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CR2MET: A high-resolution precipitation and temperature dataset for hydroclimatic research in Chile

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The lack of direct observations allowing reliable regional-scale climate characterization is a stumbling block for national environmental studies and large-sample hydrological assessments. Given the influence of the Andes on the precipitation regime and the scarcity of data in elevated lands, reducing biases and uncertainties in climatic variables represents a particularly challenging task across the complex landscape Chile.

The Center for Climate and Resilience Research Meteorological dataset (CR2MET) have been developed to alleviate the uncertainties in climate conditions presented in most watersheds in Chile. This dataset includes a precipitation and a near surface temperature product with 3-hourly data, spanning the period 1979-2016, over a 5-km grid for continental Chile. Based on a mixed methodology, the precipitation product aims to make best use of available observations in central-southern Chile and of reanalysis data. The method builds on a statistical downscaling of precipitation provide by the ERA-Interim reanalysis. The statistical models, nurtured also with local topographic data and with other large-scale variables from ERA-Interim (notably moisture fluxes), are calibrated against an updated national rain-gauge network. An interpolation technique is used in a second stage to adjust the climatology and temporal variability in regions close to monitoring stations. The temperature product is constructed with relatively different approach. In addition to the observed diurnal extreme temperatures (daily maximum and minimum), local topographic data and large-scale information from reanalysis, the land surface temperature (LST) derived from MODIS retrievals were also considered. In this case, the satellite data is of key importance providing spatial heterogeneity forced by, e.g., different land-cover conditions.

Results from the CR2MET initiative, to be used in a new National Water Balance in Chile, are presented. We show a comparison with other datasets available at similar spatiotemporal scales and a streamflow-based evaluation carried out with the Variable Infiltration Capacity (VIC) Model simulations.