

A detailed photograph of fossilized plant material embedded in a light-colored, textured rock matrix. The fossils include a thick, dark, vertically oriented stem on the left side, and several fan-shaped, radiating structures, likely fossilized leaves or spores, scattered across the right and upper portions of the image. The overall appearance is that of a well-preserved botanical specimen from a geological formation.

ABSTRACT BOOK

9th European
Palaeobotany - Palynology
Conference

26-31 August 2014

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Holocene environmental changes in the Kashubian Lake District (N. Poland) – a multi-proxy record from annually laminated lake sediments

TALK IN SESSION S36

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The sediments of Lake Suminko, with partly preserved annual lamination, were investigated by means of palaeoenvironmental methods: pollen, NPPs, diatom and geochemical analyses. The original chronology of the sediments was developed by using thirteen ¹⁴C AMS dates, radiometric measurements of ¹³⁷Cs activity, counting varves in some fragments of the profile and an age/depth modeling. The important advantage of this lake as an object for palaeoecological study is its location at the periphery of immediate settlement activity during most of the Holocene what is a rare case in central-east Europe. Very limited human impact on the lake ecosystem during most of the Holocene allowed us to follow (1) the natural processes in the lake's evolution and (2) to define climatic events according to changes in sediment geochemistry, the dynamics of *Tetraëdron minimum*, and tree PARs. The main stages in the lake's evolution indicate: (1) eutrophic conditions in the final stage of the Late glacial; (2) very low trophy and strongly changeable water level in the early Holocene; (3) slowly rising trophy through the mid- and late Holocene enabling persistence of the oligotrophic state of the lake up to ca AD 1450; (4) strong cultural eutrophication of the lake in the recent period (c. 150 years); (5) the highest Ca content in the early Holocene and then its gradual decline to minimum values in recent time. Distinct, concurrent changes in limnological proxies and tree PARs suggest occurrences of several cooler periods. Higher precipitation of Fe and Mn indicates more intensive weathering of the

catchment, while peaks in Fe/Mn suggest at least seasonal anoxia which could result from longer duration of ice-cover. Strong depressions in *T. minimum* and declines in tree PARs illustrate limitation of physiological processes in plants which could result from different factors, but first of all shorter growing season, lower summer temperatures and insolation. Our results seem to display striking conformity of the main cooling events with the "Bond's cycles", but also indicate more variable pattern what may reflect traces of more complex cyclicity of climatic shifts.

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Study of environmental contamination, fires and landscape dynamics during the Holocene in a mountain region of south-western Europe. A comparison between Cantabria and Catalonia

TALK IN SESSION S33

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The integrated study of fire (sedimentary charcoals) and contamination (heavy metals pollution and Pb isotopic signatures) shows clearly the human impact in the landscape dynamics. Fire regimes were reconstructed from sedimentary charcoal preserved in peat bog deposits, focusing the attention on fire intensity and fire frequency. The main purpose of this study is to find out the indications of human activities and their consequent environmental changes in two mountain regions. The comparison

has been made between two cores extracted from *Sphagnum* peat bogs. One of them is located in the Cantabrian range (Molina, 534 m a.s.l.) and the other one is placed in the catalan Pyrenees (Bassa Nera, 1890 m a.s.l.). They have been characterized on the basis of sedimentary characteristics and the organic content has been measured by loss-on-ignition (LOI). The study of sedimentary charcoal (<150 microns) has provided valuable records of fire history and the results indicate different fire regimes for both zones. The results show an almost continuous sequence of fires for the studied periods, not always linked to human activities. There is a significant increase of fires from the Neolithic times and the maximum values are achieved during the last three millennia. After medieval period, fire activity was similar to other mountain records, with low-intensity fires in order to maintain the open spaces. On the other hand, the analysis of chemical elements related to environmental impact (As, Cu, Ba, S, Cd, Zn, Sr, Cr, Ti, Al, Fe, Ni, Mn and Pb) have also been determined in both regions and the results show also a diverse environmental contamination history. It has been evidenced that fluctuations in some elements content and Pb isotopic composition were probably related to either natural inputs or human impacts (burning and clearance of forest for agriculture, and mining and smelting of Pb ore) during the Holocene. In addition to this human action during this period it is clear that climate change is also reflected in the vegetation patterns.

Pennsylvanian (mid-Bolsovian–Cantabrian; Moscovian) biostratigraphy and vegetation change in the Bristol Coalfield, UK

TALK IN SESSION S14

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The Bristol Coalfield of southwest Britain, although intensively studied in the early history of palaeobotany (1820s to 1940s), has received little attention for 75 years. Here we present the results of a multidisciplinary re-investigation the Warwickshire Group of this neglected coalfield; which comprises, from base to top, the Winterbourne, Pennant Sandstone and Grovesend formations. This

integrated study considers both palaeobotanical (permineralisations, adpressions and sandstone-casts) and palynological (miospore and megaspore) data sets in a facies context, allowing recognition of a diverse patchwork of plant communities closely related to a variety of depositional settings, including: coastal plain, alluvial plain, peat mire, clastic swamp, riparian communities and interfluvial/hinterland areas. The Bolsovian–Cantabrian Warwickshire Group allows us to track vegetation changes in these tropical Euramerican forests over this critical period of pan-equatorial floral turnover; when humid Westphalian lycopsid-dominated mires contracted and were replaced by drier substrate habitats dominated by tree ferns and ferns in the Cantabrian. The causes of this turnover probably relate to substrates drying out due to tectonic uplift, which possibly also coincided with a period of global climate change. Palynomorph relative abundance data indicates that the demise of the lycopsid-dominated mires may have been gradual; starting in the mid-Bolsovian, ~3 million years before the Asturian–Cantabrian boundary. Pronounced cyclicity in palyno-assemblages are identifiable in clastic environments, which likely reflect changes in vegetation driven by fluctuations in moisture levels related to pulses of uplift in front of the rising Central Pangaeian Mountains to the south. Based on an investigation of all available data, we also develop a new system of biostratigraphical zonation for the Bristol Coalfield. The palaeobotanical biozonation identifies a stratigraphical gap encompassing the early to mid-Asturian, occurring between the mid- to late Bolsovian Pennant Sandstone (*Laveineopteris rarinervis* Subzone) and the late Asturian Grovesend formations (*Dicksonites plukenetii* Subzone). This tectonic-induced stratigraphical gap most likely relates to the Leonian Phase of the Variscan uplift and can be correlated with contemporaneous hiatuses in the South Wales and other European coalfields. However, palynological biozonation indicates the presence of Asturian aged rocks at the top of the Pennant Sandstone Formation; slightly diminishing the duration of this stratigraphical gap.