some parts of the basement were exhumed and cooled down during tectonic processes in the Cenozoic. The progade greenschist metamorphic rocks east of Halbturn are located on the eastern side of a fault scarp shown in the map by WESSELY et al. (1993). Based on petrographic characteristics they may represent (Upper Carboniferous?) Permian to Lower Triassic siliziclastic sediments similar to those in the Schladminger and Seckauer Tauern („Rannach Series").
The consistent polymetamorphic history of the investigated rock series allows a
correlation with basement units outcropping in surrounding areas. The basement of the Seewinkel cannot resemble the Tatric unit of the Little Carpathians because the latter is characterised by pre-Alpine cooling ages, indicating less than 300 °C during the Alpine event. The Lower Austroalpine unit in the Leithagebirge shows an intense Alpine phyllonitisation which causes the more or less complete transformation of biotite to chlorite in most of the lithologies. Further there are no lithological similarities. The crystalline rocks of the Ruster Höhenzug and in the area of Jois show variable lithology with frequent biotite. Ar-Ar muscovite and Rb-Sr biotite ages are partly or fully reset during the eo-Alpine event (FRANK et al. 1996). However, no Permo-Triassic sedimentary cover is known from this basement.
In our interpretation the basement of the Seewinkel can be correlated with units of the Silvretta-Seckau nappe system of the Schladminger and Seckauer Tauern, which are overlain by Permian to Lower Triassic clastic sediments with a greenschist facies metamorphic imprint during the eo-Alpine event.

FRANK, W., LELKES-FELVARI, G. & DUNKL, I. (1996): Thermal history of Austroalpine basement rocks of the borehole Fertörakos-1004, Western Hungary. - Advances in Austrian-Hungarian Joint Geological Research, 1996: 177-195.

WESSELY, G., KRÖLL, A., JIRICEK, R. & NEMEC, F. (1993): Wiener Becken und angrenzende Gebiete 1:200.000: Geologische Einheiten des präneogenen Beckenuntergrundes. - Geologische Themenkarte, Geol. B.-A., Wien.

Luminescence dating at the Upper Palaeolithic site of Krems-Wachtberg, Austria

LOMAX, J.[1], PREUSSER, F.[2], NEUGEBAUER-MARESCH, C.[3], EINWÖGERER, T.[3] & FIEBIG, M.[1]

[1] Institute of Applied Geology, University of Natural Resources and Applied Life Sciences, Peter Jordan Str. 70, A-1190 Vienna; johanna.lomax@boku.ac.at;
[2] Institute of Geological Sciences, University of Bern, Baltzerstr. 1+3, CH-3012 Bern;
[3] Prehistoric Commission of the Austrian Academy of Sciences, Fleischmarkt 22, A-1010 Vienna

