

AppNote:

High Mountain Meteorological Network in Peñalara Natural Park

Motivation

Mountains are of crucial importance for many environmental, scientific social and economical reasons. From a climatic point of view, they play a fundamental role in the climate system and are unique areas for the detection of climate change. Despite the importance of mountains, meteorological observations at these areas are scarce and lacking of good quality. Remoteness, extreme environmental conditions and difficulties of having powerful energy sources and good communications are the main reasons for this.



“Complexity of terrain and harsh environmental conditions make it difficult to keep long and representative data series.”



Peñalara Natural Park (Central System, Spain) has been object of numerous scientific programs under a wide spectrum of disciplines. Most of these programs require a scientific quality meteorological data base. Due to the complexity of the terrain it is necessary to conduct in situ measurements with a high density of sites in order to have representative data series.

Objective

The main objective of this project is to set up a hydro-meteorological network in the Guadarrama Mountains with scientific quality and equipped with mountain specific sensors.

Case Study Summary

Services:



Location:

Peñalara Massif (Central System, Spain).

Contracting Agency:

Parque Natural de Peñalara (Region of Madrid)

Products Used:

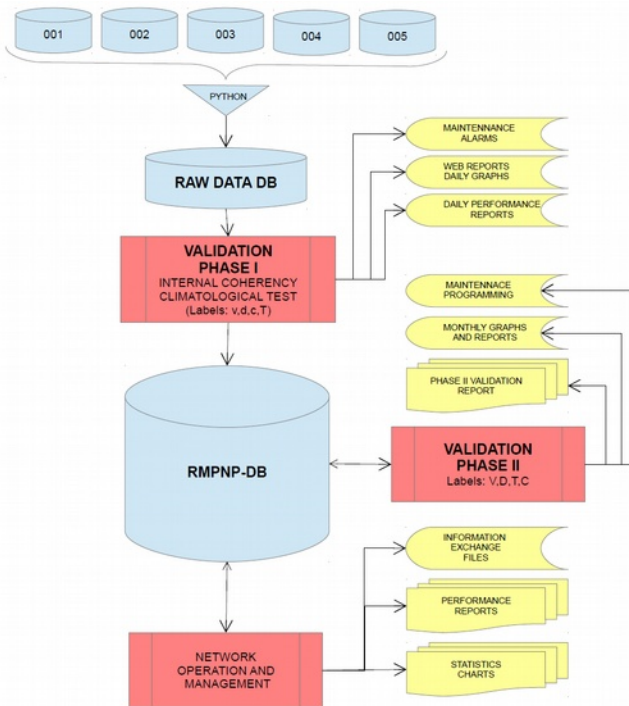
Lambrecht rain gauge, Young Wind Monitor Alpine Version, Lycor pyranometer, Judd snow height sensor, Rotronic HC2-S3 air temperature and relative humidity sensor, Gantner data logger, Vaisala HMP45, NovaLynx rain gauge, E+E Electronic temperature y humidity probe, RNG anemometer and wind vane, Campbell Scientific CR200.

Measured Parameters:

Precipitation, air temperature, relative humidity, wind speed & direction, solar radiation, snow depth, underground temperature.



Methodology



“Maintenance programs are specially important in high mountain networks due to the extreme environmental conditions”

Considering the main **objective** is to have reliable and long meteorological observations, the following **measuring strategy** has been defined.

- The network is based on automatic measurements. Some manual observations are done for calibration and quality control at a small number of sites.
- Five sites are considered enough taking into account the size and complexity of the area. The final distribution make an average of one site per 250 m of altitude.
- Regarding the sitting criteria, recommendations from the World Meteorological Organizations (WMO, 2008) are followed when possible, maximizing the representativity and minimizing environmental impact of installations.

During the first years (1998) manual data downloading was performed but now TCP/IP protocol through the GPRS network is giving an excellent result considering the volume of data.

At present (2014) validated time series of the network are hosted in a PostgreSQL, Python, PHP platform. An integral system is now satisfying users from the scientific community to general public through a web page.

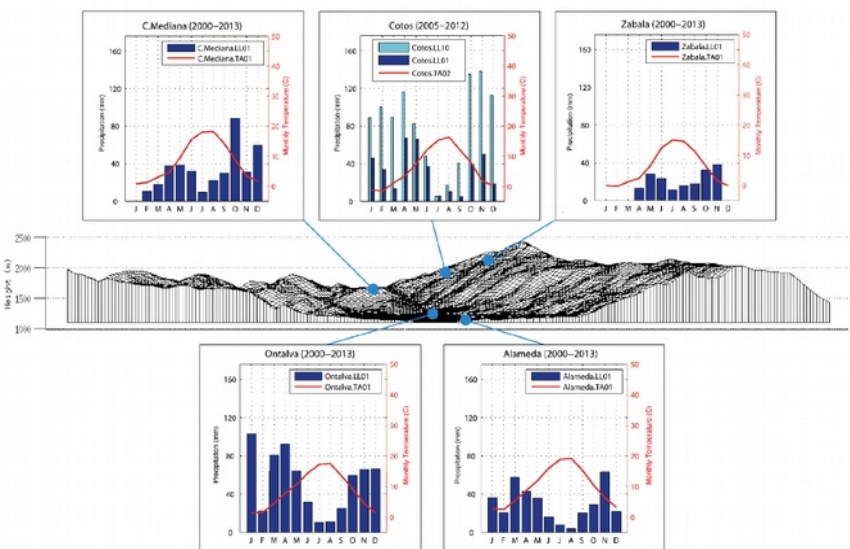
In order to guarantee the quality of the data, interMET has been operating a quality assurance program including preventive, evolving and corrective maintenance.

Results

After continuous evolution the network consists on five fully automatic meteorological stations plus other points for short campaigns and manual observation. Measurements have shown to be reliable and representative and data gap have been minimized.

Due accumulated experience through the years, a considerable know-how on mountain meteorological observation has been acquired.

As a result of this long commitment, now there is a considerable amount of data sets used by many scientists and organizations in charge of the research, management and conservation of this little but precious area.



Due to our excellent trajectory, procedures, professional competences and environmental commitment, interMET has accreditation on ISO 9001:2008 and ISO 14001:2004 for the activity: “Design, installation and management of meteorological and environmental networks”.



For more information on interMET services and projects visit:
www.intermet.es

