# Influence of landscape processes on the preservation of soil organic matter in hydric soils

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Rates of formation and turnover of soil organic matter (SOM) are modulated by conditions and processes at landscape scales. Landscape gradients in soil properties are commonly affected by spatial interactions among geologic substrates, climatic and geomorphic settings, ecologic relationships, hydrologic flow, and transport of solutes and particles. Landscape features often dominate effects of soil disturbance such as drainage of wetlands and erosion of hillslopes caused by human land use. While landscape variations in soil properties and disturbance are often associated with variations in SOM quantity and quality, landscape effects on SOM preservation are difficult to assess due to the diversity of processes and the scale of interactions that must be considered.

Hydric soils are a prominent example of the importance of landscape processes in controlling soil properties and susceptibility to disturbance. Occurrences of hydric soils require landscape constraints that enhance water saturation, flooding, and ponding. These conditions are associated with the preservation of high levels of SOM, which make hydric soils very attractive for agriculture when they can be drained and tilled. Areas of disturbed hydric soils may represent previous environments in which SOM preservation was significantly higher before the influence of human activities. At the same time, historically high rates of tillage-induced erosion may have been associated with enhanced rates of SOM formation and downslope preservation by burial.

Defined features of hydric soils persist over extensive areas of the conterminous United States (CONUS) long after their hydric formation conditions have been altered by historical changes in land and water management. To assess the various relationships among these changing landscape conditions and SOM preservation, we integrate CONUS geospatial datasets representing SOM and other properties of hydric soils, topography, hydrography, and historical trends in land use and vegetation. Using probabilistic representations of the datasets and their relationships, we infer a range of significant effects on SOM preservation that depend on landscape settings and on the relative importance of dynamic processes and disturbances operating at landscape scales.