NATIONAL METEOROLOGICAL INSTITUTE

METEOROLOGICAL NETWORK AND DATA PROCESSING DEPARTMENT

Thermal Study of Costa Rica by means Automatic Meteorological Stations

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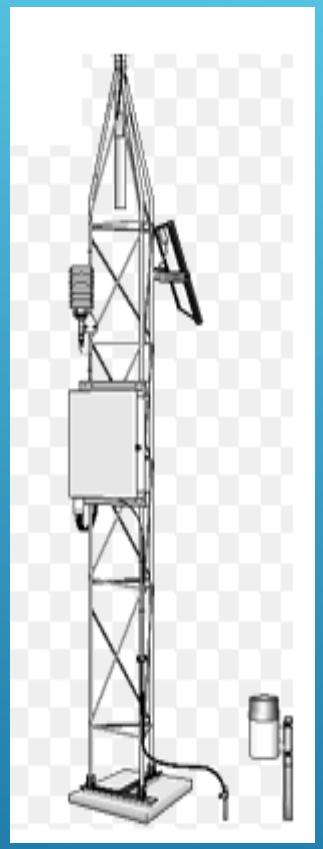
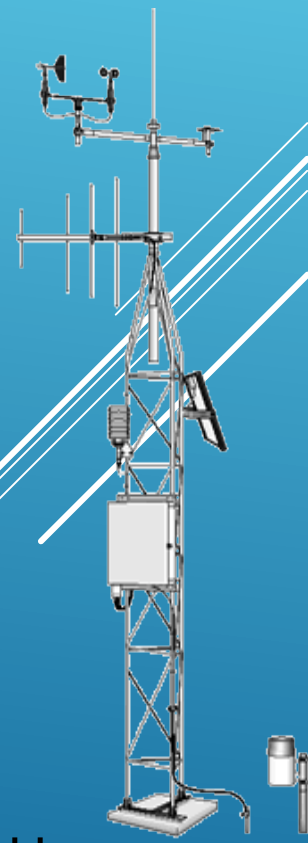
Netherland, 08-11 October, 2018.

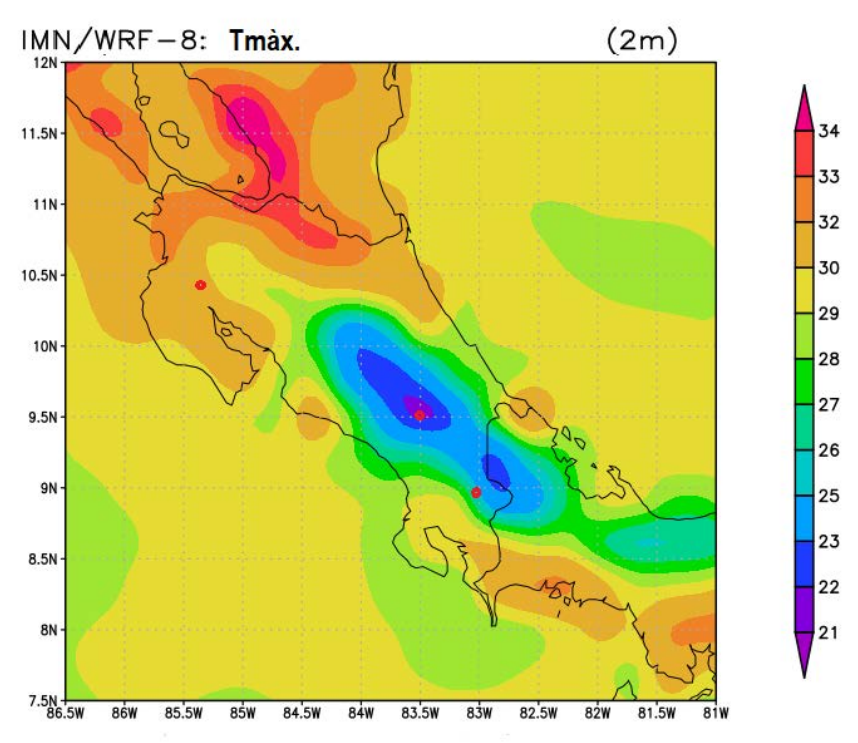


Weather station Type UTP

The installation, recollection and data processing of the conventional meteorological stations (EMMs) predominated until 1998, up to this moment, a new technology was launched (Automatic Meteorological Stations, AMSs), which produced a considerable change in the institutional database; thus, starting from the results from the studies of the different meteorological stations, an institutional baseline was conformed: (1960-1991)/(1981-2010).

