhalite rock and fine-grained foliated polyhalite, respectively) expose no significant chemical differences to each other. All measured points on polyhalite are similar to each other (30 points) und located near the ideal composition. All samples show slightly elevated amounts of calcium, but then diminished amounts of potassium, which is most probably an error in measurement. The contents of subordinate cations is low and similar, with oxide percentages below 0.3 (Mn < Na < Sr < Fe).

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Preliminary observations of the magmatic mineralogy of Pliocene volcanics from Alchar, Macedonia: significance for the mineralization process

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The formation of porphyry and epithermal ore deposits requires a number of agents including chlorine as main ligand for transporting metals in hydrothermal systems (e.g., HEINRICH 2005). Here, we investigate the compositions of magmatic and hydrothermal minerals of the volcanic-hosted hydrothermal ore system of Alchar, Macedonia as no mineral chemistry of was reported from the Alchar volcanic complex. Alchar is a calcalkaline intrusive and extrusive complex also extending to northern Greece (YANEV et al. 2008), which hosts an epithermal Au-As-Sb-Tl deposit (KOCHNEVA et al. 2006). The volcanic products including the cooling history of a subvolcanic latite body of Alshar (Alshar latite in the further text) were recently dated by $^{40}Ar/^{39}Ar$ mineral dating and the ages range from 5.1 Ma (age of intrusion) to 3.3 Ma (age of cooling through ca. 200°C; NEUBAUER et al. 2009). The biotite ages of 5.0± 0.1 and 5.1±0.1 Ma from blocks of the Vitacovo tuff forming likely the initial Pliocene volcanism in the Alchar region indicating that Alchar latite and the Vitacovo tuff formed at the same time by the same process. A hydrothermal K-feldspar of Alshar precisely dates the main event of subsequent hydrothermal alteration at 4.31±0.02 Ma.
Our investigations of amphibole and biotite of subvolcanic latite from Alchar and of the Vitacovo tuff show a significant compositional variation of magmatic minerals. Phenocrystic amphiboles of the Vitacovo tuff exhibit a significant zoning. The cores are commonly magnesio-hornblende, rims magnesio-hastingsite. Clinopyroxene phenocrysts are also commonly zoned and their compositions vary within the diopside field. The chlorine contents of amphiboles and phlogopite are between 0.02 and 0.1 wt%. Some amphiboles, clinopyroxenes and plagioclases reveal an oscillatory zoning and the variation of plagioclase is between $Ab_{42.5}An_{55.4}Or_{2.2}$ and $Ab_{63.6}An_{30.8}Or_{5.6}$. Oscillatory zoning of amphibole, plagioclase and clinopyroxene response either to P-T fluctuations during crystallization (GARCIA-CASCO et al. 2002) or can be related to mixing events in magma chambers. Magmatic processes such as crystallization recharge in magma chambers, decompression during ascent and convection can explain these patterns (GINIBRE et al. 2007).
The phenocrystic amphibole is uncommon in the Alshar latite. Diopside is again slightly zoned. Plagioclase is less zoned than in the about coeval Vitacovo tuff and compositions range between $Ab_{57.1}An_{37.4}Or_{5.6}$ and $Ab_{48.6}An_{48.7}Or_{2.7}$. The chlorine content in rare amphibole and abundant phlogopite ranges between 0.08 and 0.18 and is similar to that of same minerals of the Vitacovo tuff.
Our new mineral data suggest that chlorine as a major agent for ore formation originates from the magmatic system and was likely released from the magma. Fluid inclusions of the epithermal ore system indicate a low-salinity hydrothermal fluid for mineralization (KOCHNEVA et al. 2005). The above mentioned dated K-feldspar is relatively rich in the albite component (27.6 to 29.0 mol percent), low in the An component and shows BaO contents of 0.76 and 2.30 wt%. The high albite content seems uncommon for hydrothermal alkali feldspars.

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Artiodactyl trackways in Pleistocene eolianites on Antiparos (Central Cyclades, Greece)

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Yellowish calcarenite sandstones have been mapped along the NW coast of Antiparos island (Aegean). These sandstones form dm to 5 m thick layers which cover greenschist to amphibolite grade metamorphic rocks of the Attic-Cycladic Crystalline of the Central Hellenides. The sandstones can be traced from below sea-level up to an elevation of approximately 80 m. Generally, the sandstone layers and the internal lamination are parallel to the slopes of the underlying crystalline without forming any morphological terraces; cross-bedding with dip-angles >35° has only rarely been recorded. The sandstones are dominated by marine bioclasts including mainly corallinaceaen red algae, benthic foraminifers and fragments of gastropods and bivalves with siliciclastic components of less than 20 %. The sandstones are