Contribution ID: **32** Type: **Graduate Student Paper Competition**

Quantifying Crop Water Productivity Gaps to Overcome Future Climate-Driven Losses in Indian Winter Wheat Systems

Thursday, October 23, 2025 4:20 PM (20 minutes)

Climate change poses a significant threat to the food security of India, a global hotspot of groundwater depletion crisis. This study investigates the impact of rising vapor pressure deficit (VPD) on winter wheat crop water productivity (CWP) in India using novel high-resolution remote sensing data and fixed-effect panel regression models. We find that increased VPD significantly reduces winter wheat CWP. We conducted CWP gap analysis to assess the potential for India's winter wheat systems to adapt to future climate-driven CWP declines under various climate scenarios (SSP126, SSP245, SSP370, SSP585) for mid-century (2041-2060) and end-century (2081-2100) utilizing outputs from ten CMIP6 models. We identified regions where the historical CWP gap is greater than the projected decline, indicating a strong potential to overcome future VPD-induced stress. While some areas show considerable resilience under mild scenarios, extreme scenarios reveal significant challenges where projected CWP losses may exceed past adaptive capacities. These results underscore the urgent need for targeted, climate-adaptive water management strategies to enhance agricultural resilience in India.

Is there a SINGLE day you are unavailable to present?

October 24, 2025

Is there a time of day you are unavailable to present?

Afternoon

Organized Session Details

Author: SHAYEGHI, Afshin (University of Oklahoma)

Co-authors: Mr PAN, Li (University of Oklahoma); Prof. JAIN, Meha (University of Michigan); Dr BHATTARAI, Nishan (University of Oklahoma); Dr XIAO, Xiangming (University of Oklahoma); CHEN, Xiaodong (University of Oklahoma)

Presenter: SHAYEGHI, Afshin (University of Oklahoma)

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