The palaeolithic site of Krems-Wachtberg is located at the confluence of the Krems and the Danube in Lower Austria. The excavated section consists of a 9 m thick loess sequence and a well preserved Upper palaeolithic find layer 5 m below the present surface. Due to the discovery of a double-infant burial, the site achieved international attention among archaeologists and Quaternary researchers. The find layer was radiocarbon dated to 31.3±0.3 ka calBP and is placed into the Gravettian period (EINWÖGERER et al. 2006). The loess sequence lacks well developed palaeosols; only embryonic soils are present in places. This suggests more or less continuous loess sedimentation with some short breaks. The site represents an important archive for past climatic change, recorded by the loess sequence, and for the ontogeny of early modern humans, represented by the Gravettian find layer. In order to reconstruct the environmental conditions at the time of human occupation at the site, accurate age estimates of the find layer and the loess sequence are a crucial prerequisite. A secure chronology further allows correlation with other (terrestrial and marine) climatic records and archaeological sites, contributing to a better understanding of past climate change and human dispersal on a broader scale.
Optically and infrared stimulated luminescence (OSL and IRSL) dating is a technique which allows determining sedimentation ages in the range of a few tens of years up to several hundred thousand of years (PREUSSER et al. 2008). Loess is considered ideal for the application of luminescence dating due to its aeolian nature and thus, complete bleaching of the OSL-/IRSL signal during transport. Nevertheless, several problems when OSL-dating loess have been encountered in the past, including low quartz signal intensities, heterogeneity on a microdosimetric scale, and age underestimation of the feldspar fraction due to anomalous fading (for a recent review, see ROBERTS 2008).
Several strategies were applied to obtain a reliable luminescence chronology of the loess sequence. First, a very narrow spaced sampling resolution of ~20 cm was used in order to provide internal control on the consistency of the chronosequence. Second, both the quartz and the feldspar fraction were dated, which enables a further internal check on the reliability of ages and the causes of dose variations. For example, a significantly higher quartz age compared to the feldspar age may be the result of anomalous fading of the feldspar fraction. A much higher scatter in the quartz palaeodose distribution compared to the feldspar distribution might be caused by low quartz signal intensities or/and by microdosimetric heterogeneity. Furthermore, fading tests following RUFER et al. (unpublished) were carried out on selected samples.
The resulting luminescence ages range from ~18 to 45 ka and are in correct stratigraphic order for both the quartz and the feldspar fraction, providing some confidence in their reliability. However, the feldspar ages underestimate the quartz ages by around 20 to 30 %. Preliminary fading tests showed that the feldspar age underestimation is most likely caused by signal fading of this mineral fraction. Further test are needed though for a reliable fading correction. The quartz fraction exhibited high palaeodose variations, whereas the feldspar fraction showed only minimal scatter in palaeodoses. This confirms the well bleached and un-mixed nature of the loess. The quartz palaeodose variations are most likely caused by microdosimetric heterogeneity, poor counting statistics and varying luminescence properties. The luminescence ages

of the loess sequence imply a nearly continuous loess sedimentation, possibly with small breaks. The breaks are too short to be resolved by the luminescence ages, but a broad correspondence to the GRIP record is recognised in the data.

EINWÖGERER, T., FRIESINGER, H., HÄNDEL, M., NEUGEBAUER-MARESCH, C., SIMON, U. & TESCHLER-NICOLA, M. (2006): Upper Palaeolithic infant burials. - Nature, **444**: 285.

PREUSSER, F., DEGERING, D., FUCHS, M., HILGERS, A., KADEREIT, A., KLASEN, N., KRBETSCHEK, M., RICHTER, D. & SPENCER, J. (2008): Luminescence dating: Basics, methods and applications. - Quaternary Science Journal (Eiszeitalter und Gegenwart), **57**: 95-149.

ROBERTS, H.M. (2008): The development and application of luminescence dating to loess deposits: a perspective on the past, present and future. - Boreas, **37**: 483-507.

New data from the Lower Cretaceous Puez key-section in the Dolomites (Southern Alps; N-Italy)

LUKENEDER, A.

Geological and Palaeontological Department, Natural History Museum, Burgring 7, 1010 Vienna, Austria; alexander.lukeneder@nhm-wien.ac.at

Investigations on different fossil groups within fields of isotopic, magneto- and cyclo-stratigraphic and geochemical analysis are combined to extract the Early Cretaceous history of environmental changes as displayed by the sea level and climate. This results in calibrating ammonite biostratigraphy and magnetostratigraphy through isotope data. The main investigation topics of the submitted project within the above-described framework are the biostratigraphic, palaeoecological, palaeobiogeographic, lithostratigraphic, cyclostratigraphic and magnetostratigraphic development of the Early Cretaceous of the Puez area.

The main locality within the project is located in huge outcrops located at the southern margin of the Puez Plateau. It is located within the area of the Puez-Geisler Nature park in the northern part of the Dolomites (Trentino-Alto Adige; South Tyrol). Lower Cretaceous ammonoids (n = 640) were collected at the Puez locality in the Dolomites of Southern Tyrol (LUKENEDER & ASPMAIR 2006). The cephalopod fauna from the marly limestones to marls here indicates Late Valanginian to Late Albian age. The underlying Biancone Formation (Maiolica Formation) is of Early to Late Valanginian.

