Long-term continental scale reconstruction of soil erosion based on lake sediment archives and RUSLE model

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Increases in soil erosion around the world cause soil degradation and compromise freshwater ecosystem services. However, global patterns of soil erosion and fluvial sediment transfer attributable to anthropogenic activities are poorly understood (c.f. PAGES-GloSS*). Lake sediments can record the rates at which matter is transported from watersheds to inland sediment basins. In addition, sediment records provide a highly informative perspective on how allochthonous loading is affected by hydrometerological and land surface characteristics over long-term time scales. Here, we reconstruct centennial to millennial changes in sediment fluxes (bulk and mineral fractions) from 371 lakes sediment archives distributed across six continents using both modeling (Revised Universal Soil Loss Equation - RUSLE) and empirical data analyses (^{14}C, sediment density, and elemental analysis of lacustrine sediment cores). Cores archived at the National Lacustrine Core Facility (LacCore, USA) were analysed at INRS, Canada, using tomodensitometry (computed tomography/CT scans) and micro-X-rady fluorescence (XRF). Our work will identify hotspots of changes in soil erosion during the Anthropocene and quantify the long-term storage of terrestrial matter in lake sediments, in order to identify key environmental drivers of these processes.

*PAGES-GloSS: Past Global Change – Global Soil and Sediment transfers in the Anthropocene