

Saturday, October 10, 3:00-3:50 p.m.

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Transporting water from soil to leaves: Physical challenges and functional constraints

Photosynthesis imposes a huge hydraulic cost: water vapor lost through open stomata must be replenished with water pulled from the soil. The physical demands placed on the xylem are large: conduits can fail if they physically deform due to the internal (negative) pressures or if air penetrates through conduit walls, resulting in the rapid expansion of the gas phase (cavitation) and the formation of an air embolism that blocks flow. Central to understanding how drought impacts plant productivity is identifying when and how xylem conductivity is lost. Yet the methods to resolve this remain hotly contested. In this talk I review new work that combines advanced imaging and hydraulic measurements and which suggests that water under tension can be remarkably stable. I also consider the impact of water transport at the landscape scale, showing new results linking agricultural intensification with cooler extreme temperatures.