



Soil erosion and its impacts on the production and emission of greenhouse gases in the North American Great Plains

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Soil erosion by wind, water and tillage results in the redistribution of vast quantities of soil the within landscapes of the North American Great Plains. The magnitude of this redistribution is greatest in landscapes that are topographically complex and intensively tilled. Eroded soil either remains within the cultivated area of the landscape (the field) or it is transported to the field boundary or beyond to adjacent lands and waters. Soil that is rich in organic carbon and nitrogen is lost from the upper slopes of hills and accumulates in lower slopes. In many landscapes, as soil is lost from hill-tops, subsoil that is poor in organic carbon and rich in inorganic carbon is exposed at the surface. In landscapes that are or have been intensively tilled, these losses and accumulations of soil can exceed 100 cm in depth. As a consequence of tillage and the resulting soil erosion, the distribution of materials that are required to produce greenhouse gases (CO_2 and N_2O) has been dramatically altered – some source materials are buried while others may be exposed. This paper examines the potential impacts of soil erosion on the production and emission of these gases and on the sequestration of carbon. These impacts are demonstrated to have the potential to be very significant and require better understanding to accurately access greenhouse gas dynamics.