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Department of Atmospheric Sciences Seminar Announcement

Department of Atmospheric Sciences, S.O.E.S.T., University of Hawai'i at Mānoa
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The terrestrial biosphere contributes to current climate warming: an unexpected role resulting from anthropogenic perturbation

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You are invited to our weekly online Atmospheric Sciences Fall 2021 seminars via Zoom meeting.
When: October 13, 2021 at 3:30PM HST
Meeting admission: 3:15PM HST

Register in advance for this meeting:

<https://hawaii.zoom.us/meeting/register/tJwlcOmtpz8iGtFAfj1LmB2t-J89CV76hI1s>

After registering, you will receive a confirmation email containing information about joining the meeting.
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Abstract:

The terrestrial biosphere can release or absorb the greenhouse gases, carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), and therefore has an important role in regulating atmospheric composition and climate. Recent assessment (IPCC AR6) indicated that the land biosphere plays a major nature contribution to climate stability by removing around one third of anthropogenic CO₂ emissions from the atmosphere each year. However, anthropogenic perturbation of the land biosphere has altered the carbon and nitrogen cycles, and the resulting increases in the emissions of non-CO₂ greenhouse gases (CH₄ and N₂O) in particular can contribute to climate change. By considering all three major GHGs (CO₂, CH₄ and N₂O) together, our study shows that the cumulative warming capacity of concurrent biogenic CH₄ and N₂O is a factor of about two larger than the cooling effect resulting from the global land carbon dioxide uptake in the 2000s. Land-use intensification using today's practices to meet food and energy demands increases anthropogenic GHG emissions, which is not consistent with stabilizing the climate at low temperature scenarios. However, the adoption of climate-smart land use practices to enhance carbon storage as well as reduce non-CO₂ GHG emissions from human-impacted land ecosystems could reverse the biosphere's current warming role. Therefore, how we manage the global lands needs to become a central part in our strategy to mitigate climate change.

Key References for the Talk:

Tian, H. et al. (2020) [A comprehensive quantification of global nitrous oxide sources and sinks](https://doi.org/10.1038/s41586-020-2780-0), *Nature* 586, 248-256. <https://doi.org/10.1038/s41586-020-2780-0>

Tian, H., et al. (2016) [The terrestrial biosphere as a net source of greenhouse gases to the atmosphere](https://doi.org/10.1038/nature16946), *Nature* 531, 225–228, <https://doi.org/10.1038/nature16946>

Bio:

Dr. Hanqin Tian is Solon & Martha Dixon Professor, Director of International Center for Climate and Global Change Research, and Leader for interdisciplinary cluster of CHESS (Climate, Human and Earth System Sciences) at Auburn University. His primary research interest focuses on the predictive understanding of biosphere's roles in global biogeochemical cycles and the Earth's climate. His research has resulted in over 300 peer-reviewed journal papers including over 25 papers in *Nature/Science/PNAS* and their sister journals with a citation of 30K and H-index of 83. His pioneering work on the global carbon and nitrogen cycles and greenhouse gas emissions is at the leading edge of the field. He has served on Scientific Steering Committee of the Global Carbon Project (GCP), Co-Chair of the international consortium of GCP-INI (International Nitrogen Initiative) for global nitrous oxide assessment, the APLU's Board of Oceans, Atmosphere, and Climate. Dr. Tian is an Andrew Carnegie Fellow (Brainy Awardee) and elected Fellow of AAAS and AGU.