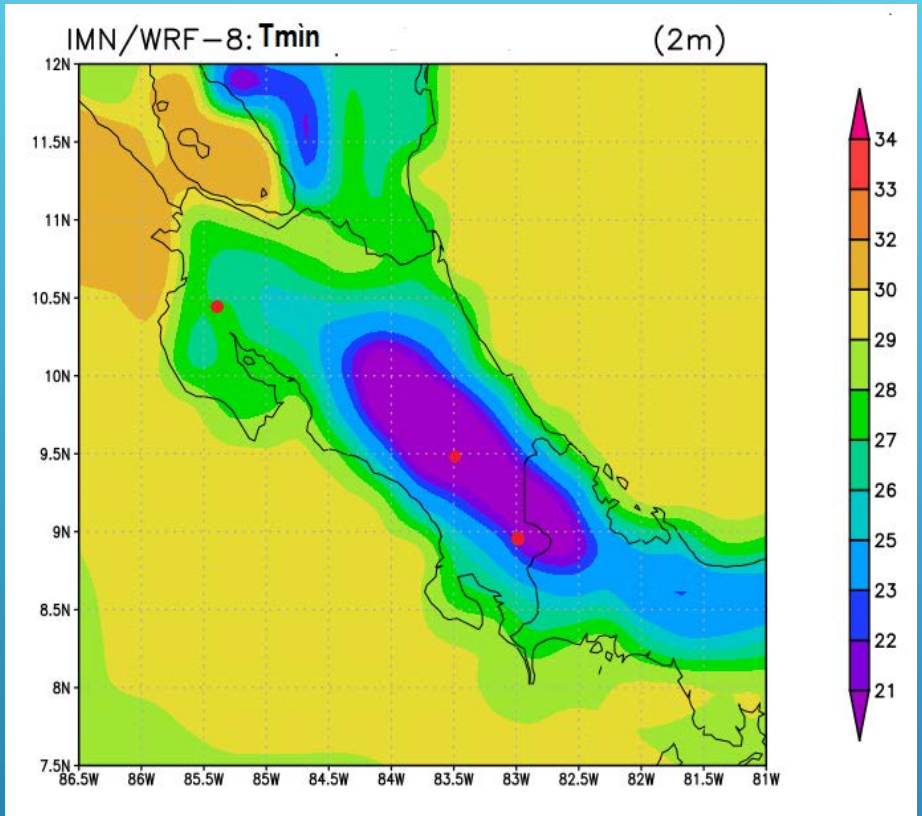


Weather station Type U



The current study, it has been determined that the AMS of Guanacaste, Cartago and Puntarenas, must be considered zones of priority for this research due to their impact, meteorological conditions, location and content data for a period of ten years and their adequacy of environmental measurements.

Another important factor is the climatic characterization because it is a tropical country influenced by diverse factors and meteorological elements and facilitate thermal oscillation within a small country such as Costa Rica.



