UNIVERSITÀ DEGLI STUDI FIRENZE
Dipartimento di Ingegneria Civile e Ambientale

Seminar

UNDERSTANDING THE CLIMATE IMPACT OF THE THREE GORGES RESERVOIR

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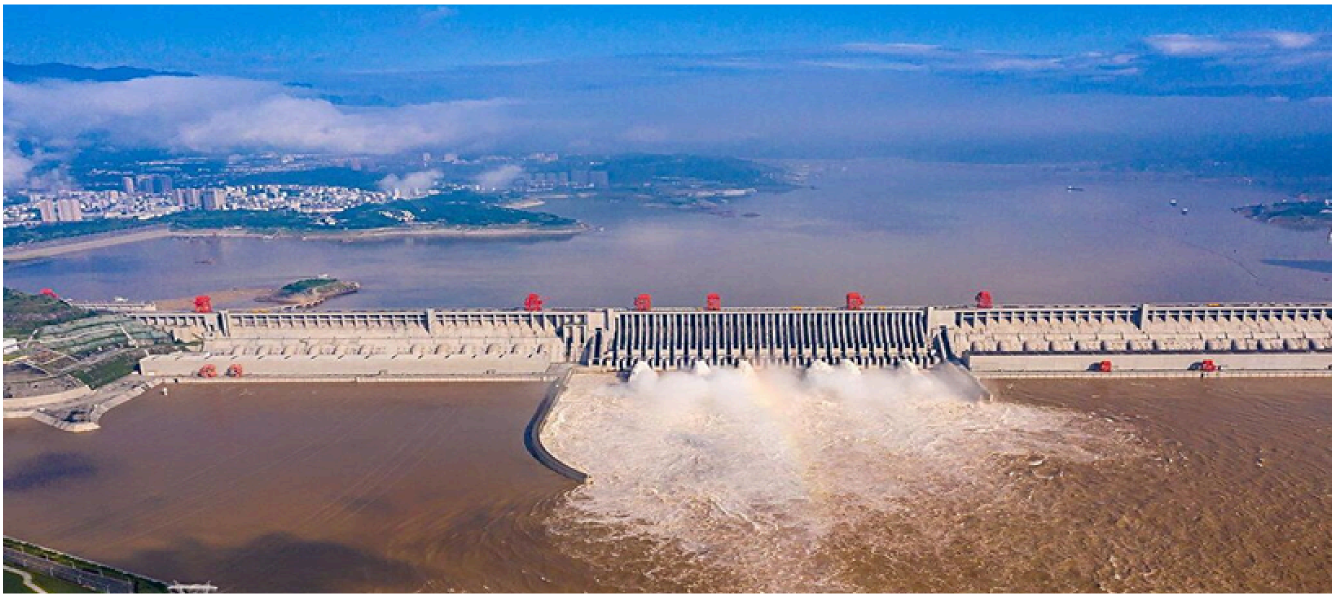
ROOM 138, S.MARTA



The construction of large artificial water bodies is being increasingly promoted as a viable response to the growing demand for water resources and energy. Consequently, the weather-system and regional climate effects induced by reservoir impoundment have become a central topic in research on land–atmosphere feedbacks. To effectively anticipate and manage the potential climate risks that a warming future may pose to regional water security, agricultural production, and human societies, it is essential to characterize the spatiotemporal patterns of reservoir influences on key regional climate variables—particularly precipitation; decouple how reservoir regulation modifies moisture transport and surface energy exchange; and uncover the mechanisms through which reservoir operations reshape the regional water cycle and energy balance. Such understanding is critical for clarifying how large water infrastructure can reorganize regional weather and climate processes by altering surface properties and hydrological pathways. Here, we take the world's largest hydropower project—the Three Gorges Reservoir (TGR)—as a case study. By integrating in situ observations, satellite remote sensing, and process-based modeling, we quantify the combined impacts of TGR construction and operation on the regional water cycle and energy balance, and diagnose the underlying mechanisms through which the reservoir reconfigures the regional climate system.

Hongbin Li

Hongbin Li is a joint PhD candidate in hydrology and water resources at the University of Florence's Department of Civil and Environmental Engineering, where he conducts research under the supervision of Professor Giovanni Forzieri. His work explores the complex dynamics of land–atmosphere interactions by focusing on two primary drivers of land-surface alteration: the climatic impacts of large-scale anthropogenic reservoirs and the eco-hydrological consequences of vegetation change. By integrating Earth observation data with process-based modeling, Mr. Li elucidates the physical mechanisms underlying these shifts to provide a robust scientific evidence base. Ultimately, his research informs how human-induced modifications to the land surface influence regional climate stability and global hydrological cycles.