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Combined use of geostatistical and conceptual hydrological models for a preliminary assessment of "undercatch" of precipitation in The Canales Basin (Sierra Nevada, Spain).

Patricia Jimeno-Sáez[1], Antonio Juan Collados-Lara[2], Rodolfo Alvarado-Montero[3], **David Pulido-Velazquez**[2], Eulogio Pardo-Igúzquiza[4], and Javier Senent-Aparicio[1]

[1]Universidad Católica San Antonio de Murcia (UCAM), Departamento de Ciencias Politécnicas, Murcia, Spain (pjimeno@ucam.com; jsenent@ucam.edu)

[2]Instituto Geológico y Minero de España, Granada, Spain (d.pulido@igme.es; aj.collados@igme.es)

[3]Deltares, Operational Water Management Department, Delft, The Netherlands (Rodolfo.AlvaradoMontero@deltares.nl)

[4]Instituto Geológico y Minero de España, Madrid, Spain (e.pardo@igme.es)

Gauges modify wind fields, producing important undercatch in solid precipitation. For this reason, solid precipitation measurements show significant bias with respect to real values, especially under windy conditions. In this work we propose a methodology that combines geostatistical and hydrological models to perform a preliminary assessment of global undercatch and precipitation patterns (distribution between solid and liquid phase and spatial gradient with elevation) in alpine regions. It is based on the available information about daily natural streamflow and daily climatic data (precipitation and temperature) in the catchment. We want to analyse long time periods in order to take into account the stochastic behaviour of natural streamflow and climatic variables. A preliminary assessment of temperature and precipitation fields is performed by applying various geostatistical approaches assuming some hypothesis about the relationship between climatic fields and altitude. The generated fields are then employed as inputs of conceptual hydrological models, which includes two parameters to correct the solid and liquid precipitation, respectively. We have considered different hydrological approaches (SRM, HBV and a Témez model with a simple degree-day approach). The parameters are calibrated by minimizing the difference between the simulated and historical natural streamflows and/or snow cover area. It allows us to identify the best combination of geostatistical and hydrological models to approximate streamflow, to perform a global preliminary assessment of the undercatch of solid and liquid precipitation and their precipitation patterns by analysing spatial gradients with elevation. The methodology was applied in the Canales Basin, an alpine catchment of the Sierra Nevada (Spain).

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