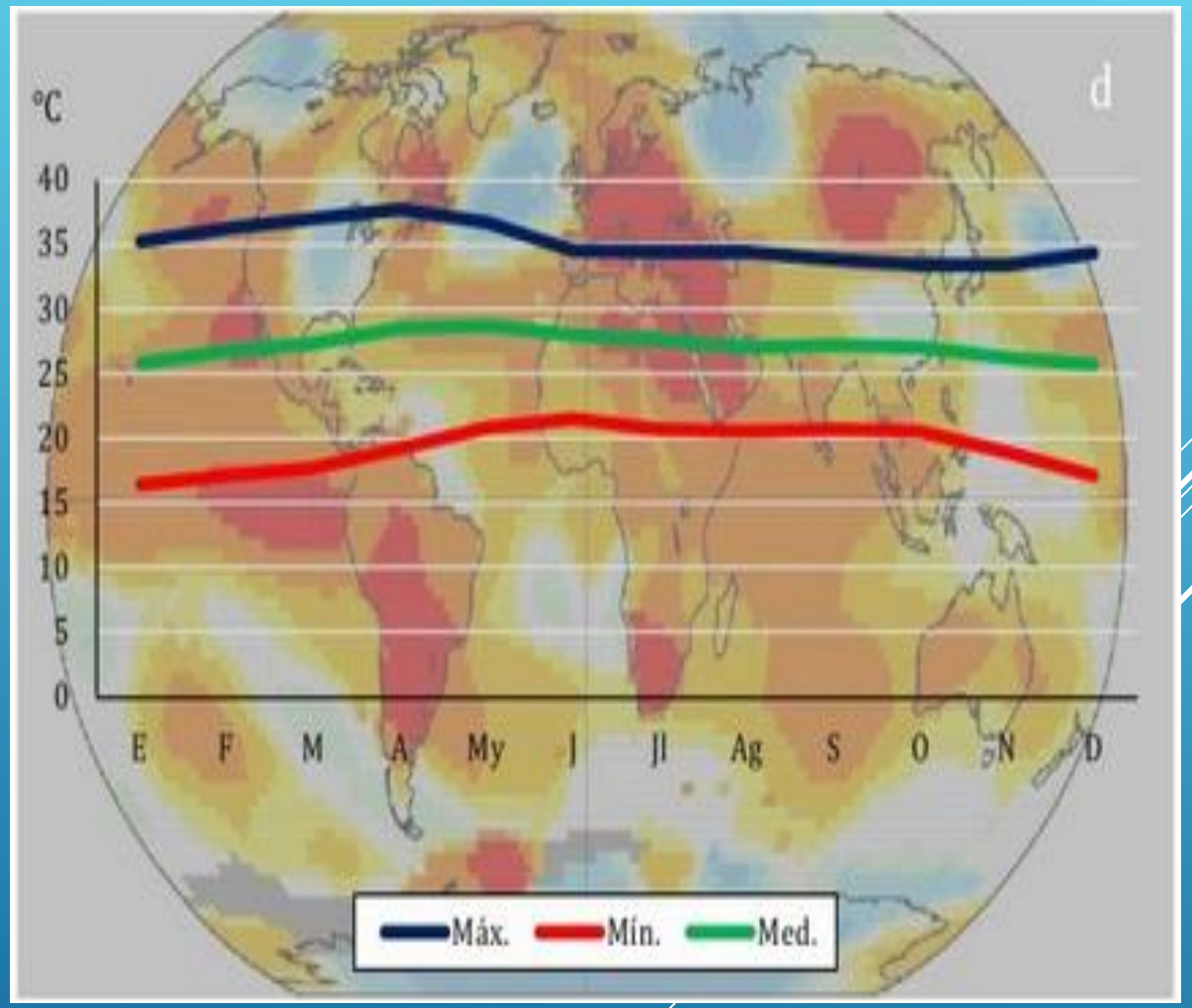
Likewise to define the actions to be developed for the continuous improvement of the database of the NMI, through the study and statistical results that will be obtained from the meteorological stations to Early warming systems (EWSs).

Additionally, the effects of extreme weather events, creating the need for the preventive and corrective improvement of the database for the operation of (EWSs).

Spatial distribution of the stations.

WS	Name	Cimate zone	LATITUDE (NORTH)	LONGITUDE (WEST)	Altitude (msnm)
73137	VOLCAN IRAZU, AUT.	Central Valley	9º58'8"	83º50'21"	3331
74051	AEROP.LIBERIA OESTE 07	North Pacific	10º35'54"	85º32'24"	70
98095	ALTAMIRA	South Pacific	9º01'45"	83º00'28"	1371

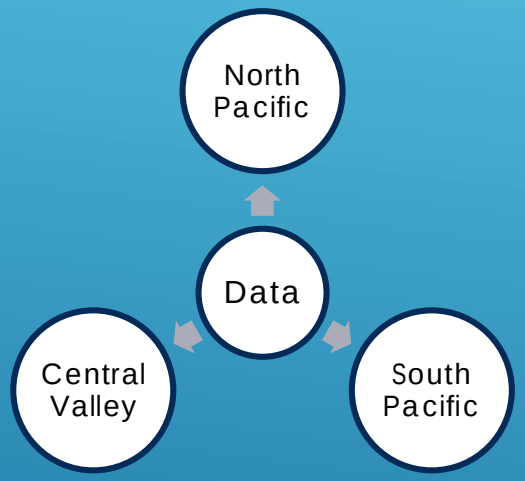
The meteorological variable of the study are: máximum temperature and mínimum temperatura.



Maintenance plan.

The data processing contains different stages, where we should have the reports, review report, data entered (SEMA) and RmetCC.

