Submitted Abstract

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Abstract

Groundwater and surface water are an integrated system and understanding both components is critical for managing mountain water resources. The hydrology of mountain regions is complex due to steep elevation gradients, large ranges in climate, complex geology and geomorphology, the presence or absence of cryosphere elements, and ongoing climate change. Within this dynamic setting, groundwater (i.e., water that is stored in and flows through the subsurface) is an important component of the hydrologic cycle in mountainous terrains. A proportion of rain, snowmelt, and or glacial melt infiltrates into the subsurface and recharges groundwater. Within mountain groundwater systems, there are many pathways that infiltrated water may travel. From shorter to longer residence times, and from larger to smaller contributing areas, these include:

flow through highly permeable proglacial deposits (e.g., talus slopes) discharging to ephemeral streams within days,

surface sediment and shallow bedrock aquifers, recharged during seasonal rain/snow events, contributing to stream baseflow over seasonal to interannual cycles, and

deeper mountain system recharge (e.g., mountain front or mountain block recharge), that recharges adjacent valley aquifers over years to decades.

In our presentation, we argue that the partitioning of groundwater between these different subsystems is complex but critical to understand the role of mountains as the world’s water towers. Within this context, there are many critical outstanding questions: What is the amount of water entering each of these subsystems? How do we quantify the partitioning of water between these different subsystems? And how will climate change, reduced cryosphere, and/or human activities affect groundwater systems and subsystem partitioning?