The Laboratory of Tree-Ring Research

presents a talk by

Mark Macklin

(University of Aberstwyth)

Scrambled or Poached? Modelling and Environmental Signals in Alluvial Systems

Wednesday, December 10, 2014 - 4:00pm to 5:00pm
Room: Harshbarger 206

Recent numerical and physical modelling has claimed that environmental signals are entirely 'shredded' or 'scrambled' during fluvial sediment transfer processes, but landform and associated sedimentary records worldwide suggest otherwise. One probable reason for this apparent discrepancy is that many catchments contain depositional 'niches' , such as cutoffs, flood basins and identifiable deposits from single large events (e.g. slackwater sediments and boulder berms), whose long term morphological evolution and associated alluvial records are not accurately reproduced by present modelling studies. These models transfer sediment from cell-to-cell, whereas in reality step lengths during a flood event, and the creation of an environmental record, can vary by several orders of magnitude between coarse and fine-grained material. Where modelling has confirmed field observation of alluvial records is in the variable responses of contiguous catchments to the same external forcing and the differential processing of environmental signals in different parts of a catchment, including alluvial fans and channel pattern change. In this paper I review how meta-analysis of fluvial landform and sedimentary sequences worldwide is enabling the collation and interpretation of multiple depositional niches and the reconstruction of environmental signals over a growing range of space and timescales. I suggest a re-engagement of modellers with these recent advances in the actuality of the dated fluvial sedimentary and flood event records is required. With the development and application of increasingly high resolution dating and global Earth Observation techniques, one promising research avenue would be the exploration of data mining procedures to identify new patterns and environmental signals from the systematic analysis of large landform and sedimentary data sets.

The University of Arizona