Identifying and attributing data quality problems: temperature and precipitation observations in Bolivia and Peru


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Abstract
Low data quality of climate observations is a problem in large parts of the world, especially in developing countries such as Bolivia and Peru. Many climatological studies do not give much importance to the evaluation of data quality before analysis, even though errors in the time series may distort the final results. Errors may occur at any point in the chain of data generation, e.g. due to poor measurement configuration, unsuitable station location, poor station maintenance, erroneous instrument reading, or inaccurate data digitalization and post processing. The nature of some errors in Bolivia and Peru differs from those found in western networks because of the unequal data collection conditions. The partial or total lack of metadata and the low density of the station network impede the quality assessment of the Bolivian and Peruvian climatological datasets. The projects DECADE (Data on climate and Extreme weather for the Central Andes) and CLIMANDES (Servicios CLIMáticos con énfasis en los Andes en apoyo a las DEcisiones) analyze and improve the quality of the Bolivian and Peruvian temperature and precipitation datasets. This study demonstrates and characterizes the most common as well as a few peculiar errors found in the data. Visits of the stations allowed us to detect the source of errors and to gather valuable metadata information. If the source of a specific error is known, correction is potentially possible. This is an important benefit in sparse networks, because the number of stations is already critically low for applications such as homogenization. Furthermore, we investigate which of the errors are not detected by standard quality control processes. Alternative error detection and quality assessment methods are suggested.