

DESCRIPTION AND ORGANIZATION OF THE WMO COMBINED INTERCOMPARISON OF THERMOMETER SCREENS/SHIELDS IN CONJUNCTION WITH HUMIDITY MEASURING INSTRUMENTS

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Description and Climatology of the Site

The WMO combined Intercomparison of thermometer screens/shields in conjunction with humidity measurements was held from the 1st of November, 2008 to the 31st of October, 2009, at the meteorological station of Ghardaïa, Algeria, situated at 640 Km south of the capital Algiers. The meteorological station (32°24 N, 03°48 E, 468 meters above the sea level) is bordered to the north west by the city of Ghardaïa (20 Km), to the east is the Noumerate Airport (1500m), to the north is an open field and in the south the national road N°1.

The climate of the city of Ghardaïa is characterized by low annual precipitation, which is extremely variable. The annual distribution of temperature is fairly uniform. The temperatures of summer vary from 40 °C to 45 °C and the absolute maximum recorded in Ghardaïa is 47 °C in July 2005.

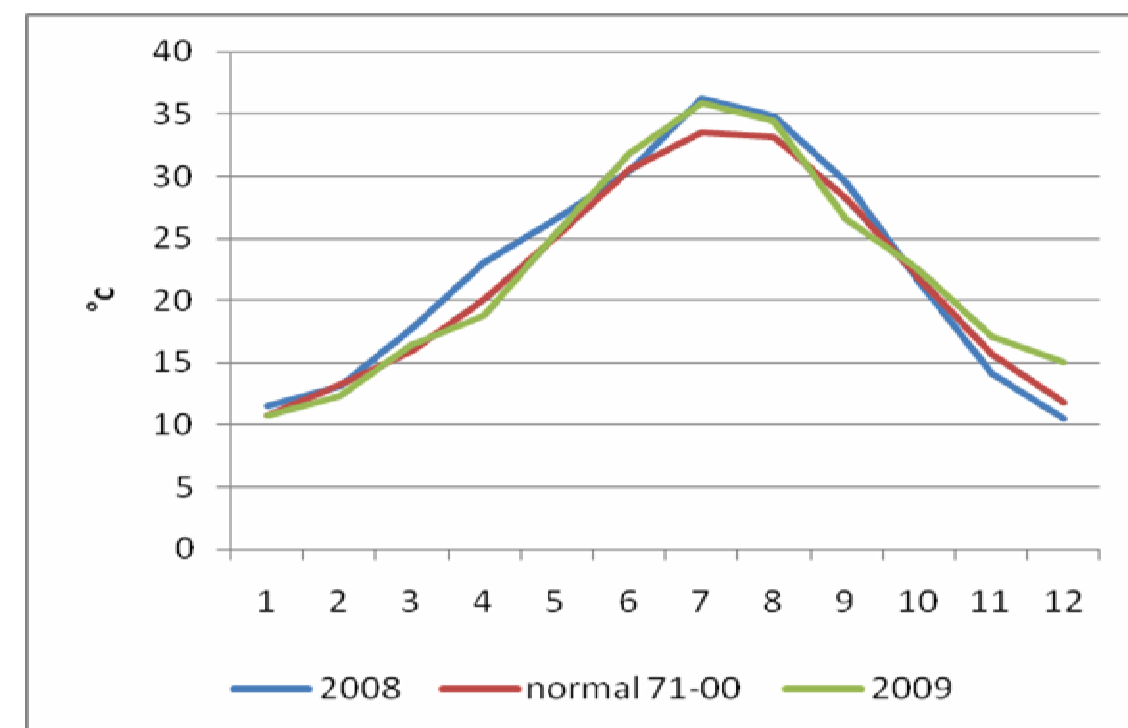
The maximum winds are about 15 m/s, occurring during the spring season, and their direction are predominately from north-northeast

