Of droughts and flooding rains

The development of a palaeoflood record for the Murray-Darling Basin

Author: Dr Elyssa De Carli | edcarli@uow.edu.au
School of Earth, Atmospheric and Life Sciences (SEALS),
The Univeristy of Wollongong

In February 2020 the Murray PALaeo Research Group (Murray PALs) headed down the River Murray in South Australia to explore the region's geomorphic legacy. The PALs consisted of Dr Elyssa De Carli, Dr Sam Marx, Professor Anthony Dosseto and student David Barnott-Clement from the University of Wollongong, and Dr Jan-Hendrik May from The University of Melbourne, bringing together expertise in Quaternary environments, geomorphology, sedimentology, palaeoclimatology and isotope geochemistry.

Murray PALs from left to right: De Carli, Marx, Barnott-Clement, Dosseto, May

Dedicated scientists vibracoring in a billabong

Whaker techniques on a floodplain

The aim of the trip was to core billabongs and floodplains between Mannum and Murray Bridge in South Australia in order to investigate various aspects of the Murray's Holocene geomorphic legacy. The trip was supported by the GeoQuEST Research Centre at the University of Wollongong and through a mixture of vibracore and whacker techniques 14 sediment cores were acquired, representing approximately 37 metres of sediment. These cores capture the sedimentary sequence of the Holocene Coonambidgal Formation, characterised by a clay and silt rich laminated sequence that reflects sediments sourced from the Darling and Murray River sub-catchments. Investigation of this laminated sequence will not only shed light on the geomorphic evolution of the River Murray during the Holocene, but primarily contribute to the development of a multi-millennial palaeoflood record for the Murray-Darling Basin (MDB).

Vibracoring in more favourable conditions on a floodplain

The MDB covers 14% of Australia's landmass and drains climatically and geologically distinct regions of eastern Australia, with rainfall and streamflow in different parts of the Basin driven by separate climate systems. The behaviour of these climate systems, and their role in driving flood and drought extremes in eastern Australia is not well understood, as the short instrumental record (~120 years in total) captures only a small window of Australia's natural flood/drought variability. Currently there are very few long-term palaeorecords capable of inferring streamflow and climatic variability for the MDB, and existing reconstructions rely on indirect indicators of rainfall from sites located outside of the Basin area. These records however imply that the short instrumental record does not capture the full range of flood and drought variability and suggest that significantly longer and more frequent wet and dry periods have been experienced in eastern Australia before records were kept. As such, the development of palaeorecords that capture the long-term variability of floods and droughts affecting the MDB and eastern Australia are crucial. Investigation of the laminated sedimentary sequence within these cores, with continued support from the GeoQuEST Research Centre, will shed light on the long-term nature *of droughts and flooding rains*, informing water security and management of MDB resources, especially under projected climate change.

Laminated muds of the Coonambidgal Formation depicting light grey flood layers from the Darling River sub-basin interbedded within darker grey layers from the Murray River sub-basin