Different graphs will be elaborated, where the analysis, conclusions and recommendations of the data subtracted from the MSs are obtained.

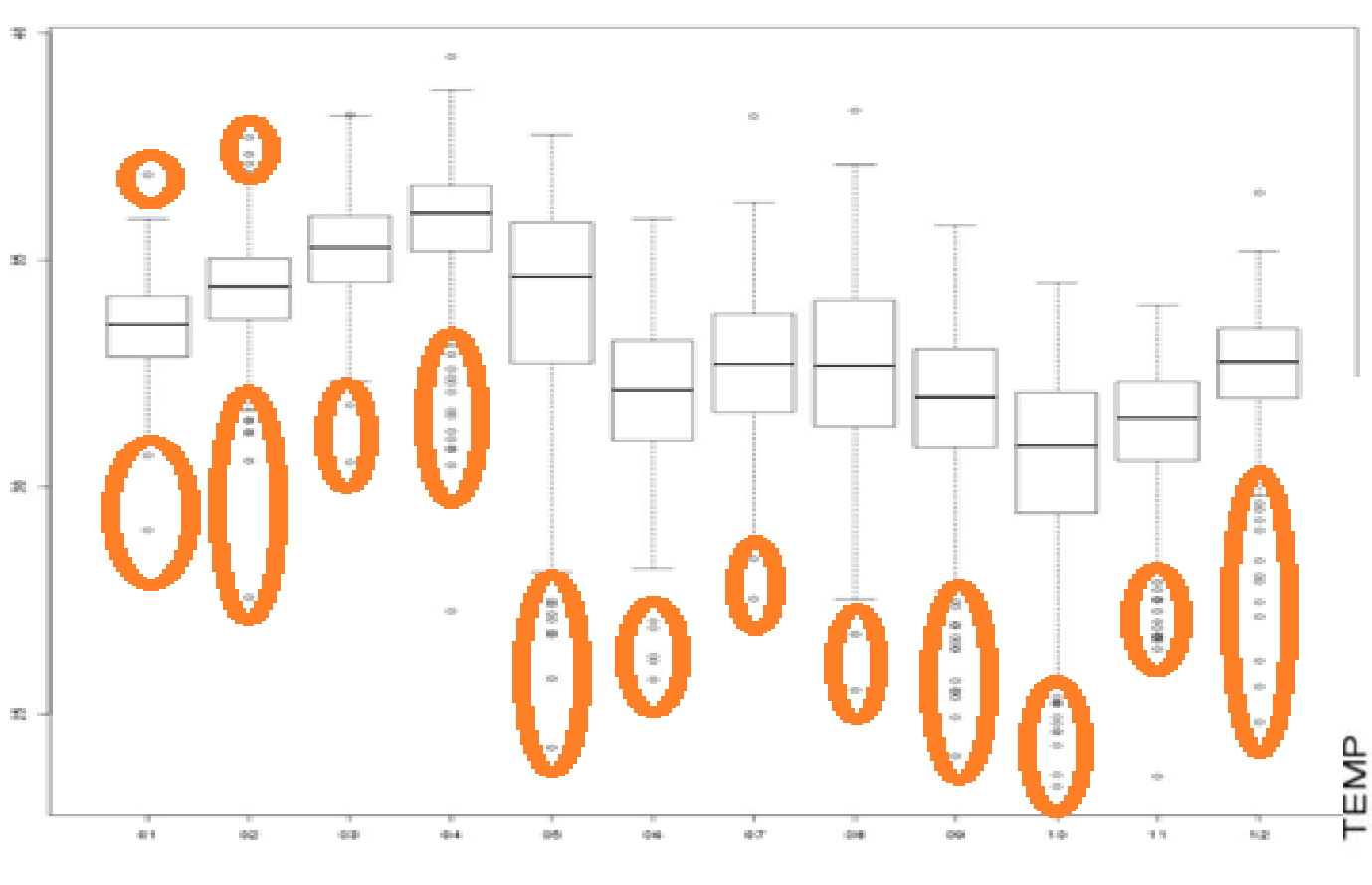


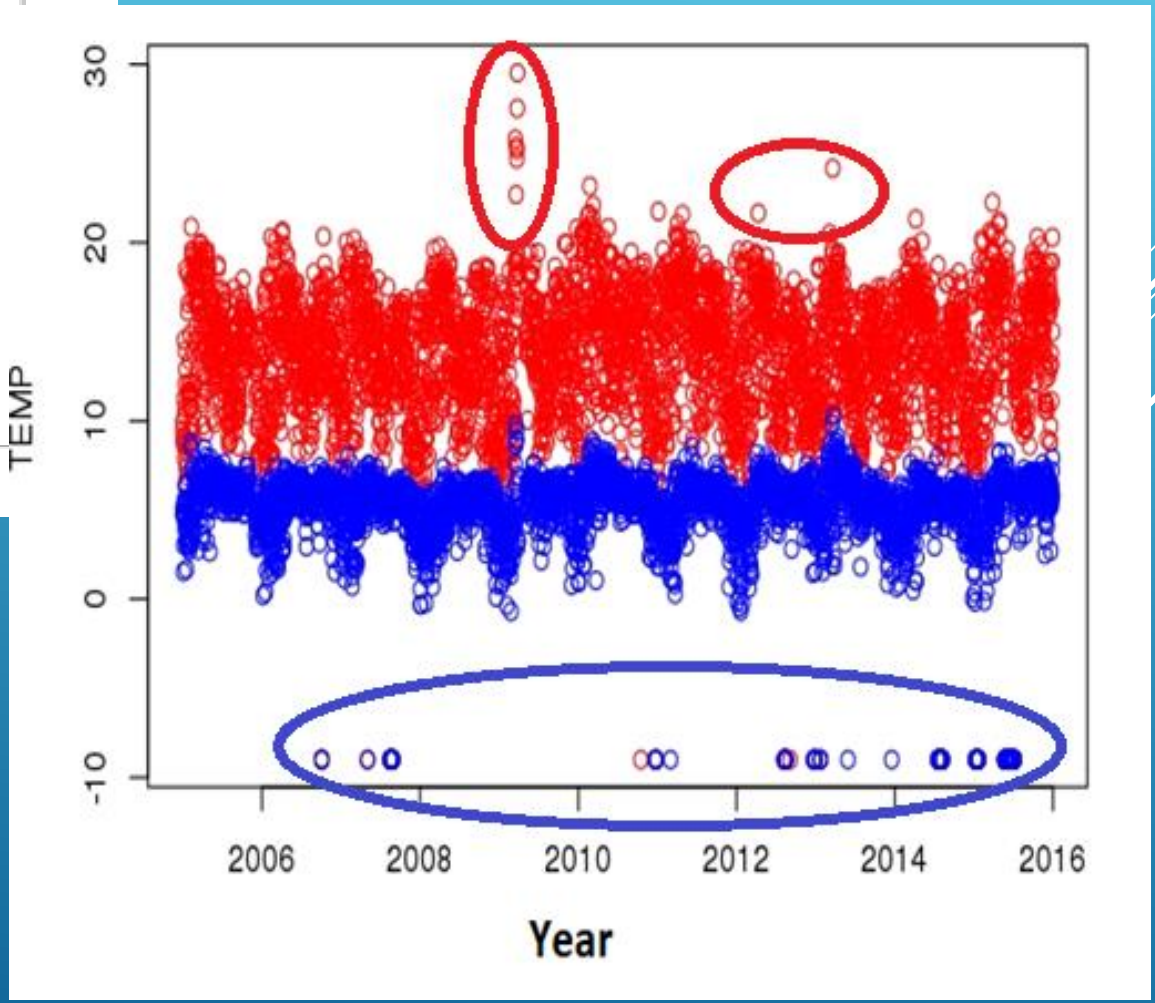
Visited areas

Outline RmetCC Folder

Results

Statistical analysis:



