

Sample age is being determined through association with dated emu eggshells (via amino acid racemization) and/or AMS  $^{14}\text{C}$  analysis of wombat tooth enamel carbonate. Most of our samples derive from the post-extinction interval (45–10 ka), which suggests a high degree of inter-annual variation in the amount of seasonal C4 vegetation and hence monsoon intensity in this region throughout the late Pleistocene. Furthermore, these data suggest there was no significant reduction in the amount of seasonal C4 biomass in the Darling Lakes region after the extinction interval.

#### 0085

##### Tracing ancient cultural practices around lake Malawi from ancient Lake level fluctuations: Need for further research

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Past studies by Crossely (1982) among others from the Iron age to recent have shown that Lake Malawi levels have been fluctuating between high and low levels over time. These lake level changes resulted in the inhabitants shifting outwards or towards the lake as shown by unique artifacts at ancient settlements around the lake. Currently, the earliest site at Nkope Bay has been dated back to the 3rd century AD. From the artifacts at the site, this was associated with a very high lake Malawi levels while Mawudzu site dated between mid-12th to 18th Century is associated with low lake levels. There is however a need to extend the available record by detailed radiometric dating. This paper is a synopsis aimed at highlighting possible research areas that can further extend our understanding of human history around the lake up to the pre-iron age using ancient lake level changes.

#### 1354

##### Amino acid racemisation evidence for a last interglacial age shoreline at Kingscote, Kangaroo Island, South Australia

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Amino acid racemisation (AAR) age determinations of disarticulated *Katylisia* sp valves ( $n = 9$ , mean valine D/L = .287, CV = 9.1%, total hydrolysable amino acids) from a 0.2–1 metre thick stranded shoreline, existing within the low-lying Kingscote coastline, points to a last interglacial age. This unit is prominent due to the ubiquitous presence of Wisanger basalt derived pebbles, cobbles and boulders, and a rich faunal assemblage which includes the bivalved mollusc *Katylisia* sp. the megascopic foram *Marginopora* and numerous *Batillaria* sp.. This was laid down on a heterogeneous assemblage of Tertiary Kingscote Limestone, Permian glacial till, Triassic fluvial channel bodies, and weathered Wisanger Basalt, and on the northeastern Kingscote coast protected through burial under Permian till. Previously, this unit was recognised as two dissimilar coastal deposits – (1) the Kingscote pebble beach (geological monument) outcropping between the yacht club and coastal swimming pool and described as of last interglacial age and a Glanville Formation equivalent, based on biostratigraphy, and (2) a Holocene imbricated flattened basalt cobble unit visible in road cuttings near the Bluff on the northern Kingscote coast, which was depicted as a St Kilda Formation equivalent, also based on biostratigraphy. This study was initiated because of the uncertainty of the 'Holocene' age and stratigraphical relationship of the stranded deposits near the Bluff to the 'Kingscote pebble beach', and to similar faunal elements within a core (SV#5) currently being investigated from cen-

tral Gulf St. Vincent, and which are of 30–45,000 years in age. The extent of the raised shoreline in Kingscote was mapped using GIS based Mobile Mappers, supported by laboratory AAR D/L, faunal, thin section and taphonomic analyses. AAR D/L evidence from disarticulated valves of *Katylisia* sp. ( $n = 9$ ), *Annapella cycladea* ( $n = 3$ ), and *Paphia* sp. ( $n = 1$ ), suggest that all sections of this raised shoreline are of the same age – while the mean valine D/L of 0.287 for *Katylisia* sp. is in accord with previous data for the last interglacial maximum from the South Australian region. A recovered coral provides support for an enhanced Leeuwin current influence, while the general 2 – 3 metre APSL height of the shoreline is similar to that of the Eyre Peninsula, and suggests this area was relatively stable when compared to Normannville, Fleurieu Peninsula since the Late Pleistocene.

#### 0954

##### Deconvolving semi-arid landscape histories: insights from cosmogenic nuclides

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The use of cosmogenic isotopes for geological studies has increased significantly over the past decade. This talk will review several straightforward applications that demonstrate the power of cosmogenic nuclides to elicit the processes (and their rates) that modify arid and semi-arid landscapes. Specifically, we use five sites in the American southwest to demonstrate that we can now begin to address long-standing models of landscape evolution in drylands.

In order to understand landscape-scale processes, the large variance indicative of processes operating at small spatial-scales must be addressed. Thus, an important aspect of landscape-scale investigations requires amalgamation of sediment by nature's mixing process, stream channels, or by a geologist mixing sediment collected from geomorphically similar units. Either way, sediment mixing averages thousands of unique grain histories and allows us to determine average landscape-scale behavior. For example, at the Chemehuevi Mountain piedmont, we used the nuclide concentrations measured in sediment from different geomorphic sources to model millennial-scale erosion rates and the piedmont's sediment budget. By comparing nuclide concentration of the sediment sources to that of channel sediment sampled at km intervals down-piedmont, we infer that the difference results from the exposure during transport. Thus, the excess nuclide concentration (divided by the production rate) estimates sediment transport speeds, which are centimeters to meters per year for the Chemehuevi Mountain piedmont. A similar increase in nuclide concentration down the Iron, Granite, and East Range Road piedmonts, suggests sediment transport speeds of dm per year for these active surfaces dominated by shallow channels with unconsolidated banks. Lastly, nuclide concentrations measured in ~2m deep vertical soil pit exposures, dug into 6 piedmont surfaces of different ages, allows us to quantify deposition rates and determine the timing and duration of past and present surface stabilities. Compilation of these data suggests wide-spread Stage IV deposition, followed by equivocal deposition and surface stability histories, which may relate to lag-times caused by the distance from the sediment sources. A change from surface stability or slow deposition to wide-spread sediment transport occurred on the active portions of all studied piedmonts at the Pleistocene-Holocene transition. Thus, there may be a change in piedmont behavior in Mojave Desert that correlates to climate change. Without cosmogenic nuclide analysis, it would be difficult, if not impossible to identify such changes. Given the wide ar-

ray of techniques using cosmogenic nuclides, we can now address long-standing models of landscape change in arid and semi-arid regions.

