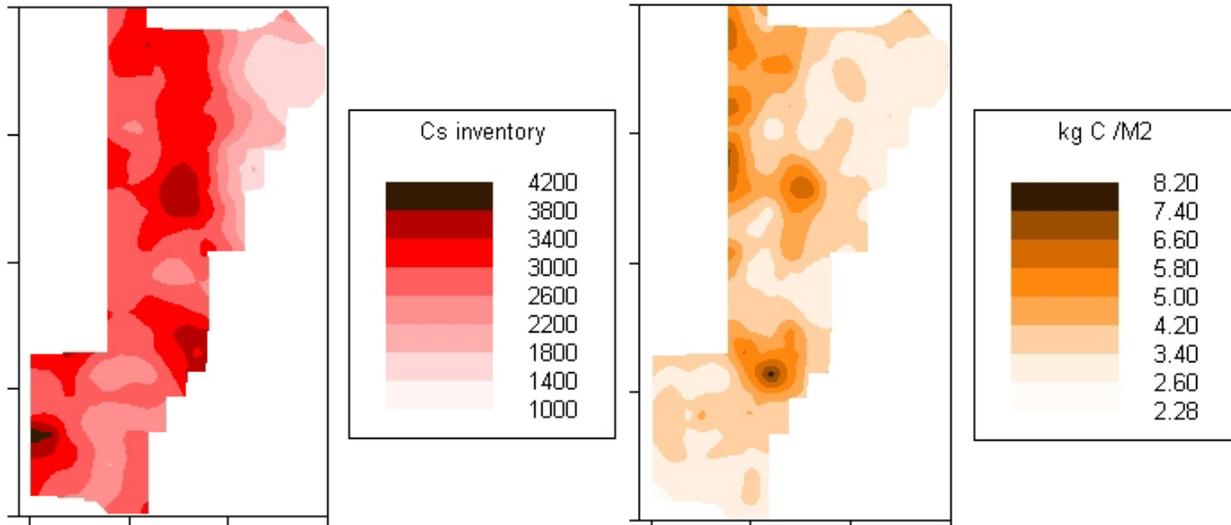


Redistribution of Soil Carbon

Scientific, political, and social interests have developed recently in the concept of using agricultural soils to sequester carbon. Studies supporting this concept indicate that soil erosion and subsequent redeposition of eroded soils in the same field may establish an ecosystem disequilibrium that promotes the buildup of carbon on agricultural landscapes. The problem is to determine the patterns of soil erosion and



redistribution on the landscape and to relate these to soil carbon patterns. Radioactive $^{137}\text{Cesium}$ was used to estimate soil erosion and soil carbon patterns on the OPE³ watershed. Profiles of soils from an upland area and soils in an adjacent riparian system were collected in 5 cm increments and the concentrations of ^{137}Cs and carbon were determined. ^{137}Cs (Fig. 1) and carbon (Fig. 2) were uniformly mixed in the upper 15-20 cm of upland soils. ^{137}Cs (Bq g^{-1}) and carbon (%) in the upland soils were significantly correlated ($r^2=0.66$). Carbon content of the 0-20 cm layer was higher ($1.4 \pm 0.3\%$) in areas of soil deposition than carbon content ($1.1 \pm 0.3\%$) in areas of soil erosion as determined by the ^{137}Cs technique. These data suggest that measurements of ^{137}Cs in the soils can be useful for understanding carbon distribution patterns in surface soil. Carbon content of the upland soils ranged from 0.5 to 1.9 % with an average of $1.2 \pm 0.4\%$ in the 0-20 cm layer while carbon below this upper tilled layer (20-30 cm) ranged from 0.2 to 1.5 % with an average of $0.5 \pm 0.3\%$. Total carbon was 2.66 kg m^{-2} and 3.20 kg m^{-2} in the upper 20 cm and upper 30 cm of the upland soils, respectively. Carbon content of the 0-20 cm layer in the riparian system ranged from 1.1 to 67.0 % with an average $11.7 \pm 17.1\%$. Carbon content below 20 cm ranged from 1.8 to 79.3 % with an average of $18.3 \pm 17.5\%$. Total carbon in the upper 20 cm of the riparian profile was 10.1 kg m^{-2} and 15.0 kg m^{-2} in the upper 30 cm of the riparian profiles. This is an increase of total carbon by a factor of 3.8 and 4.7 for the upper 20 cm and upper 30 cm of the riparian profiles, respectively, when compared to the upland soil profiles.

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Link to Publications: