

## Impacts of temperature variations on soil organic carbon and respiration at soil erosion and deposition areas

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### Abstract

Soil organic carbon (SOC) is a critical indicator of soil fertility. Its importance in maintaining ecological balance has received widespread attention. However, global temperatures have risen by 0.8°C since the late 1800s due to human-induced greenhouse gas emissions, resulting in severe disruptions in SOC dynamics. To study the impacts of temperature variations on SOC and soil respiration, we used the Soil Carbon and Landscape co-Evolution (SCALE) model, which was capable of estimating the spatial distribution of soil carbon dynamics. The study site was located at Heshan Farm (125°20' 10.5" E, 49°00' 23.1" N), Nenjiang County in Heilongjiang Province, Northeast China. We validated the model using observed soil organic carbon and soil respiration in 2015 and achieved excellent agreement between observed and modeled variables. Our results showed considerable influences of temperature increases on SOC and soil respiration rates at both erosion and deposition areas. In particular, changes in SOC and soil respiration at the deposition area were greater than at the erosion area. Our study highlights that the impacts of temperature elevations are considerably dependent on soil erosion and deposition processes. Thus, it is important to implement effective soil conservation strategies to maintain soil fertility under global warming.

**Keywords :** Soil Organic Carbon, Erosion, Deposition, Soil Respiration

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