EGU2020-11040
https://doi.org/10.5194/egusphere-egu2020-11040
EGU General Assembly 2020

RAHU Project: Assessing water security and climate change adaptation strategies in the glaciated Vilcanota-Urubamba river basin

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The Peruvian Andes are a hotspot of vulnerabilities to impacts in water resources due to the propensity for water stress, the highly unpredictable weather, the sensitivity of glaciers, and the socio-economic vulnerability of its population. In this context, we selected the Vilcanota-Urubamba catchment in Southern Peru for addressing these challenges aiming at our objectives within a particular hydrological high-mountain context in the tropical Andes: a) Develop a fully-distributed, physically-based glacier surface energy balance model that allows for a realistic representation of glacier dynamics in glacier melt projections; b) Design and implement a glacio-hydrological monitoring and data collection approach to quantify non-glacial contributions to water resources and the impact of catchments interventions; c) Mapping of human water use at high spatiotemporal resolution and determining current and future levels of water (in)security; and d) Integrate last objectives in a glacier - water security assessment model and evaluate the tool's capacity to support locally embedded climate change adaptation strategies.

The RAHU project intends to transform the scientific understanding of the impact of glacier shrinkage on water security and, at the same time, to connect to and inform policy practices in Peru. It follows a "source to tap" paradigm, in which is planned to deliver a comprehensive and fully integrated water resources vulnerability assessment framework for glacier-fed basins, comprising state-of-the-art glaciology, hydrology, water demand characterisation, and water security assessment. It includes glacio-hydrological and water resources monitoring campaigns, to complement existing monitoring efforts of our project partners and collaborators, and new remotely sensed data sets. Those campaigns will be implemented using the principles and tools of participatory monitoring and knowledge co-creation that our team has pioneered in the tropical Andes. The datasets produced by this approach, combined with existing monitoring implemented

by our team and collaborators, will allow us to build an integrated water supply-demand-vulnerability assessment model for glacierized basins, and to use this to evaluate adaptation strategies at the local scale.

This research is part of the multidisciplinary collaboration between British and Peruvian scientists (Newton Fund, Newton-Paulet).