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Inverse modeling of biomes and $\delta^{13}C$ to reconstruct the Grande Pile Eemian record: Characterization of an instable climate interval

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A new method to reconstruct past climatic conditions from pollen and isotopic data is applied to new counts from a new core, GP21, in the Grande Pile area. The climatic conditions reconstructed concerns the 130 to 100 kyr interval, which includes the Eemian lato sensu. To do so, we applied the Biome4 vegetation model in inverse mode to both pollen counts and $\delta^{13}C$ values. The method considers the $\delta^{13}C$, measured in parallel to the pollen samples, as another constraint for the model. First the biomes and the $\delta^{13}C$ simulated by the model are compared with the biome allocation, yielded after the biomisation of the pollen data, and the measured $\delta^{13}C$ considered after a determined degradation effect on the preserved organic matter $\delta^{13}C$. This procedure allowed us the reconstruction of the mean annual temperature and precipitation and of the warmest and coldest months mean temperatures. We show that during the Eemian itself, the precipitation indicates similar values to the modern ones with no particular variation, contrary to the cold stadials and the penultimate glaciation characterized by very low values. Conversely the temperature estimates indicate different pattern. Indeed several oscillations are identified during the studied interval. The peak interglacial values are reached early at about 125–124 kyr, but two other warm intervals are identified afterwards. The variations of the temperature estimates seem related to sea surface oscillations occurring in the North Atlantic region and support the reconstruction of Northern Hemisphere ice-sheets building timing. Furthermore seasonality variations are also identified through the comparison of the warmest and coldest month temperatures, which indicate a different pattern during the studied interval.

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The QUAVIDA synergy: Quaternary fire, vegetation and climate change in Australasia

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QUAVIDA is a new project which aims to understand the interactions among vegetation structure and function, climate and fire regimes during the Late Quaternary. The project targets Australasia as a critical area in the development of a global picture of environmental change. Australasia has experienced major wet/dry, temperature and atmospheric CO_2 fluctuations in the past; human arrival and occupation have also had a substantial environmental influence. Much of the vegetation within the region is fire-prone (and fire-adapted), with fire management long and widely practised. We need to understand the natural climate variability, disentangle the role of humans in past changes and investigate how plant types, vegetation and fire regimes will respond to future climate changes. QUAVIDA will do this by using state-of-the-art earth system models in hypothesis-testing mode, running simulations for specific times in the past but with different model components operative and using different scenarios of external and internal forcing. In order to evaluate and interpret these simulations, comprehensive data sets describing palaeoenvironmental conditions at key times in the past will be required. Thus, the first major focus of activity within QUAVIDA has been the creation of a comprehensive database of palaeoenvironmental information from Australasia, covering the last 70,000 years. The database contains radiometrically-dated pollen, phytolith, plant macrofossil, stickrat midden, carbon isotope and charcoal records. Interrogation of this database will yield benchmark reconstructions of vegetation patterns and fire regimes for the evaluation of the model simulations. Using more than one source of palaeoenvironmental information allows differences in the temporal and spatial scale of different kinds of observations to be taken into account in making reconstructions. It also allows for the fact that different sources record different aspects of climate and/or environmental changes. This presentation will introduce QUAVIDA, the methods and preliminary results of the palaeo-data synthesis, and discuss the project's contribution to the international earth-modelling community.

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The Australasian Pollen and Spore Atlas: A new online relational database

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The Australasian Pollen and Spore Atlas enables online accessibility to the largest collection of pollen and spores information in the Australasian region that is currently located at the Australian National University. This is a searchable database that is accessible over the web and suitable for professional as well as the technical novice involved in pollen and spore identification. Novel approaches to the federation of other smaller existing pollen and spores databases will result in an ever expanding and freely available resource. The information made available will increase research capacity across the region through a reduction in duplication and enhanced accessibility to key knowledge available in the Australasian Pollen and Spore Atlas. Key features of the database are illustrated on the poster and an online demonstration will be available during the conference.

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Late Holocene ecosystem variability and anthropogenic activities in the Savanna biome of Southern Kenya

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Palaeoecological records from dry environs are relatively rare due to poor accumulation of sediments. Pollen and charcoal analysis are presented from Namelok Swamp southern Kenya to reveal anthropogenic activities and climate variability over the last 2250 yr BP. One of the main changes is a shift to open woodland dominated by Acacia and grasses that appears to be a result of increased fire intensity in the savanna biome. This transition may be linked to desire for new pasture and to control animal diseases. An increase in Poaceae reflects a period