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Trends and variability of climate indices for the agricultural sector in the southern Peruvian highlands

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The agricultural sector strongly depends on climatic conditions during the growing season. Extreme events, such as droughts and floods, can lead to crop losses and thereby threaten the livelihood of farmers. This is of particular concern for an area such as the Southern Peruvian Andes, where social protection mechanisms are lacking and climatic conditions are harsh. In this context it is of high interest to know about the climatic variability and trends of indices relevant for the agricultural sector, such as the number of frost days, the occurrence of long dry periods, the number of (consecutive) days exceeding or falling below plant specific temperature thresholds or the beginning of a rainy season.

Within the Climandes project (a pilot project of the Global Framework for Climate Services) these climate indices were analyzed with respect to their interannual variability and trends within the time period 1981-2016. Different to most climatological analyses focusing on annual or seasonal time periods, the indices are temporally aggregated to the growing season and as well to the phenological phases of the respective plants. The results are based on quality controlled and homogenized observational data provided by the meteorological and hydrological service of Peru. For the temperature indices, we find spatially homogenous and significant trends related to a general warming trend (e.g. less frost days, fewer cool nights) on annual time scales as well as for the growing season from December to February. For precipitation, trends are spatially more heterogonous with a tendency towards heavier rainfall events (rx5, r95ptot) during the growing season.