transgression. Regional and local models have been elaborated for the time span between 8 000 and 3 000 cal BP – a time of rapid sea level rise. As key areas for local models served the Wismar Bight, the Darss–Zingst Peninsula, and Rügen Island.

Rockslide mechanics reconstruction using FEM and photoplastic modelling

Hartvich F.[1], Poul I.[2] and Košťák B.[1]

[1]*Institute of rock structure and mechanics, Academy of Sciences of the Czech Republic, V Holešovičkách 41, Prague 8, 182 09, Czech Republic, hartvich@irsm.cas.cz*
[2]*Czech geological survey, branch Brno, Leitnerova 22, Brno,658 69 Czech Republic*

On a steep eastern slope under a Celtic site of Obří Hrad in the Šumava Mts. (South Bohemia), a complex, multi-generation rockslide was identified. Detailed mapping of the site revealed several systems of rockslide scarps, corresponding to respective deformation generations. Following research was aimed to assess the current behaviour of the slope and likely mechanics of the rockslide. Reconstruction was difficult as the rockslides were not very fresh, and the accumulations were practically removed by the fluvial processes from the narrow valley floor. Numerous research methods were applied. The depth and profile of the potentially unstable slope was investigated using geophysical methods. Several monitoring systems to assess the current movements were installed, including automatic extensometers, rod dilatometers and steel tape extensometers. Detailed measurements of tectonic joints and foliation structures were performed to investigate geometrical predispositions for sliding. Relative dating of the scarps was performed using the Schmidthammer test, comparing the scarps to other exposed rocks. Based on these analyses, a hypothesis on the rockslide formation and mechanics was formulated and tested using two independent methods: FEM calculations in the FLAC software, and photoplastic models, simulating the behaviour of the tectonically fractured rock massif. The preliminary results of these techniques illustrate the possible mechanics of the sliding while the monitoring systems offer a frame for the timescale of the events.

Changing seasonality patterns from Miocene Climate Optimum to Miocene Climate Transition deduced from the Crassostrea isotope archive

Harzhauser M.[1], Piller W.E.[2] and Grunert P.[2]

[1]*Natural History Museum Vienna, Geological-Paleontological Department, Burgring 7, A-1010 Vienna,*
[2]*Institute of Earth Sciences, Graz University, Heinrichstrasse 26, A-8010 Graz*

The Western Tethyan estuarine oyster *Crassostrea gryphoides* (Schlotheim, 1813) is geologically long lived. Appearing in the Oligocene it persists up to the Pliocene in the entire Western Tethys. With sizes of over 80 cm length, it is the largest Miocene bivalve in the Western Tethys Region. Its modern congeners are economically important in shellfish farming. Therefore, numerous studies focused on the biology and ecology of *Crassostrea* including several sclerochronological studies Herein we measured 5 shells from the Miocene Climate Optimum (MCO) and the subsequent Miocene Climate Transition (MCT) to evaluate changes of seasonality patterns.

MCO shells exhibit highly regular seasonal rhythms of warm-wet and dry-cool seasons. Optimal conditions resulted in extraordinary growth rates. Estuarine waters during the MCO in Central Europe display a seasonal temperature range of c. 9-10°C. Absolute water temperatures have ranged from 17-19°C during cool seasons and up to 28°C in warm seasons. Already during the early phase of the MCO, the growth rates are declining. Still, a very regular and well expressed seasonality is dominating, but extreme climate events did occur. The seasonal temperature range is still c. 9°C but the cool season temperature is slightly lower

(16°C) and the warm season water temperature does not exceed c. 25°C. At 12.5-12.0 Ma. The seasonality pattern is breaking down and is replaced by successions of dry years with irregular precipitation events. The amplitude of seasonal temperature range is decreasing to 5-8°C. No clear cooling trend can be postulated for that time as the winter season water temperatures range from in Central Europe instead of a simple temperature decline scenario.

Hydrochemistry and isotope composition of spring waters in Aydincik, Mersin (Turkey)

Hatipoglu-Bagci Z.

Department of Geological Engineering, University of Mersin, Ciftlikkoy, 33343 Mezitli Mersin Turkey, zubeyde@mersin.edu.tr

The increasing population, agricultural areas and summer houses increase water demands in Aydincik area and Soğuksu Spring is the major source for providing drinking, domestic and irrigation water needs in Aydıncık and its vicinity. However a detailed hydrogeological investigation has not been done up to the present. In order to establish a sustainable water management plan it is required to characterize hydrogeologic structure and to determine of the conceptual hydrogeologic model. For this purpose hydrochemistry, stable isotopes (^{18}O, ^{2}H), and tritium isotope (^{3}H) were used for assessing groundwater recharge sources, flow paths, and residence times of Soguksu Spring and other small springs in Aydincik area. The study area is situated between 33˚25'N and 33˚37'N latitudes and 36˚12'E and 36˚26'E longitudes in Aydıncık district of the Mersin Province and it covers approximately 120 km^2. This area comprises a rough hillside area that is bounded by the Mediterranean Sea to the south and the Taurus Mountains to the north. Rough structure is formed depending on both tectonic features and rock type. The topographic elevation changes from 0 m to 1000 m. This area has a complicated tectonic structure and geological units deposited during the Infra-Cambrian (Precambrian) to recent. These units includes calcshist, cloritshist, limestone and metaconglomerate, quarzite, dolomitic limestone, shale basal conglomerate and sandstone. Average discharge of Soguksu Spring is 1.8 m^3/s between 1999 and 2009. Its max discharge is reached 13.5 m^3/s in 2007 and minimum discharge is 0.1 m^3/s in 2006. Other small springs also supply water needs in rural areas. The occurrence of groundwater is mainly associated with fracture and joint systems in this area. Due to major joints associated with the Alpin Orogeny, the formations of the area have been fractured, making these formations good aquifers as a result of secondary permeability. Hydrochemical evaluations on this study are based on field and laboratory data collected from 11 springs from May 2009 to March 2010 in four periods. According to in-situ measurements spring waters temperature, pH and specific electrical conductivity are found to range between 12.7-19.8º C, 6.16-7.27 and 331-829 mS/cm, respectively. These field parameters of the samples show a narrow change interval in four periods. Low temperature and specific electrical conductivity reveal that groundwater water–rock interactions at limited level. The groundwater compositions fall into two groups based on the major cation and anion. These are: Ca-HCO_3, which is prevalent in most of the spring waters, and Ca-Mg-HCO_3. The formation of these groups is basically a consequence of the dissolution of carbonate and dolomite minerals. Oxygen-18, deuterium and tritium analyses are performed for May 2009 samples. The stable isotope compositions for this period range between –5.73 and –7.02 ‰ V-SMOW for oxygen-18 and between –27.92 and –34.90 ‰ V-SMOW for deuterium. The stable isotopes show the predominance of low elevation precipitation. Tritium concentrations between 2.87 and 4.25 TU suggest recent recharge. Local recharge indicates potential groundwater susceptibility to surface contamination. However, only one sample has greater nitrate concentration than EPA Drinking Water Limits and maximum level of nitrate is 16 mg/l.