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

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Assessing climatological trends and extreme events requires high-quality data. However, for many regions of the world, observational data of the desired quality is not available. In order to eliminate errors in the data, quality control (QC) should be applied before data analysis. If the data still contains undetected errors and quality problems after QC, a consequence may be misleading and erroneous results.
A region which is seriously affected by observational data quality problems is the Central Andes. At the same time, climatological information on ongoing climate change and climate risks are of utmost importance in this area due to its vulnerability to meteorological extreme events and climatic changes. Beside data quality issues, the lack of metadata and the low station network density complicate quality control and assessment, and hence, appropriate application of the data.
Errors and data problems may occur at any point of the data generation chain, e.g. due to unsuitable station configuration or siting, poor station maintenance, erroneous instrument reading, or inaccurate data digitalization and post processing. Different measurement conditions in the predominantly conventional station networks in Bolivia and Peru compared to the mostly automated networks e.g. in Europe or Northern America may cause different types of errors. Hence, applying QC methods used on state of the art networks to Bolivian and Peruvian climate observations may not be suitable or sufficient.
A comprehensive amount of Bolivian and Peruvian maximum and minimum temperature and precipitation in-situ measurements were analyzed to detect and describe common data quality problems. Furthermore, station visits and reviews of the original documents were done. Some of the errors could be attributed to a specific source. Such information is of great importance for data users, since it allows them to decide for what applications the data still can be used. In ideal cases, it may even allow to correct the error.
Strategies on how to deal with data from the Central Andes will be suggested. However, the approach may be applicable to networks from other countries where conditions of climate observations are comparable.