

Paper Number: 2631

Effect of soil erosion on soil organic carbon in the Wuyuer River Basin, China

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Soil erosion is important interactional process between the soil carbon sink and the ocean or lake carbon sink. There is a lot of research on the influence of erosion on the soil carbon pool but very little research related to the variation of soil organic carbon pool and erosion flux on the scale of a river basin. The drainage area of the Wuyuer River, the second biggest interior river of China, is about 2.3×10^4 km². The area of water loss and soil erosion, about 45.7% of the total river basin, is typical for research on the influence of erosion on soil carbon pool. In this study, samples were systematically collected from topsoil, soil vertical profile and sediment vertical profile. Based on the systemic analysis of organic carbon content, N content, ¹³⁷Cs and ²¹⁰Pb, we estimated the variation of the soil organic carbon density over 30 years.

The results of this study indicate that the soil organic carbon density decreases at the upstream area of the Wuyuer River basin and increases in the downstream area, such as Zhalong wetland, and area on both sides of the river. The variation of the soil organic carbon density relates to erosion and re-deposition of soil in the river basin. Organic carbon storage loss from soil erosion over 30 years is about 68.9Tg ~90.9Tg. According to the deposition rate and average content of organic carbon in the washland, wetland and reservoir, we estimated that the total organic carbon storage deposited in the river basin during 30 years was about 52.9 Tg. The difference between the organic carbon storage loss from soil erosion and total organic carbon storage deposited in the river basin during 30 years is 16.0 Tg ~48.0Tg, indicating that the Wuyuer River basin is the area of carbon source.

