



Using lake sediment archives to evaluate late Holocene flood history

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The sediment trapping efficiency offered by lakes should allow their sediments to reflect changes in discharge; however studies linking lake records with changing catchment hydrology are rare (e.g. Foster et al., 2003; 2008). Research examining sediments from the last 500 years from Loch of the Lowes (Tweed catchment) reveal variations in sediment properties that have been related to variations in transport capacity (flow regime). Small lakes with moderately sized catchments and limited capacity for upstream sediment storage appear to produce a strong coupling between the catchment and the lake, which appears essential for the system to record a flood stratigraphy. In northwest England and southwest Scotland land-use related woodland clearances have rendered upland landscapes susceptible to erosion. These conditions have produced lake sediment records for the last 4-2000 years dominated by catchment soils and sediments. Careful separation of grain size, geochemical and environmental magnetic parameters can identify suites of signals that reflect variations in both (1) supply and (2) the capacity of the system to transport materials to the lake. The capacity parameters (e.g. sand, HIRM and HIRM/XLF) broadly reflect changes in discharge, can be interpreted in terms of flood frequency. Preliminary data for the Loch of the Lowes basin in the central Southern Uplands of Scotland show a strong correlation with the North Atlantic Oscillation. There the capacity-related lake proxies appear to identify phases of increased flooding ~AD 1625–1650, 1680–1700, 1730–1760, 1800–1815, 1850–1880, 1910–1930, 1960–1970 and possibly the 1990s. Good correspondence between the sediment 'flood' archive and historical records of flooding in Scotland suggests that lake-catchment systems of this type have the potential to yield valuable information on past hydrological response. These issues are developed in relation to other lakes in northwest England.