FSU Meteorological Seminar Series, Autumn 2021

Dr. Olivia E. Clifton
NASA Goddard Institute for Space Studies

Turbulence-vegetation-chemistry interactions: influences on dry deposition and oxidation

Exchanges of reactive gases between the biosphere and atmosphere influence tropospheric chemistry, climate, and ecosystems. Most work focuses on the emissions of reactive gases from the biosphere, but dry deposition happens when gases are removed from the atmosphere by the biosphere, and ambient chemistry inside vegetation canopies can alter exchanges. Organization in turbulence in the atmospheric boundary layer can spatially separate ("segregates") air masses, which may cause chemistry to speed up or slow down relative to the assumption of well-mixed conditions (ubiquitous in analyses of observations and models). Segregation can also influence dry deposition rates when there are correlated fluctuations in the strength of the leaf uptake and the leaf-level concentrations of the depositing gas. In my talk, I will show results from a novel tool, large eddy simulation coupled to a multilayer canopy model and a simplified chemical mechanism. First, I will show that correlations between ozone (an air pollutant and potent greenhouse gas with an important depositional sink) and leaf uptake are relatively small, suggesting that estimates of ozone removal can ignore this effect. Low segregation is in part due to counteracting influences from micrometeorological variations on ozone and leaf uptake individually versus the influence of leaf uptake on ozone. Second, I will show the impact of segregation on the reactivity of the hydroxyl radical (the most important tropospheric oxidant) inside a forest canopy and discuss how segregation and its impact changes with environmental conditions.

Zoom Link
https://fsu.zoom.us/j/92140857520?pwd=WUVzeTMvUGRuTGxEdjRBZERaZ1ZMQT09

Time: Thursday, Oct. 21, 2021 @ 3:00 PM
Host: Dr. Allison Wing