

transient climate-model simulations of temperature and moisture (precipitation minus evaporation), which are driven in turn by orbital, ice-sheet and greenhouse-gas forcing. During the past 2000 years, global biomass burning declined from a maximum at 2 ka to a minimum at ~250 cal yr BP. The minimum in burning is coincident with the Little Ice Age and with human population reductions in the Americas. The global decline in fire, however, is not supported by similar reductions in burning across all geographic areas; Southeast Asia and Australia, for example, show increased burning during the past 2000 years. Likewise, an increase in global biomass burning from ~250 to 100 cal yr BP, and a decline from 100 cal yr BP to present, primarily reflects patterns of burning in the northern rather than the southern hemisphere. Much work remains to understand fire-climate linkages in the Earth system, particularly with regard to pyrogenic emission of trace gases and aerosol precursors that influence atmospheric chemistry, physics, and radiative balance, the feedback through CO₂ emission to the global carbon cycle, and the role of disturbance in governing terrestrial ecosystems.

Holocene Reveals Reconstructions of Vegetation Cover Along N-S and W-E Transects in North and Central Europe for Evaluation of a Dynamic Vegetation Model – The Swedish LANDCLIM Project

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It is well established that changes in land surface properties may influence biogeochemical and biophysical exchanges with the atmosphere and, therefore, climate. Moreover, it has been suggested that changes in land-cover might have more significant effects on the climate at the regional spatial scale. To better understand land cover-climate feedbacks at the regional spatial scale and on long time scales, there is a need to evaluate regional climate models and the description of the vegetation/land-cover in these models using proxy records of past vegetation and climate change. Dynamic vegetation models (DVG) are often used to provide land-cover data for climate modeling. For instance, a regional climate model (RCA3, SMHI, Rossby Centre, Norrköping) was coupled to the DVG LPJ-Guess (Smith et al. 2010, Tellus 63A). In the Swedish LANDCLIM project (Gaillard et al., 2010, Clim. Past 6), the performance of LPJ-Guess in the past will be evaluated by comparison with reconstructions of past vegetation cover using Holocene pollen records and the REVEALS model (Sugita, 2007, Holocene 17). This comparison will be performed for the entire surface of the study area (NW Europe and W Europe N of the Alps) and five selected time windows, and for the entire Holocene at 20 target sites along N-S and W-E transects. We present in the poster the complete Holocene (last 11500 cal. yrs BP) REVEALS reconstructions at the 20 target sites. REVEALS estimates of plant cover were calculated for 25 plant taxa, 10 plant functional types (PFTs) (for comparison with the LPJ Guess outputs) and 3 land-cover types (LCTs) (for input in RCA3). We also discuss the effect of human activities on Holocene vegetation composition and cover in the study area.

Reconstructing Recent Sea-Level Change in the Mira Estuary, SW Portugal, Using Salt-Marsh Sediments

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Regional sea-level processes and movements in the recent past need to be quantified before we can translate global predictions, such as those in the latest IPCC assessment, into useful local values. Despite the location of two of the longest tide-gauge records from Europe, Cascais and Lagos, on the Portuguese coast recent sea-level movement in this region is poorly constrained. The analysis of salt-marsh sediments and the use of foraminiferal transfer functions can be used to redress this situation. We present here a comprehensive analysis of sub-surface salt-marsh sediments from the Mira estuary (SW Portugal) and a new foraminiferal transfer function for sea-level on this coast. Cores, monoliths and modern surface samples were obtained from Xisto marsh on the southern bank of the Mira estuary. The sub-surface sediments were described and sampled for foraminiferal analyse, ²¹⁰Pb, ¹³⁷Cs and AMS ¹⁴C dating, bulk density

and geochemistry. A foraminifera training set, with vertical stepping between samples typically less than 5 cm was created from four surface transects. A new transfer function for sea-level has been developed, and is providing encouraging results with bootstrapped errors smaller than ±10 cm. An initial reconstruction from one core using an integrated chronology indicates an high-marsh environment maintaining equilibrium with rising sea-level for the last 300 years. Work is on-going to extend and refine this record.

Exceptional Iridium Concentrations Found at the Allerød-Younger Dryas Transition in Sediments from Bodmin Moor in Southwest England

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Elevated iridium values, dated to start of the Younger Dryas cooling event, have been found in sediments deposited at a number of Late Glacial sites in North America and one in Europe. It has been proposed (e.g., Firestone et al., 2007, PNAS 104: 16016-16021) that this widespread iridium enrichment signal is the result of an explosive disintegration of a large extraterrestrial object over North America around 12,900 cal. yr BP, and it is contended that it was this event which instigated the Younger Dryas cooling. This scenario is controversial, and the 'ET' explanation of these geochemical signals is not universally accepted. This notwithstanding, we report here the finding of an iridium anomaly in the Allerød-Younger Dryas boundary sediments at Hawks Tor in the southwest of England. The concentration of iridium and other elements is determined in peat monoliths using ICP-MS, operated in collision-cell mode, and ICP-OES instruments. We find an increase of over 300 % in the iridium concentration measured in the bulk sediment immediately above the Younger Dryas boundary compared with the values found below the transition. The iridium-titanium ratio is used to confirm a lag between the start of the iridium enrichment and the timing of abrupt environmental disruption at the site signalled by decreases in the organic carbon content, and changes the concentrations of potassium, iron and manganese. These geochemical changes coincide with a shift from a humified peat to a minerogenic lithology. By using a new calibration of existing ¹⁴C ages, integrated with new AMS dates and optically stimulated luminescence ages, we show that the timing of this iridium enrichment found in southwest England is in agreement with the dates proposed for the iridium enrichment signals previously found in North America and Belgium.

Correlation of Loess Sequences in Southeastern Transdanubia Based on Field Observations, Well-Log Interpretations and Laboratory Investigations (Hungary)

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More than 100 exploration wells, drilled in connection with different geological mapping projects of the Geological Institute of Hungary during the last two decades, crossed Quaternary sediments (mainly loess). The different Quaternary sections were documented with similar methods in detail. During this project we analyzed and correlated thousands of layers of these cover sediments.

The heart of work was the correlation of the A1, A2, B, C1, C2, D and E geophysical units, which were determined during the analysis of the documented field units and geophysical measurements (mainly resistivity and magnetic susceptibility). We compared the data of the two methods during the evaluation and refined the correlation of the Quaternary units and horizons on grounds of the results of laboratory and paleontological investigations. This geological "system of co-ordinates" based on a combined database makes the refinement of the stratigraphical division, the geological evolution history and the global correlation of the Pleistocene terrestrial deposits in the region possible.

This study summarizes the main units of the correlated Quaternary formations, the field variability of the facies and the correlation possibilities. Furthermore, it looks for mathematical connections among the results of wireline-logs and laboratory measurements.