

# Weather data in Arequipa, Peru

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## INTRODUCTION

Weather monitoring networks typically measure daily precipitation, minimum temperature and maximum temperature, and sometimes other variables such as relative humidity, wind speed and solar radiation, at individual locations. Information about the current climate guides day to day activities while the study of past climate can elucidate how it varies and how it is impacted by humans and help to prepare for future conditions. One goal of a weather measurement network is to quantify climate variations through time and serve as a source of information for day-to-day decision making. These observations can be used to support many water management related decisions, such as predicting daily weather to advise farmers; warning of severe weather events; managing water resources; aiding transportation; and understanding regional changes due to climate change.

## MONITORING LOCATIONS AND AGENCIES

Weather data in Arequipa is collected by SENAMHI. In addition, weather is monitored at the Rodrigues Ballón airport by the Peruvian Corporation of Airports and Commercial Aviation (CORPAC).

There are four types of stations available through SENAMHI:

- (1) Conventional stations with real-time data availability (CRT),
- (2) Conventional stations with deferred time data availability (CDT),
- (3) Automatic stations (AUTO), and
- (4) Hydrology stations (HYRDO).

CDT and CDR stations collect daily Prec, Tmax, Tmin, and relative humidity through manual observers; AUTO stations record hourly precipitation, temperature, humidity, and wind direction and speed using electronic sensors; and HYDRO stations record hourly precipitation data using electronic sensors. The airport station (CORPAC) reports daily precipitation, snow depth, daily average, maximum and minimum air temperature, average dew point, maximum wind gust, maximum sustained wind speed, average visibility, and atmospheric pressure.

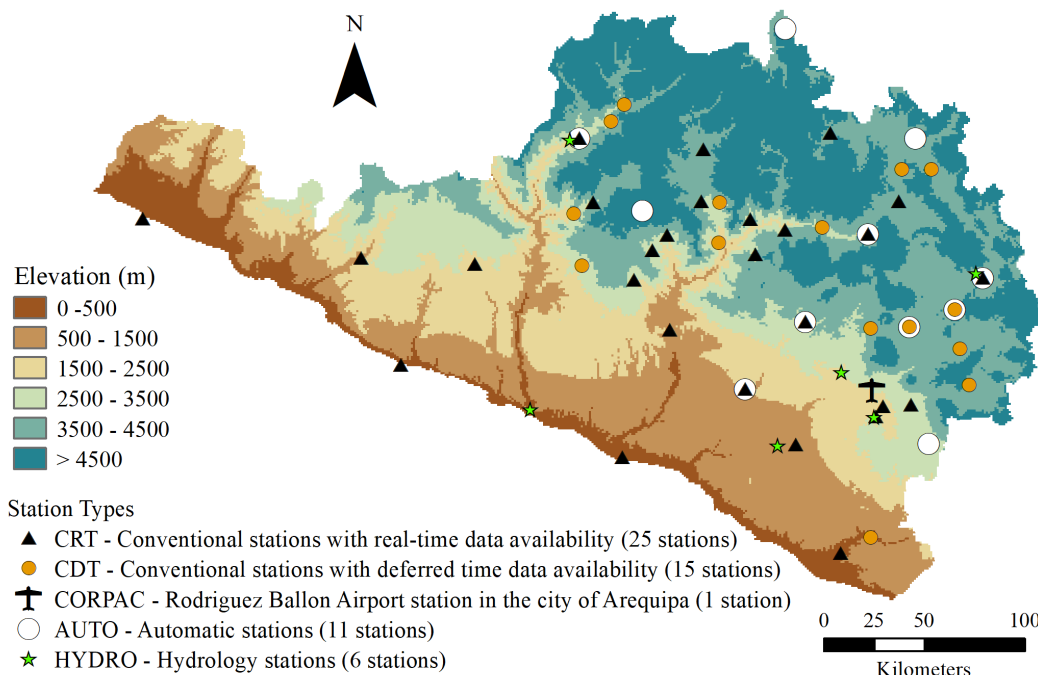


Figure 1. Weather stations measuring at least temperature and precipitation in the Arequipa Department that are active as of 2020.

## OBTAINING WEATHER DATA

- Daily precipitation (Prec), maximum (Tmax) and minimum (Tmin) air temperature since the start of data acquisition (1930s for some stations) until around 2013~2014 is available for download from SENAMHI:  
<https://www.senamhi.gob.pe/?p=descarga-datos-hidrometeorologicos>
- More recent data that includes some historical stations as well as newly installed stations are available from SENAMHI through a new database:  
<https://www.senamhi.gob.pe/?p=estaciones>
- Data from the airport is available by request from CORPAC. In addition, this data is also available through the National Ocean and Atmospheric Administration's (NOAA) Global Summary of the Day (GSOD) database: <https://data.nodc.noaa.gov/cgi-bin/iso?id=gov.noaa.ncdc:C00516#>

## DISCUSSION OF WEATHER AND CLIMATE INFORMATION

Arequipa has 47 active weather stations measuring both air temperature and precipitation, resulting in an average density of 7.4 stations per 10,000 square kilometers, which is lower than international standards. The total number of stations in the Arequipa Department increases to 53 when considering the newly established HYDRO stations that only measure precipitation.

While climate observations for some locations started as early as the 1930s, most of precipitation measurements started in the 1940s and 1950s and increased in the 1990s and 2000s. The last decade saw an increase in number of operational stations (starting in 2013) as well as modernization and automation of stations as AUTO stations with hourly measurements started to appear in 2014 and HYDRO stations started to appear in 2015.

*Table 2. Elevation range of weather stations in Arequipa.*

Elevation range	N° of stations	Stations (%)	Area (%)
0-500	5	10.4	6.4
500-1500	4	8.3	20.5
1500-2500	6	12.5	17.1
2500-3500	14	29.2	11.8
3500-4500	17	35.4	20.7
>4500	1	2.1	23.0
Total	48	100.0	100.0

Stations have traditionally been sited closer to population centers, where they can be maintained, rather than in higher altitude regions that are more sensitive to climate shifts. Two areas within the Arequipa Department have higher station density: the districts situated in and around the Colca Canyon and the city of Arequipa and surrounding districts in the Chili watershed. These two locations represent where the water is most heavily managed in the region and are located between 2500 and 4500 m of elevation. Lower densities coincide with the desert area on the coast and areas over 4500 m of elevation, situated at the north-east and north-west of the Department.

*Adequacy:* Because most measurements are in the valleys, it is likely that regional precipitation is being underrepresented by the current measurement network. Areas over 4500 m of elevation represent 23% of the Department's area and the majority of the water supply, but there is only one station, at an altitude of 5800 m (Table 1), monitoring that environment.

## CONTACT

For more information about the developers, this factsheet, and other tools from the SWM team of the Arequipa Nexus Institute, contact [nexus-swm@purdue.edu](mailto:nexus-swm@purdue.edu).