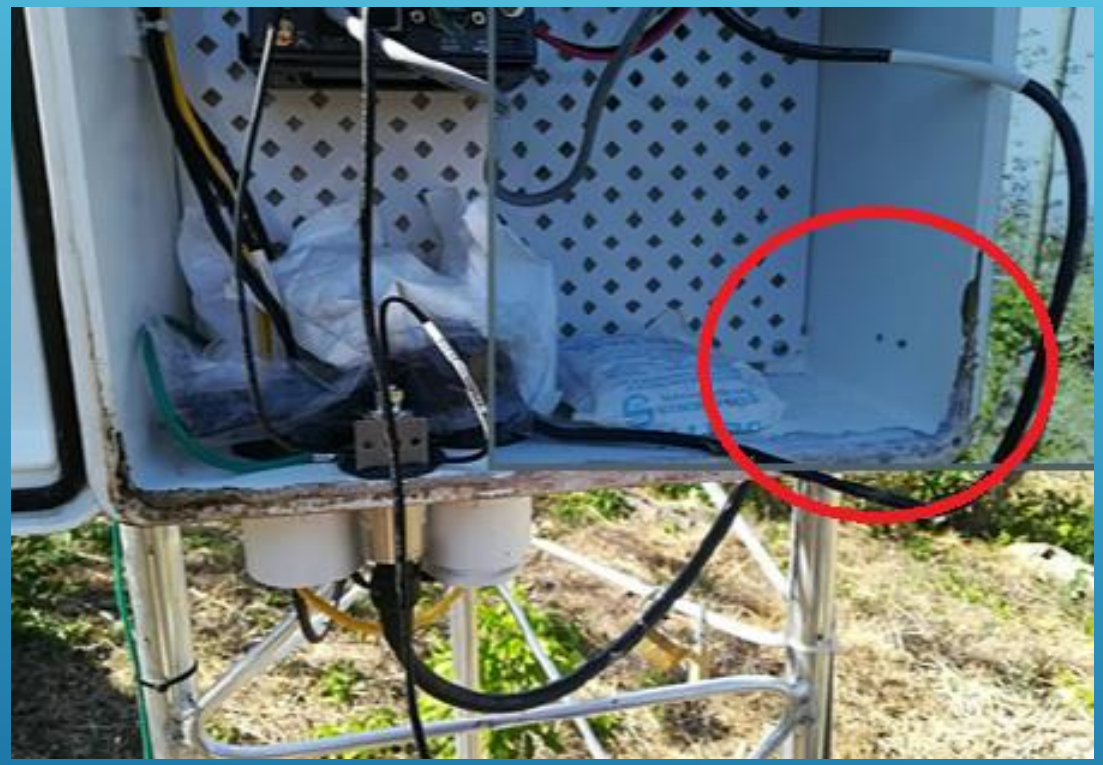


Tendency of atypical values is observed in the lower end for both temperatures (máximum and mínimum).

Problems founds in the equipment and sensors (AMS)

- The power supply has low voltage,
- The panels have not achieved the power required by weather conditions
- Damage in the battery,
- Failures in the transmission (the NMI depends on private owners),
- Error in the installation of the sensor,
- Damage on cables when cutting the grass or make constructions,
- Etc.

Problems in the equipment and sensors (AMS)



Acid spilled from the battery, damaging the fiber of the box.

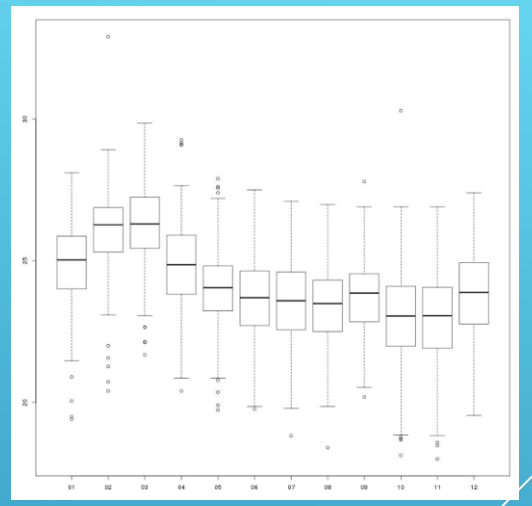
Rusted wind speed roles

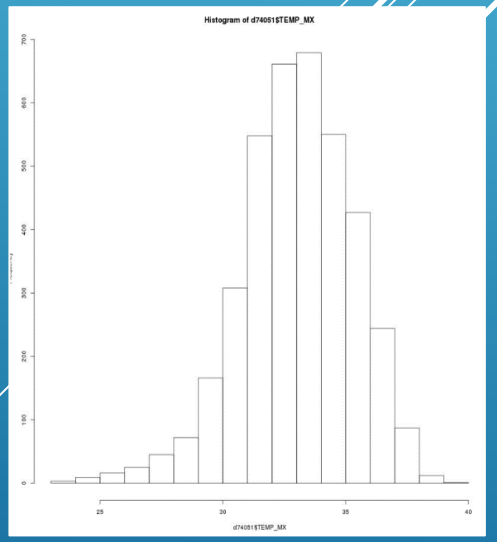
Mud panel on the temperature and humidity sensor.