Sunshine duration

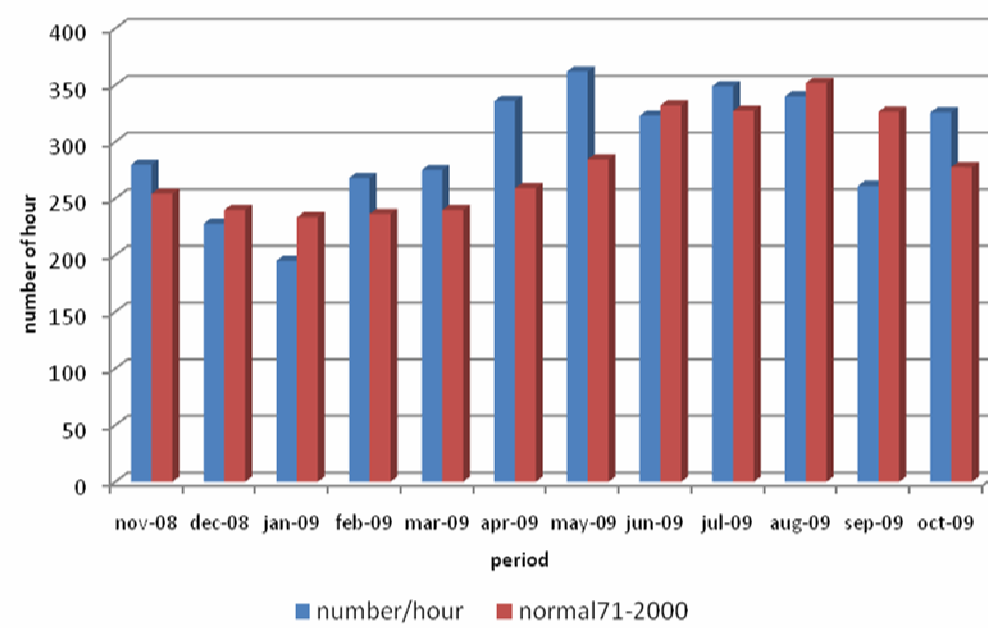
The mean monthly totals of sunshine duration show a maximum of 350 hours in May 2009 and a minimum of 195 hours in January 2009. April, May and October 2009 had significantly greater values of monthly sunshine duration than the normal. The yearly maximum event occurred in May and not in August as usual.

Temperature and relative humidity

The monthly mean temperature of Ghardaïa is 10.4 °C in January and 36.6 °C in July.



Monthly mean temperatures

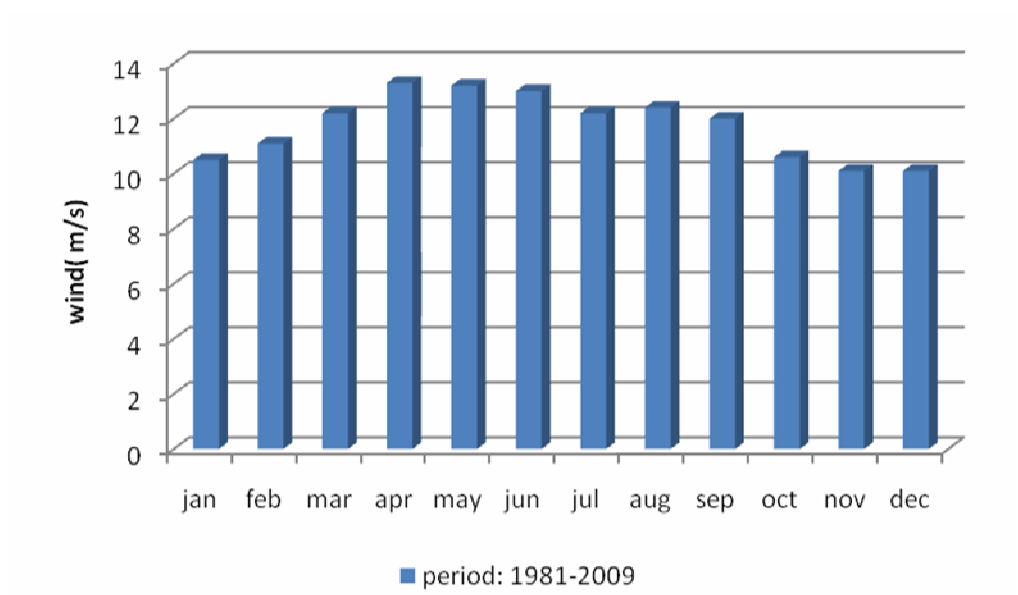


Sunshine duration

Wind

Stronger winds in the region of Ghardaïa are mostly prevailing during the period from March to June. On average of 3.3 days of dust storms and 49 blowing sand events occur per year

