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FALLOUT RADIONUCLIDES IN SOIL PROFILES AND HISTORY OF LAND USE IN YUNNAN PROVINCE, CHINA

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Between 1950 and 1980, many areas of southwest China were widely deforested but sediment yield data show no significant variation over that time, posing the question: Did land use changes accelerate erosion? We aim to understand how land use history affects erosional processes by using $^{210}Pb_{ex}$ and ^{137}Cs to unravel possible land use histories and comparing the activities of end-member soil profiles with downstream detrital samples.

Soil profiles were sampled from three tributary basins to the Mekong River with areas ranging from 198 to 2508 km^2 and mean annual precipitation from 869 to 1299 mm/yr. Land use in the basins encompasses forest, agricultural land, and grassland. We collected seven soil profile samples (five in one basin, one in each of the others) in 5 cm increments to 30 cm depth, and took samples of active channel sediment downstream of these pits. We then compared the activities of fallout radionuclides in the sediment to the soil profile samples to determine what proportion of active channel sediment is sourced from areas represented by the soil pit sample sites.

The soil profiles demonstrate a wide range in radioisotope concentrations with depth and between sites (surficial measurements of $^{210}Pb_{ex}$ ranges from 45-152 Bq/kg and ^{137}Cs ranges from 7-339 Bq/kg). Several profiles demonstrate differing rates in the decay of radionuclide concentrations with depth, suggesting a change in erosion rates. Other profiles demonstrate a complete absence of $^{210}Pb_{ex}$ and ^{137}Cs below 10-20cm, indicating extensive erosion.

The connection in radioisotope concentrations between detrital samples and upstream soil pits is less well constrained. Preliminary results show a potential dilution effect in radionuclide concentrations in detrital samples moving downstream from source sites. At one sample site, ^{137}Cs and $^{210}Pb_{ex}$ activities are much lower in detrital samples than in the soil pits, going from 152 to 7 Bq/kg and 223 to 4 Bq/kg, respectively. This dilution effect appears to be amplified in detrital Cs measurements, to the extent that the majority of Cs readings fell below detection limits. Ultimately, our ability to correlate detrital samples with end member sources may be limited by complexities in sediment transport in fluvial systems.

Session No. 204--Booth# 10

T9. Developing Proxies for Human Impact on Soil and Sediment Mass Transfer throughout the Holocene (Posters)
Tuesday, 3 November 2015: 9:00 AM-6:30 PM

Exhibit Hall (Baltimore Convention Center)

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