Global Change Biology：土壤有机碳随氮添加的长期放大反应（转）

Global Change Biology

PRIMARY RESEARCH ARTICLE | Full Access

Long-term, amplified responses of soil organic carbon to nitrogen addition worldwide

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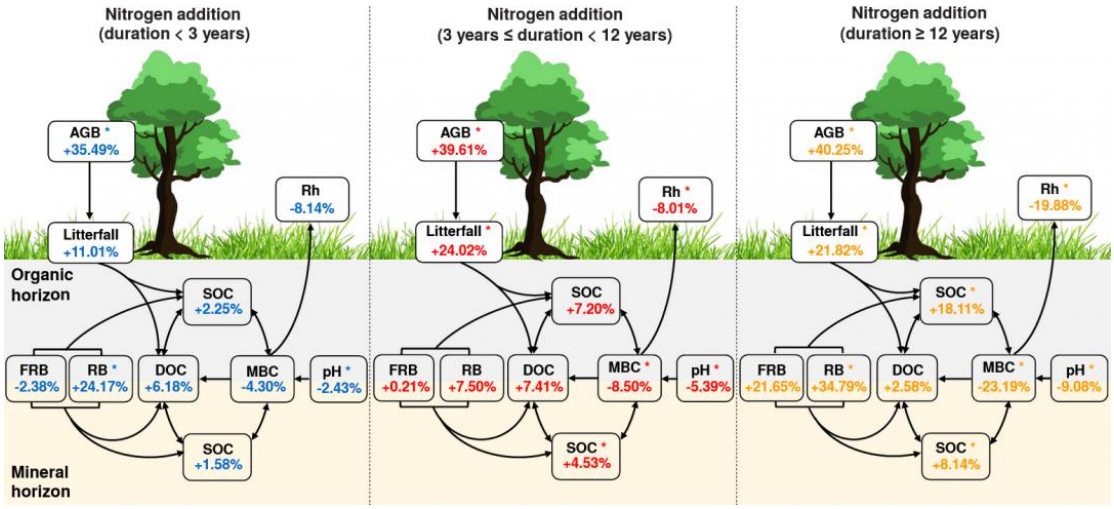
南京林业大学生物与环境学院徐侠教授团队分析了全球 369 个试验地点 60 年间的大型数据集，以探索土壤有机碳随氮添加的长期放大反应。相关成果发表于 Global Change Biology（IF=8.555）。

Abstract

Soil organic carbon (SOC) is the largest carbon sink in terrestrial ecosystems and plays a critical role in mitigating climate change. Increasing reactive nitrogen (N) in ecosystems caused by anthropogenic N input substantially affects SOC dynamics. However, uncertainties remain concerning the effects of N addition on SOC in both organic and mineral soil layers over time at the global scale. Here, we analyzed a large empirical data set spanning 60 years across 369 sites worldwide to explore the temporal dynamics of SOC to N addition. We found that N addition significantly increased SOC across the globe by 4.2% (2.7–5.8%). SOC increases were amplified from short- to long-term N addition durations in both organic and mineral soil layers. The positive effects of N addition on SOC were independent of ecosystem types, mean annual temperature and precipitation. Our findings suggest that SOC increases largely resulted from the enhanced plant C input to soils coupled with reduced C loss from decomposition and amplification was associated with reduced microbial biomass and respiration under long-term N addition. Our study suggests that N addition will enhance SOC sequestration over time and contribute to future climate change mitigation.



土壤有机碳（SOC）是陆地生态系统最大的碳汇，对减缓气候变化具有重要作用。人为氮输入导致生态系统活性氮（N）增加，显著影响土壤有机碳动态。然而，在全球范围内，氮添加对土壤有机层和矿质层中有机碳的影响仍存在不确定性。为此，本文分析了全球 369 个试验地点 60 年间的大型数据集，以探索土壤有机碳随氮添加的时间动态。结果表明，施氮显著提高了土壤有机碳水平，增幅为 4.2%（2.7%-5.8%）。在短期和长期施氮过程中，土壤有机层和矿质层有机碳的增幅都变大了。氮添加对土壤有机碳的正向影响不受生态系统类型、年平均气温和降水的影响。本研究结果表明，在长期添加氮的情况下，土壤有机碳的增加主要是由于植物碳输入的增加，以及分解和放大过程中碳损失的减少，这与微生物生物量和呼吸作用的减少有关。研究结果表明，随着时间的推移，氮的添加将增强有机碳的封存，有助于减缓未来气候变化。

原文链接：https://mp.weixin.qq.com/s/XFmohJSoG2NMMcBJMgzpUA