Lake Van Drilling Project "PaleoVan"

Krastel S.[1], Litt T.[2], Anselmetti F.[3], Kipfer R.[3], Örcen S.[4], Cagatay N.[5] and Cukur D.[1]

[1]*Leibniz Institute of Marine Sciences (IFM-GEOMAR), Kiel, Germany, skrastel@ifm-geomar.de*
[2]*Steinmann Institute of Geology, Mineralogy and Palaeontology, University of Bonn; Germany*
[3]*Eawag, Swiss Federal Institute of Aquatic Science and Technology, Switzerland*
[4]*Department of Geology, University of Yüzüncü Yil, Van, Turkey*
[5]*Eastern Mediterranean Centre for Oceanography and Limnology, Istanbul Technical University, Istanbul, Turkey*

Lake Van is the fourth largest terminal lake in the world (volume 607 km^3, area 3,570 km^2, maximum depth 460 m), extending for 130 km WSW-ENE on the Eastern Anatolian High Plateau, Turkey. The annually-laminated sedimentary record of Lake Van promises to be an excellent palaeoclimate archive because it potentially yields a long and continuous continental sequence that covers several glacial-interglacial cycles (ca. 500 kyr). Therefore, Lake Van is a key site within the International Continental Scientific Drilling Program (ICDP) for the investigation of the Quaternary climate evolution in the Near East. Based on the high-resolution seismic data and multidisciplinary scientific work, it is planned to drill a series of sites in Lake Van in the frame of ICDP in summer 2010. The geochronological precision on a decadal or even annual scale will allow comparisons not only with astronomical cyclicity but also signals below the frequency of Milankovitch cycles, such as North Atlantic Oscillation, which may have also affected the past climate system of the eastern Mediterranean region. As a closed and saline lake, Lake Van reacts very sensitively to lake level changes caused by any alterations in the hydrological regime in response to climate change. Tephra layers, documented in short cores and also expected in the deep drill cores of Lake Van sediments, allow reconstructing larger volcanic events and environmental impacts. The short cores from Lake Van show also strong evidence of earthquake-triggered microfaults, interpreted as seismites. Similar features are expected to be found in the deeper sections. The unique setting of Lake Van, which records simultaneously the volcanic as well as the earthquake history, will also allow establishing possible coincidence between larger earthquakes and volcanic events.

Based on high resolution reflection seismic data, four sites have been selected for the drilling campaign. The 'Ahlat Ridge'-Site is the most important site. It is the deepest site (water depth ~375m) where we plan to recover a complete sedimentary section for paleoclimatic investigations. The 'Northern Basin'Site is located in a small basin close to the northern shore of Lake Van. The proximity to the Quaternary volcanoes will allow studying major eruptions of the volcanoes and associated volcanogenic hazards. Two sites in different water depths of the Erek Fan are planned to investigate lake level fluctuations and the evolution of Lake Van. Additionally all sites will allow to identify seismites for analyzing the seismic activity in the past. The rise of the human culture and the transport of mantle fluid trough continents are additional questions, which will be addressed by the drilling campaign. Drilling will take place during three months during July, August and September 2010. We will be able to present the first initial results of this campaign during the meeting in Thessaloniki.

Tectonometamorphic evolution of the Rhodope orogen: Constraints from macro- and microstructures, petrology and geochronology

Krenn K., Bauer Ch., Proyer A. and Hoinkes G.

Institute of Earth Sciences, Department of Mineralogy and Petrology, Karl-Franzens-University of Graz, Universitätsplatz 2, 8010 Graz, Austria, kurt.krenn@uni-graz.at

