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Trimethylamine from Subtropical Forests Rival Total Farmland Emissions in China

Yunhua Chang*, Yu-Ning Feng, Lin Cheng, Jianlin Hu, Liang Zhu, Wen Tan, Haobin Zhong, Yi Zhang, Ru-Jin Huang, and Yele Sun

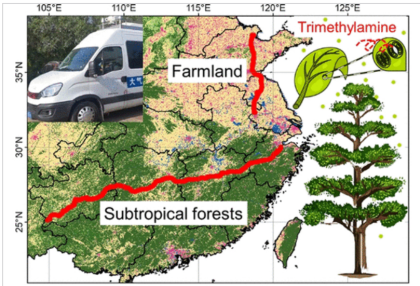
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Abstract

Many types of living plants release gaseous trimethylamine (TMA), making it a potentially important contributor to new particle formation (NPF) in remote areas. However, a panoramic view of the importance of forest biogenic TMA at the regional scale is lacking. Here, we pioneered nationwide mobile measurements of TMA across a transect of contiguous farmland in eastern China and a transect of subtropical forests in southern China. In contrast to the farmland route, TMA concentrations measured during the subtropical forest route correlated significantly with isoprene, suggesting potential TMA emissions from leaves. Our high time-resolved concentrations obtained from a weak photo-oxidizing atmosphere reflected freshly emitted TMA, indicating the highest emission intensity from irrigated dryland (set as the baseline of 10), followed by paddy field (7.1), subtropical evergreen forests (5.9), and subtropical broadleaf and mixed forests (4.3). Extrapolating their proportions roughly to China, subtropical forests alone, which constitute half of the total forest area, account for nearly 70% of the TMA emissions from the nation's total farmland. Our estimates, despite the uncertainties, take the first step toward large-scale assessment of forest biogenic amines, highlighting the need for observational and modeling studies to consider this hitherto overlooked source of TMA.



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Subjects

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