

AppNotes:

High Mountain Hydro-Meteorological Network



Motivation

Mountains play a crucial role in the climatic system, in the water cycle and are excellent indicators of climate change. Nevertheless, their complex orography and high altitude make precipitation monitoring one of the biggest challenges on automatic monitoring. Their complex spatial patterns, the big variation of snow precipitation and the effect of extreme temperatures, like rime freezing, make precipitation monitoring at mountains extremely difficult.

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



Sierra de Guadarrama (Central System, Spain) is a mountain range with some elevations above 2400 masl. This sierra is the main source of fresh water for millions of inhabitants, industry and agriculture. Some studies estimate areas with annual of 1700 mm/year Also, this area is subject of many scientific alpine research programs that require a robust meteorological data base.

Synergies

interMET has been en-charged of the operation of the Peñalara network and accumulates 14 years of experience in this mountainous area. On the other hand OTT Medio Ambiente Iberia S.L. shows expertise on precipitation monitoring worldwide and manufactures what seems to be one of the best approximations to solve automatic precipitation monitoring: their OTT Pluvio² gravimetric rain gauge.

Objective

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

Case Study Summary

Services:



Network Location:

Guadarrama Mountains, north Madrid, Spain.

Contracting Agency:

CEI Moncloa (GUMNET)

Products Used:

OTT Pluvio², alpine version Young Wind Monitor, Hukseflux NR01 radiometer, Felix SL300 snow depth sensor, Rotronic HC2-S3 air temperature and relative humidity sensor, Campbell Scientific CR3000 data logger.

Measured Parameters:

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

Methodology

Six OTT Pluvio² rain gauges have been installed in an area of less than 25 km² with complex orography. Along with these, other ancillary meteorological information is taken using snow height, wind, temperature, humidity and radiation sensors. This information will help to validate, correct and use the complete information taken by OTT Pluvio².

OTT Pluvio² is an all-weather precipitation gauge that uses superior weight-based technology to measure the amount and intensity of rain, snow, and hail.

www.ott.com

Data is stored in a Campbell Scientific CR3000 logger and transmitted to central server through GPRS.

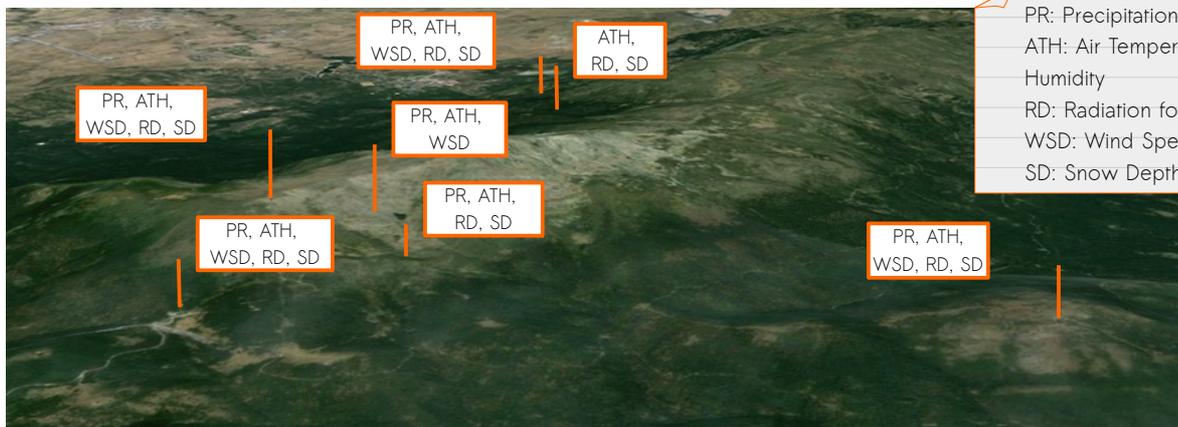
In order to guarantee the quality of the data, interMET has operate a maintenance program that include regular preventive actions on each site. These programs are specially important in high mountain networks due to the harsh environmental conditions.

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



Results

At the end of 2015 the network includes seven full automatic operational hidro-meteorological stations ranging from 1600 to 2200 masl.



PR: Precipitation
ATH: Air Temperature and Relative Humidity
RD: Radiation for components
WSD: Wind Speed & Direction
SD: Snow Depth

With an excellent trajectory with projects like this and after a deep evaluation of our systems, procedures, professional competences and environmental commitment, interMET got accreditation on 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

