Vor Ort suchen die Schüler, nach einer Einführung in die Themenbereiche Geologie und Paläontologie, selbständig nach Fossilien, um diese anschließend im eingerichteten Feldlabor zu präparieren (*learning by doing*). Die Funde werden von den Schülern nach entsprechender Bestimmung mit nach Hause genommen. Durch die praktische Tätigkeit im Rahmen dieser Veranstaltungen werden die Schüler mit den Aufgaben der Erdwissenschaften und verschiedenen Methoden vertraut gemacht. Daneben wird der rohstoffwirtschaftliche Hintergrund in seiner Beziehung zur Natur erarbeitet. Das Museum nutzt die Natur als Klassenzimmer und bietet die Möglichkeit zu erleben und lernen durch:

Angreifen – Begreifen - Schauen – Erkennen – Verstehen

Abbildungen 1, 2: *Schüler bei der Fossiliensuche und beim Präparieren.*

Neoproterozoic Tectonothermal Evolution of the Central Eastern Desert of Egypt: A Slow Velocity Tectonic Process of Core Complex Exhumation

H. Fritz[1], R.D. Dallmeyer[2], E. Wallbrecher[1], J. Loizenbauer[1], G. Hoinkes[3], P. Neumayr[4], A.A. Khudeir[5]

[1] Inst. f. Geologie und Paläontologie, Univ. Graz, Österreich, [2] Department for Geology, Univ. of Georgia, Athens, USA, [3] Inst. f. Mineralogie und Petrologie, Univ. Graz, Österreich; [4] Centre for Strategic Mineral Deposits, Univ. of Western Australia, Australia, [5] Department of Geology, Univ. of Assiut, Egypt

Syn-convergent extension in collision zones may be driven by gravitational instabilities known as gravitational collapse or by far-field stresses induced by block motions associated with lateral extrusion. During these processes that are initiated by mechanical instabilities, the velocity of tectonic activity is approximately an order of magnitude higher than time required for heat conduction and re-equilibration of the thermally disturbed lithosphere. Consequently short term tectonic processes, rapid exhumation of rocks and clockwise pressure temperature metamorphic loops have been predicted and reported from these tectonic settings. By contrast, in oceanic and oceanic/continental convergence zones large amount of magmas are generated and continuously expelled during plate convergence. In such a scenario, magmatism itself can be assumed to be the major driving force for mountain destruction and rocks exhumation. Emplacement of plutons is balanced by downward movement of cold and dense material resulting in relative vertical mass movement. Since the thermal structure of the lithosphere that was modified by continuous magmatism controls extensional tectonics rather than far-field stresses or body forces, a continuous and slow exhumation process has to be assumed. The corresponding pressure temperature metamorphic paths, although highly variable within those orogens, are defined by anticlockwise pressure temperature loops. In order to identify stress induced from magmatically controlled exhumation, we focus on the interrelation between extension tectonics, magmatism and depositional dynamics of sedimentary basin during the exhumation of Neoproterozoic core complexes in the Central Eastern Desert of Egypt.

Exhumation of core complexes in the Central Eastern Desert of Egypt was highly diachronous. During early stages, low velocity exhumation was triggered by magmatism that initiated at ca. 650 Ma in the Sibai core complex and caused early deposition of molasse sediments within rim synforms. Rocks from the Sibai, that constitute almost entirely of progressively evolving plutons, cooled isobarically below ca. 500°C at ca. 600 Ma as constrained by $^{40}Ar/^{39}Ar$ hornblende ages and P-T data. A second stage exhumation was released by combined effect of strike-slip and normal faulting and exhumed high grade metamorphosed Meatiq and Hafafit domes. During this stage, core complexes have been exhumed rapidly at conditions of isothermal decompression at ca. 580 Ma. Earlier formed structures within sedimentary basins have been overprinted during this stage.

We propose a new model that adopts core complex exhumation in oblique island arc collision zones that includes transpression combined with lateral extrusion dynamics. In this model, continuous magma generation weakens the crust and facilitates lateral extrusion tectonics. Since horizontal shortening is balanced by lateral extension, no major crustal thickening and no increase of potential energy (gravitational collapse) is necessarily involved in the process of core complex formation.

Late Cretaceous to Paleogene Tectonics and Metamorphism in the Eastern Alps: the "older" extrusion corridor

H. Fritz[1], K. Krenn[2], A.-V. Bojar[1], W. Kurz[3], S. Hermann[1], F. Neubauer[4], J. Robl[1]

[1] Inst. f. Geologie und Paläontologie, Univ. Graz, Österreich, [2] Inst. f. Mineralogie und Petrologie, Univ. Graz, Österreich, [3] Geologisches Institut, Univ. Bonn, Deutschland, [4] Inst. f. Geologie und Paläontologie, Univ. Salzburg, Österreich

Whereas the Miocene extrusion tectonics in the Eastern Alps is fairly good known, the effect of Late Createaceous to Early Paleogene tectonics and metamorphism is still under debate. Recognition of this structural and metamorphic event is hampered by the fact that spatial distribution of Cretaceous / Paleogene structural elements coincide frequently with later, Miocene extrusion-related structures. However, from geochronological and tectonometamorphic arguments there is strong evidence that this "older extrusion tectonics" played a major rule in Alpine architecture. This includes: (1) Major tectonic lines, interpreted as Early Createaceous thrusts are overprinted and sealed by upper greenschist- to amphibolite-facies metamorphism and tectonics. (2) Large rock volumes within eastern sectors of the Eastern Alps cooled down below ca. 300°C already in Cretaceous times. (3) A large number of age data previously interpreted to date Early Alpine nappe stacking cluster around ca. 80 Ma and may easily be reinterpreted in terms of strike-slip and/or extension tectonics. We present several examples of Late Cretaceous / Paleogene tectonothermal events from the Eastern Alps and discuss spatial distributions of those structures in the frame of Alpine architecture.

Eastern Austroalpine sectors: Cretaceous/Paleogene extension tectonics is most evident in the area next to the Graz Paleozoic where deposition of Gosau type sediments is closely linked with exhumation of the Gleinalm complex and extension within the Graz Paleozoic. Late Cretaceous amphibolite-grade metamorphism is localized along the margins of the Graz Paleozoic to the surrounding crystalline complexes. Very condensed paleothermal gradients across these boundaries are the result of exhumation of deeply buried crystalline complexes and juxtaposition against the lower grade structural cover. Associated P-T paths include isothermal decompression followed by isobaric cooling at shallow levels together with infiltration of highly salinar fluids. Lode-type ore deposits including gold mineralisation formed as consequence of heat advection and decompression.

Northern Austroalpine sectors: A series of steeply dipping, ca. W-E trending deformation zones are traced from the Ennstal to the Seckau Complexes. This zone is characterised by mylonites that evolved at upper greenschist metamorphic conditions and W–E stretching associated with a strong coaxial component of deformation. Exhumation of rocks, fluid infiltration and formation of a series of ore occurrences are associated with this event.

Southern Austroalpine sectors: Sets of highly ductile strike slip and normal faults are traced along the southern margin of Austroalpine units, although frequently obliterated by younger tectonic events along the Periadriatic Lineament. These include Cretaceous Pejo structures, remnants of Cretaceous to Paleogene structures along the Pustertal, within the Gailtal and Kreuzeck units. Within southeastern sectors juxtaposition of the Plankogel against the Koralm unit is explained by Late Cretaceous normal faulting.

Summarizing we argue that any palinspastic reconstruction has to include Late Cretaceous to Paleogene dispersal of Austroalpine units which had been largely exhumed during Paleogene times.