



UNIVERSITÀ
DEGLI STUDI
FIRENZE

Dipartimento di
Ingegneria Civile
e Ambientale

INDICEE

**International Doctorate in
Civil and Environmental Engineering**



SEMINAR

HOW DOES VAPOR PRESSURE
DEFICIT REGULATE
TRANSPIRATION? PERSPECTIVES
FROM SITE OBSERVATIONS,
REMOTE SENSING, AND MODEL
SIMULATIONS

Shijie Li

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TIME

from 4 pm



LOCATION

Room 138 S. Marta



For info

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Vapor pressure deficit (VPD), a key indicator of atmospheric dryness, has markedly increased across most global land areas due to progressive warming. Although site-scale studies show that increasing VPD may enhance plant transpiration (Tran) and influence water and energy fluxes between land and atmosphere, this relationship has not been thoroughly investigated on the global scale. Here, we apply a binning approach to quantify the contribution of VPD to global Tran by ruling out the effect of soil moisture. To this aim, we integrate satellite-based observations, reanalysis data sets, and simulations from sixteen Coupled Model Intercomparison Project Phase 6 (CMIP6) models into a coherent framework. VPD shows a broadly positive influence on Tran over most parts of the global land consistently across all data sets. Exceptions occur in tropical rainforests where reanalysis data and CMIP6 model outputs suggest a negative VPD-Tran interplay. Attribution analysis suggests that increasing leaf area index reduces the positive effect of VPD on Tran in reanalysis data sets and CMIP6 models compared to satellite-based observations. This discrepancy may reflect differences in the representation of the effective canopy-level response to high atmospheric water demand, potentially involving stomatal regulation, plant hydraulics, and vegetation structure. Such differences may contribute to an underestimated transpiration response to VPD. These findings highlight the need to better represent physiological processes, hydraulic processes, and vegetation structural characteristics in process-based models to capture vegetation responses to increasing water stress.



Shijie Li
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Dr. Shijie Li is a Postdoctoral Researcher in the Department of Civil and Environmental Engineering at the University of Florence, where he has been working with Professor Giovanni Forzieri since 2024. He received his Ph.D. in Remote Sensing and Meteorological Applications from Nanjing University of Information Science and Technology, China, in December 2023. From 2022 to 2023, he was a Visiting Scientist in the Remote Sensing Department at the Helmholtz Centre for Environmental Research (UFZ), Germany. His research focuses on understanding how vegetation regulates key ecohydrological processes, such as evapotranspiration and gross primary productivity, with particular emphasis on their roles in shaping past and future climate extremes, including heatwaves, droughts, and compound extreme events. His work also investigates the ecological and socioeconomic impacts of these climate extremes.