



Comparison of approaches to interpolating climate observations in steep terrains

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The accuracy of water resources studies in mountainous areas is often complicated by the low number of weather stations, along with strong spatial and temporal variability in climate. Near-global data sets such as satellite and re-analysis data help address this problem but there remain major questions about their appropriate and optimal use especially in mountainous areas. We compare methods for spatial interpolation of time series of precipitation and temperature in the mountainous Aconcagua region of central Chile. A Generalised Linear Mixed Model with parameters estimated using approximate Bayesian inference is compared with three simple methods based on Inverse Distance Weighting, Lapse Rates, WorldClim data set and the CHIRPS satellite product. Leave-one-out cross validation using the Root Mean Squared Error shows that merging the WorldClim data with gauged time-series is an accurate, easy to apply and relatively robust method, especially as the number of gauges is reduced. The Generalised Linear Mixed Model also performs well but is more sensitive to the number of gauges available. We conclude with a discussion of the applicability of results to water resources modelling.