

A DETAILED PROXY RAINFALL RECORD FROM LAKE BROADWATER, DALBY, SOUTHEAST QUEENSLAND

Andrew COTTRILL¹, Joachim RIBBE¹, Martine MARON².

Andrew.Cottrill@usq.edu.au

¹University of Southern Queensland, Toowoomba, Australia, ²University of Queensland, Brisbane, Australia.

Lake Broadwater is located in southeast Queensland and the upper reaches of the Murray-Darling Basin and was selected to develop a detailed proxy rainfall record and palaeoenvironmental history for this region. Lake sediments from 0-171 cm were collected and returned to USQ for geological logging, grain size and geochemical analyses as well as lead (²¹⁰Pb) and carbon (¹⁴C) dating.

The lake sediments consist mostly of fine dark grey silts and clays with small amounts of fine sands, which increase towards the surface. Detailed particle size analysis (0.05-880µm diameter) using laser diffraction was used to determine grain size distributions. A bimodal population of very fine clays/silts and fine sands occur in most samples, with sand becoming more abundant from 38 cm towards the surface. Multi-element geochemistry using ICP/AES and CNS analyser was completed to determine Fe, Mn, Al, Na, K, Ca, Mg, Sr, Cu, Zn, Pb, C, N and S values. Organic, carbonate and silicate matter percentages were derived from LOI. Elevated C, Ca, Sr, N, Cu and Zn values were identified in the top 1 cm. Ba, Na, Al, Mg, Mn and Fe increase from the surface down the profile whilst siliciclastic % increases. Lead (²¹⁰Pb) dating was attempted but was unsuccessful. Carbon (¹⁴C) dating of the humic acid fraction gave a maximum age of 9470 years (+/-100 years) at 170-171 cm, which is close to the Pleistocene-Holocene boundary. This indicates an average rate of sedimentation of ~0.22 mm per year.

Lake Broadwater is a mature, eutrophic lake that has had a relatively stable recent past making it ideal for developing a palaeoenvironmental history of the region. Two significant changes in sedimentation occur at 38 cm (~3240 yr B.P) and 16 cm (~2190 yr B.P) indicating a change to drier conditions and the onset of stronger ENSO variability.