Tectono-stratigraphy, macro- and microstructures, petrology and geochronology have been combined into a comprehensive model for the tectono-metamorphic evolution of the Rhodope orogen from the Jurassic to the Early Paleogene. High-grade deformed and metamorphosed continental and mantle rocks in two study areas in the Central and Eastern Greek Rhodope are part of a suture zone (Rhodope Suture Zone: RSZ) which extends over at least 120 km from the W to the E. It is structurally underlain by a Lower Unit consisting of Pangeon gneisses with Variscan age and a metasedimentary cover of marbles with Triassic(?) age and overlain by the Upper Unit, a Late Jurassic sequence consisting of orthogneisses at the base, discordantly covered by (meta-)ophiolites (Circum Rhodope) on top. Considering our proposed model, the Lower Unit was derived from the Apulian plate during the Paleogene whereas the Upper Unit indicates calc-alkaline magmatism which took place during the early exhumation phase of the suture zone rocks. (Meta-) ophiolites are related to a rifting stage within the southern Neotethyan Ocean and have been obducted in north direction during Jurassic/Cretaceous time. The material from the investigated suture zone most likely originated as an extensional allochthon south of the European continent during Permo/Triassic time was subsequently subducted beneath Europe in the Early Jurassic (≥180 Ma). On the basis of comparable metamorphic ages and coherent structures but differences in metamorphic conditions and lithologies the rocks of the RSZ are subdivided into an Upper and a Lower Part. The P-T-d history of both parts differs due to the relative tectonic position within the exhuming wedge. Information for the prograde history is derived from subduction-related structures within quartzites in the Lower Part. Metapelites marking the transition between both parts contain microdiamonds and indicate that central parts of the RSZ experienced UHP conditions before exhumation started. Exhumation was controlled by buoyancy-driven normal displacement with SW-shearing at the base (Lower Part) and NE-shearing on top (Upper Part) indicating an early activity of a deep crust shear zone (Nestos Shear Zone) from the Late Jurassic to the Late Cretaceous. An intervening stage of mineral re-crystallization and thermal re-equilibration from partial anatexis in the Upper Part probably decreased exhumation rates and rocks experienced long-lasting overprinting at mid-crustal levels. Because of slow exhumation rates, peak indicators of a probable UHP stage were almost totally obliterated. A common exhumation history of both parts at pressures lower than about 12 kbar (35 – 40 km depth) is proposed. During this stage, rocks of the RSZ experienced their main ductile overprint due to southwest-directed shearing and folding. Differences in the deformation overprint of both parts are indicated by plunge angles of the stretching lineation which are steeply dipping to the NE in the Lower Part and subhorizontally dipping to the NE in the Upper Part. The Lower Part experienced long-lasting retrogression due to SW-directed shearing with the lack of partial anatexis and thermal re-equilibration. Upper crustal structures evolved most likely due to slab retreat and point to tectonic erosion as a final exhumation mechanism for the units of the Upper Part. Late stage shear activity at the Nestos Shear Zone accompanied with magmatism dominated in the footwall units of the Lower Part. This late tectonics is considered as coevally with the formation of Variscan basement domes originating from the underthrusted Lower Unit, thus making the Rhodope orogen a classic core complex juxtaposed to former structurally higher units.

Latest Jurassic – Earliest Cretaceous mass movements in the polish part of the Pieniny Klippen Belt and Silesian Unit (Outer Flysch Carpathians)

Krobicki M., Golonka J. and Słomka T.

Faculty of Geology, Geophysics and Environmental Protection, AGH University of Science and Technology, Al. Mickiewicza 30, 30-059, Kraków, Poland, krobicki@geol.agh.edu.pl, jan_golonka@yahoo.com

Distribution of sedimentary breccias, mass flows; redeposited clasts, which indicate time and mechanisms of origin of tectonic movements within sedimentary basins, are the main objects of the presented paper. These types of tectonic activity in Polish part of the Carpathians are well documented both in the Outer (Flysch) Carpathians and in the Pieniny Klippen Belt. Neo-Cimmerian tectonic events took place both in the Alpine Tethys and Proto-Silesian Basin. A big geotectonic reorganization, known as the Walentowa Phase, took place in AT during the latest Jurassic-earliest Cretaceous (Neo-Cimmerian) movements resulting in extensive gravitational faulting. Several tectonic horsts and grabens, documented by facies diversification, were formed. These rejuvenated some older structures and Middle/Late Jurassic (Meso-Cimmerian) faults which caused uplift of the shallow intrabasinal Czorsztyn