

Inverting the hydrological cycle: when streamflow measurements help assess altitudinal precipitation gradients in mountain areas

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Abstract This paper presents an attempt to “invert” the hydrological cycle and to use streamflow measurements to improve our knowledge of precipitation input in data-sparse mountainous regions. We use two data sets of 31 Swiss and 94 Swedish catchments, and three simple long-term water balance formulas. By assuming a simple two-parameter correcting model to regionalize precipitation from the too-sparse precipitation gauging network, we show that it is possible to identify, without ambiguity, the altitudinal precipitation gradient from streamflow. Although the snow undercatch parameter remains more difficult to identify, its range seems coherent with values found in the literature.

Key words orographic precipitation gradient; water balance formulas; Budyko formula; Ol’dekop formula; Turc formula