### 1380

#### **Environmental change in the coastal wetlands near Adelaide, Australia**

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The coastal wetlands located near metropolitan Adelaide are comprised almost exclusively of the Grey Mangrove (*Avicennia marina*). This native vegetation is a natural resource that has numerous suggested functions, including coastal buffering, mitigation of terrestrially derived nutrient runoff, fish nursery habitat and also ecotourism. The coastal wetlands that are the focus of this study exist primarily within two aquatic reserves. As such, it is important to understand how this coastal environment once existed so as to provide a reference for assessing its current condition. In the relatively calm marine environment provided by the Grey Mangrove, sediments are trapped amongst the roots and pneumatophores. Within these sediments, a number of proxies exist, by which past environmental conditions may be reconstructed. These proxies include microfossils, such as diatoms and forams, macrofossils, such as pollen and seeds, but also relatively indistinguishable fractions of the soil matrix generally referred to as OM (organic matter). The ultimate question being asked within the larger context of this palaeoecological study is, “What impact has European settlement had on the coastal environment near Adelaide?” The research presented here will focus on the palaeoecological utility of OM, found in mangrove sediments, toward answering this question. Sediment samples were collected and analysed from among twenty-three modern sites and three sediment cores. In addition, plant samples representing the types of organic matter typically found in the study region (e.g. samphire OM, mangrove OM, seagrass OM, macroalgal OM), were collected from the same modern sites. An analysis of <sup>13</sup>C and <sup>15</sup>N isotopes was performed, as organic matter sources may be differentiated based upon recognisable isotopic signatures (e.g. marine vs. terrestrial plant origins). <sup>13</sup>C-NMR spectroscopy was then used to supplement the stable isotope analysis, providing an additional means of differentiating carbon types and their sources. In order to make inferences about post-European impacts upon the study region, a modern chronology was obtained. <sup>210</sup>Pb profiling of the sediment cores was performed in combination with an analysis of exotic *Pinus* pollen occurrences. This study describes the environmental changes that have occurred in Adelaide’s coastal wetlands since European settlement and the level of impact that may be attributable to anthropogenic influence.

### 1134

#### **What is the fidelity of ocean archives for recording terrestrial Quaternary hydroclimatic change? Insights & new chronologies from the NE Sahara**

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Offshore records suggest that the ~15 ka cal BP onset and the ~5.5 ka cal BP termination of the “African Humid Period” was a rapid response to gradual insolation forcing. Although there is general agreement that an enhanced Afro-Asian monsoon profoundly affected the water bal-

ance of the continental landmass, it is evident that the delivery and tempo varied by location. How well do the ocean core records coincide with “dry” periods of enhanced aeolian activity as recorded on land? Is there a synchronicity between the oceanic and terrestrial realms as interpreted from various proxy records for palaeoenvironmental and geoarchaeological change in the northeastern Sahara? A synthesis of available floral, faunal, and cultural records for the onset of wet conditions in Egypt and Sudan includes 500+ published radiocarbon and OSL dates from cultural contexts and various fluvio-lacustrine and Aeolian stratigraphies. At its wettest “monsoonal maximum” ~10 – 6 ka cal BP, the interior of North Africa was a marginal drought-prone environment, barely sustaining human activities and a meager steppe-shrub desert flora/fauna with some Sudano-Sahelian elements. Recurrent dry phases are associated with abandonment, deflation, and sedimentation of Aeolian sand. The complexities in this highly continental terrestrial record reflect ascendant global, oceanic, and atmospheric changes, as well as other local feedback mechanisms that cannot be gleaned from the ocean archives. Abrupt hydroclimatic changes influenced resource availability across NE Sahara, and fostered technological innovation and adaptation, as well as the development of complex culture in Desert Peoples – one that displays linkages with the emerging Pharonic civilization in the Nile Valley ~5 ka cal BP.

### 1151

#### **Pollen-based quantitative reconstruction of Danish cultural landscapes**

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The aim of this study is to calibrate and evaluate models for reconstructing the vegetation composition of past cultural landscapes from pollen spectra.

Recent studies have shown that it is possible to achieve quantitative reconstructions of the abundance of different plant groups, such as trees, grass, heather and cereals, from their proportions in pollen assemblages from sediments of small lakes in Denmark, using models of pollen dispersal and deposition.

One of the most important parameters for reconstruction is the pollen productivity of different plants. Previous estimates of pollen productivity for cereals, which is essential for reconstructing the extent of arable land, have treated them as one species, but here a new set of estimates for different cereal types and other crops are presented, based on a calibration dataset of AD 1800 pollen assemblages and historical plant abundance.

In this project, a new model, called REVEALS, is used to reconstruct regional plant abundance from pollen assemblages from large lakes. Results from present and AD 1800 are compared to modern and historical land cover maps. Such estimates of past regional plant abundance can be used in the Landscape Reconstruction Algorithm to separate background and local pollen signals at small sites, thus providing accurate reconstructions of local vegetation.

#### **Taphonomic Perspectives from Middle-Late Pleistocene Xujiayao, China**

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At what point in time Plio-Pleistocene hominins became dominant members of the carnivore guild is a question critical for addressing