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Discharge characteristics for different glacier mass balance conditions at Vernagtferner, Ötztal Alps

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Discharge from glaciers plays an important role for ecosystems, land use and hydropower production in different regions of the world. The discharge hydrograph in glaciated catchments is determined by several parameters, like snow cover, glacier size and glacier mass balance, besides others. Variations in these parameters might considerably change the temporal availability of melt water in such regions, which needs to be taken into account for long term water management planning.

Here, we investigate in detail the characteristics of discharge in a highly glaciated catchment in the central eastern Alps. The Vernagtferner basin (11 km² area and 6.9 km² glacier area) is characterised by a high density of monitoring stations, which are an ideal basis for testing and applying models of snow and glacier evolution, as well as discharge simulations. The combination of a gauging station with meteorological observations and continuous monitoring of snow and ice melt at different locations, allows to investigate the major processes in detail. During the period 2019 to 2022 rather different mass balance conditions occurred, which strongly influenced the temporal evolution of the discharge generation. We investigate the significance of snow cover, firn and glacier ice to the melt water generation and the temporal characteristics of the hydrograph.