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Paleolimnological records of Holocene carbon cycling: a late-glacial – Holocene record from Boswell Lake, British Columbia

Richard Jones, Phillip Owens, and Katrina Caley
University of Exeter, UK, r.t.jones@exeter.ac.uk

Paleolimnology offers well-established approaches for reconstructing past environmental change in terrestrial settings. Lake sediments can be analysed at a high temporal resolution (sub-annual to multi-millennial) to provide high quality, high-resolution datasets that represent a unique record of how the landscape has evolved in response to changing relationship between climate, anthropogenic activity and natural environmental processes. One key research area that lake-sediments has failed to make a signi[U+FB01]cant contribution to is carbon cycle studies, primarily due to the dif[U+FB01]culties in discriminating between the different carbon sources preserved in the lake sediment at any given time. However, the reconstruction of the Holocene Carbon cycle is one of the foremost open question requiring research to improve our understanding of the atmosphere-terrestrial ecosystem interaction.

In this study, preliminary results from Boswell Lake, a small hard water system in the boreal forests of central in British Columbia, Canada, are presented. The sediment record has been analysed using a range of geovhemical, sedimentological and biological analytical techniques to provide a high-resolution record of carbon cycling over the Late-glacial and Holocene. Signi[U+FB01]cant changes in carbon [U+FB02]ux to the lake are recorded and linked to changing climatic conditions and anthropogenic land use / land cover changes. The preliminary results from Boswell clearly show that since the end of the last ice age, anthropogenic activity is the dominant driver of change in the terrestrial carbon cycle. During the pre-European time during the Holocene, only small changes in the largely inorganic C-deposition occurred. This indicates that the regional C-cycle in boreal forests is relatively stable within the range of natural Holocene climatic variability. Since the middle of the 19th century, increased [U+FB01]re frequency and logging has led to greater rates of autochtonous organic C depostion. This shift towards the deposition of organic material is probably caused by the release of nutrients from decaying biomass, leading to a eutri[U+FB01]cation of the lake.

The signi[U+FB01]cance of this sink in the regional carbon cycle is yet unclear. Overall, the paleolimnological analysis of the Boswell Lake sediments indicate that regional C-cycles have experienced signi[U+FB01]cant changes during the Holocene, with greatest differences at the late-glacial-Holocene and Holocene-Anthropocene boundary.