



Biosphere-atmosphere exchange: insights from models and measurements

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Forests cover a significant fraction of Earth's land surface and play a critical role in Earth's climate through their influence on energy, water, and carbon cycles, as well as through exchanges of reactive species that place stringent controls on the atmosphere's oxidative capacity [or cleansing ability]. Therefore, understanding and representing the processes controlling turbulent exchange of energy, momentum, and scalars between the vegetation and the atmosphere is of critical importance for accurate weather, air quality, and climate prediction.

Canopies interact with the atmosphere through a number of pathways. Momentum absorption occurring over the distributed height range of canopy elements produces turbulence qualitatively different to that over other rough surfaces. The distributed canopy elements also absorb/scatter radiation ensuring that the leaf-level exchange of heat, moisture, and other trace gases vary spatially depending on the elemental heat capacity, atmospheric demand, and physiological controls. Canopy-induced modification of turbulence characteristics, spatially varying radiation absorption/scattering, and leaf-level emission/deposition also influence within-canopy reactant evolution.

Relying on a combination of measurements and models, this talk will: 1) present our current understanding of biosphere-atmosphere exchange, 2) highlight some new insights into atmospheric stability's role in determining the spatial structure and distribution of motions controlling turbulent transfer at the canopy-atmosphere interface, and 3) discuss implications for parameterization of biosphere-atmosphere exchange in weather, air pollution, and climate models.

Thursday, 7 January 2021, 3:30pm

*For Zoom information, please contact
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*Seminar will also be live webcast
<https://operations.ucar.edu/live-mmm>*