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Agro-climatic observations in Huaraz, Peru – first insights from water, energy and carbon dioxide flux measurements

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Small-scale farming in the Tropical Andes has been increasingly challenged by recent economic growth due to globalization of agriculture and increasing mining activities. Furthermore, in Ancash and its capital Huaraz decreasing water availability and higher water demand are a great concern for sustainable development. Recent studies have investigated the situation of small-scale farmers in hydrological sub-catchments of the Rio Santa Basin around Huaraz between the Coordillera Negra and Blanca using interdisciplinary methods. Their results show a clear disagreement between the perception of climate (or precipitation) change by local farmers and the statistical analysis of meteorological data collected at nearby weather stations. In the framework of the project AgroClim Huaraz (www.agroclim-huaraz.info), our team tries to investigate the reasons of this disparity and to assess the potential vulnerabilities and risks in local small-scale agriculture in rural areas close to Huaraz.

Recently, we installed two automatic weather stations (AWS) and a network of rain gauges (5) representing a broad range of ecosystems and altitudes along a precipitation transect (East to West). In addition, one field site has been equipped with an eddy covariance system (EC) providing continuous energy (latent and sensible heat) and carbon dioxide fluxes, while in other locations, covering the most important crop types in the region, our mobile EcoBot system has been used for periodic observations of latent and sensible heat fluxes and crop development (biomass, vegetation height) since November 2019. To date, these measurements of climate-vegetation interaction are still regularly carried out by local partners in Huaraz.

In this contribution we will (i) report for the first time the EC data, (ii) validate the EcoBot against the EC measurements and (iii) analyse the variability in crop phenology and evapotranspiration (driven by spatial differences in rainfall).

In the future, we aim to use our novel in-situ data to 1) validate remote sensing and reanalysis data, 2) run and calibrate FAOs AquaCrop model and 3) add an open-source (OS) module to AquaCrop OS integrating NDVI data (acquired by EcoBot) to drive it on larger scales with remote

sensing data.