**Authors' names and affiliations:**

Shanti Shwarup Mahto

Department of Civil and Environmental Engineering

National University of Singapore

Thanh Duc Dang

Department of Civil and Environmental Engineering

University of South Florida

Dung Trung Vu

Pillar of Engineering Systems and Design

Singapore University of Technology and Design

Simone Fatichi

Department of Civil and Environmental Engineering

National University of Singapore

Stefano Galelli

School of Civil and Environmental Engineering

Cornell University

**Session**

H020 - Advancing Hydrologic Modeling and Prediction Using Large-domain Meteorological and Hydrologic Datasets

H070 - Global Water Risks: Advances in Large Scale Flood and Drought Risk Assessment and Management for a Sustainable Future

**Abstract title**

Characterizing the Mekong’s hydrological alterations with an open source hydrological-water management model

**Abstract**

Decades of research on the Mekong River basin have vastly expanded our knowledge of key hydrological and ecological processes as well as the damages and threats associated to anthropogenic actions. There is, however, a mismatch between such expanding body of knowledge and the hydrological modelling tools that are openly available to the research community; a problem partially explained by the challenges associated to data collection in transboundary, tropical, river basins. Here, we address this gap and introduce VIC-Res-Mekong, an open source hydrological-water management model for the Mekong River basin. The model is implemented over a spatial domain of roughly 700,000 km2 and has a resolution of 0.0625 degrees. Water and energy budgets are simulated with the Variable Infiltration Capacity (VIC) model, while streamflow routing is simulated with VIC-Res, which explicitly accounts for the storage and release dynamics of water reservoirs. This is of key importance for a basin like the Mekong, where the active storage capacity of dams has increased from roughly 5 to more than 70 km3 in about twenty years. To this purpose, VIC-Res-Mekong integrates a large-scale dataset containing reservoir operating rules (retrieved from satellite images) for thirty dams accounting for more than 90% of the total storage capacity. We show that properly accounting for dam development and operations is a first fundamental step towards a reliable model calibration and the subsequent characterization of dam-induced hydrological alterations.