Spring water temperatures affected by cooling effects of relict rock glaciers – preliminary results of the Niedere Tauern Range, Austrian Alps

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Coarse blocky material is known to have a ground cooling effect in contrast to other types of surface material. The thermal regimes of blocky surface layers of two relict rock glaciers with opposing aspects are investigated and related to water temperature fluctuations at springs draining these relict rock glaciers. Air, ground surface and ground temperature in 1 m depth at several locations at both rock glaciers and water temperatures of the emerging springs are analyzed. The blocky surface layer of the SW-exposed rock glacier generally exhibits lower temperatures than the one oriented to the NE despite the aspect-related higher potential solar radiation. Variations in the seasonal snow cover seem to play a major role herein as the blocky surface of a rock glacier might be better coupled to the atmosphere, resulting in enhanced cooling. Water temperature fluctuations – e.g. short cold temperature pulses ahead of water temperature increase related to “warm” recharge events during summer – indicate a cold water source (piston flow effect) and / or a rapid cooling of event water in the vicinity of the spring during infiltration. Current data analysis points towards potential sporadic permafrost lenses, but verification thereof is not trivial based on the preliminary results. However, this knowledge is essential for the understanding of the groundwater storage of (relict) rock glaciers and is required in the light of climate change and human needs related to runoff in alpine catchments.