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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

ENAC-SIE, Master Project, Spring Semester

30 ECTS credits

Title	**Streamflow frequency prediction in extreme data-scarce regions**
Supervisors	Prof. Marc F. Muller (University of Notre Dame) , Prof. Andrea Rinaldo
Objective	The project will extend a probabilistic process-based flow duration curve approach to (i) adapt the model to other types of dominant hydrological processes (particularly snowmelt) and/or (ii) improve its scalability in extreme data-scarce regions.
Abstract	The overwhelming majority of the world's catchments are ungauged. Yet, effective water management requires accurate streamflow signatures in these basins. The challenge is especially urgent in developing countries, where in-situ data is particularly scarce where water-related risks and challenges are highest. While satellite data is well suited to address that challenge, it does not allow direct observation of policy relevant variables (such as flow duration curves). This shortcoming calls for hydrological models that are causal, analytically tractable, robust to non-stationary settings and can be driven by remote sensing observations. We recently developed a probabilistic process-based flow duration curve model that worked particularly well in seasonally dry catchments, from coastal California to the Himalayas, and is currently deployed in a webtool to assist rural electrification in Nepal.
Task description	Tasks include new theoretical developments using a soil moisture stochastic dynamic framework that is increasingly used in eco-hydrological research, and its validation in real watersheds both in data-rich (California's Sierra Nevada) and data-scarce (Pakistan's Karakorum) regions.
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