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Correcting precipitation records in south-central Chile. A reverse modeling approach

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Precipitation is the main input in the basins' water balance; therefore, correct measurements or correct estimations are necessary for hydrological modeling, management and decision making. In south-central Chile there is a low density of rain gauges (∼1 station/550 km2), most of which are located in low-altitude areas. The spatial distribution of precipitation is therefore not properly recorded and the enhancement of precipitation due to the orography is not correctly measured. In this study a reverse modeling approach at a regional scale is used in order to estimate the extent to which the precipitation amounts must be corrected in order to ensure the closure of a long-term water balance. Using a lumped water balance model, a factor for correcting the precipitation data is calculated for 45 watersheds located in south-central Chile. Then, based on a geo-statistical interpolation, a map for correcting the precipitation amounts is proposed and a validation of these corrections is achieved. The results show that in gently sloping areas the precipitation records are more representative than in steep mountain areas. In addition, the higher the mountains, the less representative the precipitation records become.