

Contrast patterns of microbial residues accumulation and contribution to SOC from tropical to boreal forests in eastern China

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Microbial residues are important to soil organic carbon (SOC) formation and subsequent sequestration. However, distribution and controls of soil microbial residues in forests at large scales remain unclear. In this study, we investigated concentration of soil amino sugars, a biomarker of microbial residues, from tropical to boreal forest of six sites in eastern China to evaluate contributions of microbial residues to SOC accumulation. Our results pronounced amino sugars concentration increased significantly from tropical to boreal forest. Structural equation modeling and correlations showed that climate and soil nutrient may drive this patterns. With increasing latitude and decreasing temperature and rainfall, soil nutrient and microbial biomass increased, leading to higher amino sugars concentrations, especially in boreal forest. Glucosamine/muramic acid ratios increased with increasing latitude, indicating fungal residues contribution to SOC in temperate forest relatively more than in tropical forest, in contrast to bacterial residues. However, the contribution of microbial residue-carbon to SOC decreased significantly from tropical to boreal forest. This inverse trend with amino sugars concentration revealed that non-microbial residues (mainly from plant) contributed more SOC in boreal forest, while, interestingly, microbial residues contributed more SOC in tropical forest, which may be related with high heterotrophic respiration rate drive by temperature. Our results suggested that contrast pattern of microbial residues accumulation and contribution to SOC in forest may be related to climate and soil nutrients at large scale.