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Water budget in the Rutor glacier area: results from multidisciplinary activities

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Due to global warming and glacial retreat, periglacial areas and headwater catchments are experiencing relevant changes in surface processes and in water budgets. The water cycle, altered by the changing snow accumulation/melting dynamics, ice ablation, higher altitude increasing rainfalls frequencies, is shifting towards larger average and peak runoff productions. These alterations have also an impact on sediment production, on geomorphological processes, on ecosystem dynamics. The goal of our research is to take advantage of multidisciplinary activities aimed at monitoring the glacial and peri-glacial area of the Rutor glacier, in the Aosta valley (north-western Italian Alps) to quantify its dynamics under climate change. The Rutor glacier is fast-retreating and has a terminus that moved more than 2 km since the mid-19th century: it is thus a perfect case study to investigate snow/ice dynamics and runoff production, considering also that the periglacial area is characterized by a number of lakes and channels that collect and convey the melt water, while dynamically responding to it. In this work, we present the results from a multidisciplinary collaboration that involves hydrologists, geophysicists, geomatics and water engineers with the goal of monitoring stream flows, water properties, lake water balance and runoff production. Thanks to the contribution of different disciplines, we could gain an advanced quantitative knowledge of the water budget in the area that will represent a starting point for further investigations of processes and interactions within this unique melting landscape.