The ammonoid fauna comprises 48 different genera, each apparently represented by one to three species. The complete occurrence at the Puez section is dominated by the Phylloceratina (30 %) and the Ammonitina (34 %). *Phyllopachyceras* (17 %) and *Phylloceras* (13 %) from the Phylloceratina are the most frequent components, followed by *Lytoceras* (12 %) from the Lytoceratina, and *Barremites* (10 %) and *Melchiorites* (8 %) from the Ammonitina. The following index ammonites could be detected so far: the latest Valanginian *Criosarasinella furcillata* (*C. furcillata* Zone and Subzone), for the middle Early Hauterivian *Olcostephanus (Jeannoticeras) jeannoti* (*O.(J.) jeannoti* Subzone), and *Toxancyloceras vandenheckii* for the early Late Barremian (*T. vandenheckii* Zone). The ammonoid fauna contains only descendants of the Mediterranean Province (Tethyan Realm). Most affinities of the cephalopod fauna are observed with faunas from the adjacent areas of Italy (Lessini Mountains, Belluno, southern Trento Plateau), the Northern Calcareous Alps and the Bakony, Geresce and Mecsek Mountains of Hungary. This is explained by the neighbouring position of the latter areas during the Early Cretaceous on the Apulian/Adria block and the Alpine-Carpathian microplate. Lower Cretaceous (Valanginian-Albian) deposits of the Puez locality in yield remarkable amounts of specimens of different ammonoid taxa showing unique epifaunal encrustations by the scleractinian, ahermatypic solitary coral ?*Cycloseris* LAMARCK, 1801 (LUKENEDER 2008). The pattern of infestation clearly documents a preference of the adherent taxa for the outer shell surface of the ammonoids, whereas the inner surface remains barren. The exact stratigraphically dating of the ammonoid fauna allows synchronously to clear the age of the infested corals and the autecological history of this new ammonid/coral palaeocommunity. The symbiotic ammonoid-coral relation from the Dolomites exists from the Valanginian to Albian times.

The cooperative project (FWF project P20018-N10; 22 international scientists): *An integrative high resolution project. Macro- and microfossils, isotopes, litho-, cyclo-, magneto-and biostratigraphy as tools for investigating the Lower Cretaceous within the Dolomites (Southern Alps, Northern Italy) -The Puez area as a new key region of the Tethyan Realm*), is on the way since 2008 by the Natural History Museum in Vienna and the Southern Tyrol 'Naturmuseum Südtirol' in Bozen. Producing major results with a broad impact requires using tools such as isotopes, magnetostratigraphy, cyclostratigraphy along with specific macrofossil groups like ammonites, belemnites, brachiopods, microfossil groups like radiolarians and foraminiferans, as well as nannofossils. This combination will provide a picture of the Lower Cretaceous sea level changes, allow conclusions to be drawn on palaeoclimate and yield results on the biostratigraphic age coupled with more stable, exact ages resulting from the well-established techniques of magnetostratigraphy.

LAMARCK, J.B.P. (1801): Systema des animaux sans vertebres, ou tableau general des classes, des ordres et des genres de ces animaux. - 1-432, Paris.

LUKENEDER, A. (2008): The ecological significance of solitary coral and bivalve epibionts on Lower Cretaceous (Valanginian-Aptian) ammonoids from the Italian Dolomites. - Acta Geologica Polonica, **58**/4: 425-436.

LUKENEDER, A. & ASPMAIR, C. (2006): Startigraphic implication of a new Lower Cretaceous ammonoid fauna from the Puez area (Valanginaian - Aptian, Dolomites, Southern Alps, Italy). - Geo.Alp, **3**: 55-91.