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UNDERSTANDING SEDIMENT SOURCING AND EROSION CONTROLS FROM ^{10}BE MEASUREMENTS IN FLUVIAL SEDIMENTS FROM YUNNAN, CHINA

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Widespread deforestation in southwestern China from the 1960s to 1990s is thought to have increased short-term erosion rates, but sediment yield data do not reflect this erosion. We use in situ ^{10}Be to test if humans have affected denudation by comparing long term erosion rates derived from in situ ^{10}Be concentration and modern sediment yield data from daily Chinese data for 22 watersheds in Yunnan. We found that in 16 watersheds, modern sediment yield averaged 2-3X higher than long-term erosion, in 4 watersheds, they are similar, and in 2, modern sediment yield is 2X lower than long-term erosion. Sediment is likely stored in terraces and toe-slope features or the sediment record does not include stochastic events for these watersheds.

We also examined the relationship between erosion rates and topography for 39 watersheds ranging in area from 21 to 289028 km^2, with mean basin slope from 10 to 20° and mean annual rainfall from 511 to 1349 mm. We found a statistically significant, positive relationship between erosion rates and both area (R^2 = 0.653, $p < 0.0001$) and mean basin slope (R^2 = 0.324, p = 0.0003). We found a significant, negative relationship between erosion and rainfall (R^2 = 0.564, $p < 0.0001$).

We tested two assumptions for using in situ ^{10}Be to quantify background erosion rates: 1) erosion is constant over different integration times and 2) sediment sourcing is steady, although not necessarily uniform, throughout the watershed. To test the first assumption, we re-sampled sites previously sampled in 2005 and 2013 (n=28). We find that in most sites, 2014 samples (n=15) had lower isotopic concentrations than the 2005 and 2013 samples. To test the second assumption, we sampled sediment from the active channel and overbank deposits at 32 locations, measuring meteoric and insitu ^{10}Be. In channel material is transported during the dry season; overbank during the monsoon. Comparing the isotopic concentration of each paired sample, we found no significant difference in insitu (Z = -1.081, p = 0.280) nor meteoric ^{10}Be (Z = -1.861, p = 0.63). Thus, there is no seasonal bias in sediment sourcing, and isotopic concentration.

Session No. 82

T9. Developing Proxies for Human Impact on Soil and Sediment Mass Transfer throughout the Holocene
Monday, 2 November 2015: 8:00 AM-12:00 PM

Room 318 (Baltimore Convention Center)

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