Leaves and beehive in the rain sensor siphon.

Statistical analysis:

- The minimum temperature data that projects greater anomalies.
- In general, a tendency of atypical values is observed in the lower end for both temperatures (maximum and minimum)
- Box plot graphic: the data are not symmetric values, the dispersion is concentrated between the average and Q3, between 50% and 75% of the distribution.
- The trend of the data has been the location between symmetric frequencies for the maximum temperature with a normal variability. While, the minimum temperature, has a small bias to the left (negative), which indicates that the minimum temperature was higher than the average.





- The presence of erroneous and suspicious data ➡ analyze:

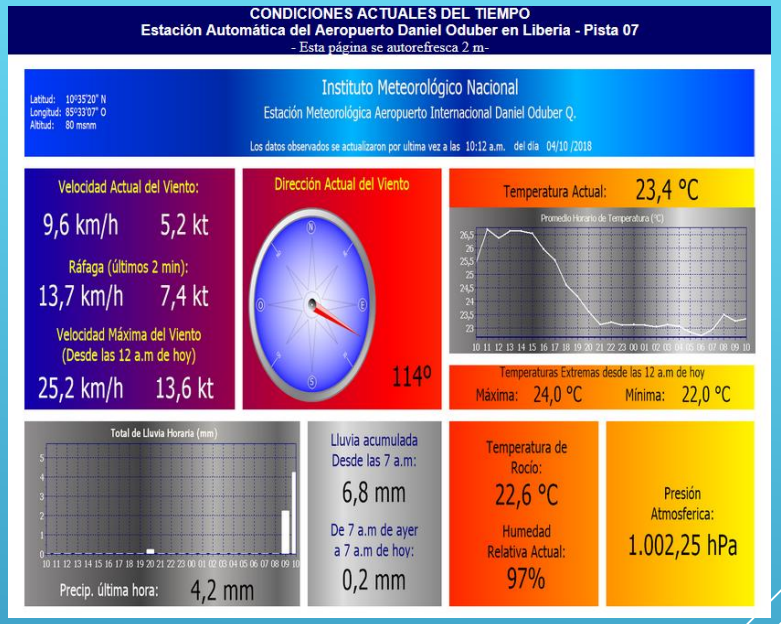
- Meteorological conditions of the period and place,
- Satellite images,
- Weather forecasts reports,
- Maintenance to check:
  - Temperature sensor (useful life, location, position, etc).
  - Current conditions around the AMS.
- Stage of data processing and quality control.

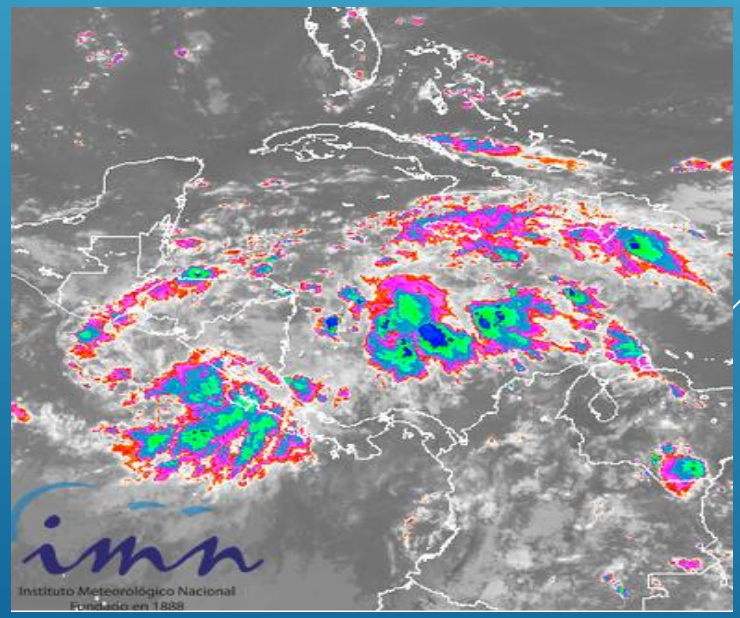
Discussion:

- To mitigate the uncertainty in the research results due derived from different negative factors: equipment installation, sensors, time betwen each visit, data control in real time, data processing, quality control and storage.

- To innovate the Data Process and Quality Control towards a Data Management System (DMS).

“Modernization of new technologies”





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Thank you!!!!

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