wetter short-term episodes are inferred at the onset and the end of Early Holocene (MU2: 9.0 to 7.5 ka BP). Cyclical fluvial sandy sequences culminated by paleosols indicative of wetter conditions were identified along Middle Holocene (MU3: 4.9 to 3.3 ka BP). During Late Holocene (MU4: 1.7 to 0.8 ka BP) another increase in aridity is deduced from the deposition of silty sequences. Extreme hydrological events have played an important role during the LIA (MU5: 0.4-0.2 ka BP), triggering arroyo incision and subsequent alluvial infilling. During historical times the influence of human action on vegetation cover must also be considered. The paleoenvironmental reconstruction derived from the infilled alluvial sequences match well with the regional available information derived from others natural archives, particularly lacustrine and speleothem records.

PREFERRED ORIENTATIONS OF TUNNEL VALLEYS IN DENMARK

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Geophysical mapping in Denmark has resulted in delineation of a large number of buried tunnel valleys. The total length of mapped valleys is at the moment more than 3.500 km. The tunnel valleys are arranged in separate generations showing preferred orientations. An analysis of these orientations reveals varying preferred orientations within geographically confined areas. Typically, each subarea shows one dominant and one to two sub-dominant orientations. More than one generation of tunnel valleys often show identical preferred orientations indicating that recurrent erosion of older valley traces has taken place.
The preferred orientations of the tunnel valleys have been compared with orientations of 1) valley erosions in the modern landscape and 2) large scale faults in the pre-Zechstein basement. Generally we find a close correlation between buried tunnel valleys and the orientations of valley erosions in the modern landscape but we also find correlations between the orientations of buried tunnel valleys and the orientations of deep seated faults in the basement. The presentation will focus on the analyses of the valley orientations and discuss the possible causes of the orientations of the valley generations. It is for instance suggested, that the correlation between the orientations of tunnel valleys and the deep seated faults has its roots in structural weaknesses within the sedimentary succession. Deformation of the sediments within fault zones may have altered the hydraulic properties of the sedimentary strata and thereby influenced the subglacial erosion patterns.

QUATERNARY INTERGLACIALS IN BELARUS, LITHUANIA AND NORTH-EAST POLAND ACCORDING TO FRESHWATER MALACOFAUNA

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In Poland archaic freshwater fauna with two Pliocene species *Parafossarulus crassitesta* (Brömme) and *Fagotia wuesti* Meijer is characteristic for Augustovian Interglacial, corresponding with Bavelian package in West Europe and Korchevian Interglacial in Belarus. These two species became extinct in the area at the end of Augustovian period. Ponto-Caspian species were also broadly abundant in mollusc fauna of Augustovian Interglacial in North-East Poland. This enables to guess that, where Baltic Sea is situated today, a former river system, belonging to the Black sea basin, might have existed.
Freshwater malacofauna of the region most features of the modern fauna from the beginning of Belovezhian or Cromerian Interglacials. Extinct species becomes more and more rare. Distinction of different interglacials is determined in great part by immigrated species. A subtropical immigrant *Corbicula fluminalis* (Müller) appears in Holstainian time only once in Pleistocene in Belarus territory. Siberian species *Valvata sibirica* Middendorf also appears only once and occupied the territory of modern Lithuania in Pleistocene. Only in optimum of Eemian Interglacial Atlantic mollusc *Belgrandia marginata*(Michaud) penetrated into Poland, Lithuania and Belarus from the West. *Dreissena polymorpha* (Pallas) has a special history. This species has been common for all Pre-Dnepr basin in Eemian Interglacial and for the second time at the beginning of Holocene. Broad expansion of this species has been noticed in historical times (almost all of the Europe and North America). Concerning the species ecology and peculiarities of its expansion we presume that *Dreisena* has penetrated into periphery of its initial area of inhabitancy with the human activity, including Neanderthal.

QUATERNARY COASTAL CAVE DEPOSITS: EUSTATIC VARIATIONS AND CLIMATE CHANGES IN BUE MARINO CAVE (CENTRAL-EAST SARDINIA, ITALY)

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The coastal karst areas are easily modified by minor eustatic oscillations, and thus by climate changes. These variations have been recorded in the marine and continental sedimentary succession in coastal caves. These natural palaeoclimate and paleogeographic archives are here preserved, due to the long-lasting, stable, low-energy environment.
Large deposits of marine and continental sediments in Bue Marino cave (Central East Sardinia - Italy) that show clear evidence of past sea level still stands (lithophaga holes, tidal notches) have been studied. These deposits are constituted of a series of clastic sediments (medium-coarse grained bioclastic-rich sands) interlayered within calcite speleothems (levels of flowstone).
They have been examined in terms of sedimentological mechanisms by stratigraphic analysis and dated through radiometric techniques (U-Th and OSL dating). Sedimentological analyses have allowed to define the palaeoenvironments related to sea level changes occurred in the last 200 ky along the eastern Sardinian coast. In terms of isotopic stratigraphy (MIS), results from luminescence dating of clastic grains and from U/Th dating of speleothems have underlined that the sedimentary succession is comprised between OIS9 and 5, including the interglacial stages OIS5e and OIS5a.
The study conducted in Bue Marino cave has shown a good correlation between data derived from sedimentary observations and speleothems and sandstone dating. They both highlight that during the interglacial isotope stage OIS5 relative high stands occurred and that climate was generally warmer than present. On the other hand, the sandstones interlayered in between the flowstone levels were carried into the system during relative sea level fall and low stands related to colder stages.

RECENT THERMOKARST LAKE DYNAMICS IN SUBARCTIC PEAT PLATEAUS

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Peat plateaus are widespread at high northern latitudes and are important soil organic carbon reservoirs. A warming climate can cause either increased ground subsidence (thermokarst) resulting in lake formation or increased drainage as the permafrost thaws. A better understanding of spatio-temporal variations in these landforms in relation to climate change is important for predicting the future thawing permafrost carbon feedback. In this study, dynamics in thermokarst lake extent during the last 35-50 years has been quantified through remote sensing time series analysis of aerial photographs and high resolution satellite images (IKONOS/QuickBird) in three peat plateau complexes spread out across the northern circumpolar region along a climatic and permafrost gradient. From the mid 1970s until the mid 2000s there has been an increase in mean annual air temperature, winter precipitation and ground temperature in all three study areas. The two peat plateaus located in the southern continuous and the discontinuous permafrost zones, where mean annual air temperatures are below -5°C and ground temperatures are -2°C or colder, have experienced small changes in thermokarst lake extent. In the peat plateau located in the sporadic permafrost zone where the mean annual air temperature is around -3°C, and the ground temperature is close to 0°C, extensive lake drainage (~8% per decade) and infilling with fen vegetation has taken place and many new thermokarst lakes have formed. In a future progressively warmer and wetter climate permafrost degradation can cause significant impacts on