

iFAST: The International Forum on Advanced Environmental Sciences and Technology

A series of distinguished seminars by eminent scientists

8 a.m. CDT, 9 a.m. EDT, Wednesday, Oct. 14, 2026

1 p.m. GMT, 9 p.m. China, Wednesday, Oct. 14, 2026



HANQIN TIAN
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www.bc.edu/content/bc-web/schools/morrissey/departments/eesc/people/faculty-directory/hanqin-tian.html

Hanqin Tian is Institute Professor at Boston College, where he directs the Center for Earth System Science and Global Sustainability and the Boston Office of the Global Carbon Project. Previously, he was the Solon and Martha Dixon Endowed Professor at Auburn University. His research has helped transform Earth system biogeochemistry from carbon-centric assessments toward an integrated understanding of coupled carbon–nitrogen cycles and multiple greenhouse gas budgets. Tian and his team pioneered the Dynamic Land Ecosystem Model, the first terrestrial biosphere model to simultaneously simulate CO₂, CH₄, and N₂O within an Earth system framework. His landmark 2016 *Nature* study provided the first comprehensive global assessment of these three greenhouse gas budgets together, challenging the carbon-centric view of land as a net climate cooler and helping catalyze the transition toward full greenhouse gas budgets. Tian leads the international Nitrogen Model Intercomparison Project and Global Nitrous Oxide Budget Assessment, contributing to IPCC and UNEP assessments. A Clarivate Highly Cited Researcher, he has authored over 500 publications, including more than 50 in *Nature*, *Science*, *PNAS* and their portfolio journals. He is a Fellow of AGU, ESA, and AAAS, and he is an Andrew Carnegie Fellow. His honors include the 2025 AGU Bert Bolin Global Environmental Change Award and the 2026 Humboldt Research Award, one of Germany's most prestigious international research honors recognizing lifetime academic achievements.

Redefining the Climate Role of the Terrestrial Biosphere: From Carbon Sink to Greenhouse Gas Balance

Abstract The terrestrial biosphere has long been viewed as a natural climate regulator because ecosystems remove substantial CO₂ from the atmosphere. But carbon balance is not climate balance. Terrestrial ecosystems simultaneously exchange CO₂, CH₄ and N₂O, which differ greatly in their sources, lifetimes and climate effects. Reducing one greenhouse gas does not necessarily mean reducing net warming, because benefits may be offset by changes in others. This seminar traces the evolution from carbon-centric assessments toward full greenhouse gas budgets, reflecting growing recognition of the interactions, trade-offs and combined climate effects of CO₂, CH₄, and N₂O. Drawing on process-based modeling, observations, model intercomparison and global synthesis, I will examine how climate variability and human activities reshape these greenhouse gas fluxes, with particular attention to the changing global N₂O budget and extension from land to inland waters. This evolution represents a conceptual shift in how the scientific community defines and evaluates the climate role of the terrestrial biosphere, providing a more complete basis for assessing net climate effects and mitigation opportunities.



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