



ATOC COLLOQUIUM

Welcome!

Please join us for the next ATOC Colloquium on **Friday, Mar. 7** from **11:00 AM–12:00 PM**, which will be held in **SEEC S228 and simulcast over Zoom**. This week's colloquium features **from Dr. Aleya Kaushik (CU CIRES)**. Please join us for conversation beginning at 10:45 AM and stay for lunch afterwards.

Using modeling and measurements of trace gases to understand terrestrial biosphere carbon cycling

Anthropogenic emissions of carbon dioxide are mitigated by land and ocean uptake of carbon, however the fate of this climate subsidy under future environmental conditions is uncertain. Land sequesters about 30% of emitted carbon but land carbon cycle responses to climate variability remain uncertain and difficult to predict. Present-day land carbon cycle models include a variety of ecosystem processes linking moisture and climate to carbon pool dynamics and land-atmosphere biospheric exchanges. Here I explore these links using the Simple Biosphere Model version 4.2 (SiB4) supported by NOAA Global Greenhouse Gas Reference Network observations to help evaluate simulations. Net ecosystem exchange (NEE) determines how much carbon is stored or released from a given ecosystem and is a balance between photosynthesis and respiration. SiB4 simulates a variety of tracers that provide mechanistic insight into these processes. While bulk CO₂ provides information about NEE, carbonyl sulfide (OCS) is a potential proxy for photosynthesis, and ¹³CO₂ traces short-term plant-level photosynthetic downregulation through environmental stress responses as well as longer-term disequilibrium which is a function of carbon pool turnover. I will present the application of OCS to evaluate Arctic seasonal carbon cycles, exploring the limits of our current understanding of OCS flux sources. I will then discuss how ¹³CO₂ provides insights into plant responses to drought conditions. Finally, I will present a global analysis of simulated carbon pool age and turnover times which impact respiration at multiple timescales. Improving estimation of SiB4 carbon residence times closes the gap between modeled and observed atmospheric ¹³CO₂ growth rate. In summary, our studies illustrate that atmospheric carbon cycle observations are a valuable tool to evaluate mechanistic responses in land surface models.



Location: SEEC S228 & Zoom

Zoom:

<https://cuboulder.zoom.us/j/4713174822>

Password: ATOC

About the ATOC Colloquium

The Department of Atmospheric and Oceanic Sciences (ATOC) Colloquium is typically held **every other Friday** from **11:00 AM–Noon**. Colloquia alternate between the following formats: (A) Full-length talk by a faculty member or invited speaker, (B) Three conference-length talks by graduate students. If you would like to nominate a speaker (including self), please email the ATOC Colloquium Committee Chair, Prof. Jianghanyang (Ben) Li (Jianghanyang.li@colorado.edu). Please visit www.colorado.edu/atoc/colloquium for further details.