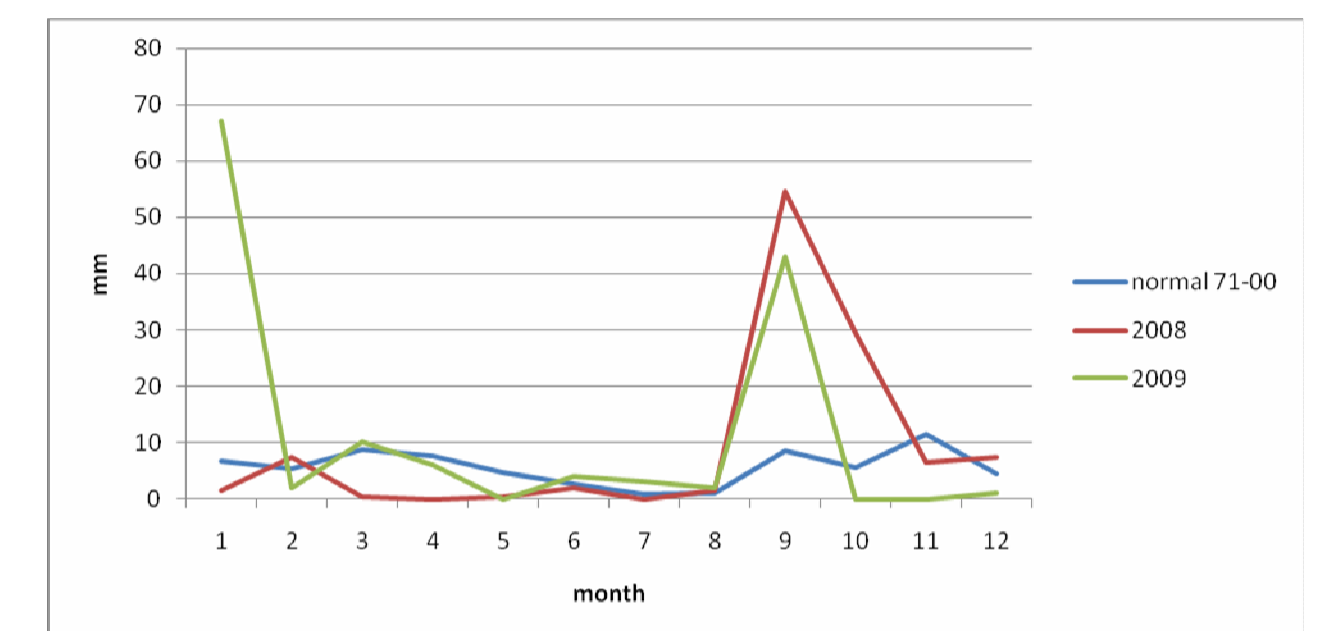
Intercomparison Field Ghardaïa, Algeria



Average Maximum Windspeed

Precipitations

Rainfall events in Ghardaïa may be compared to Mediterranean type or arid tropics rainfall events: there is highly variable from 1 to 100 m/h when violent thunderstorms occur.



Monthly rainfall amounts in Ghardaïa

Presentation of the screens and humidity sensors

29 Screens participate to the Intercomparison most of them are installed by pairs (15 naturally ventilated & 14 non-ventilated) and 17 humidity sensors both of them are also installed by pairs, having thus 08 different types of sensors.

Member Country	Photos	Manufacturer and type of the screen	Type of the screen		Acronym
			Nat	Art	
Algeria		Socima / Large Stevenson screen	01		LSOC
Australia		BOM / Small Stevenson screen	01		LBOM
Austria		Lanz	02		LLAN
France		Socima / BMD195D	02		SSOC
Germany		Eigenthum LAM30	02		VEIG
Germany		Fischer / 43141	02		VFIS
Germany		Vaisala / HMT337 & HMT330 MK	02		SVAI
Italy		CAE / TUDAS	02		SCAE
Sudan		Casella Stevenson screen	01		LCAS
Switzerland		Mateohor / Thygan VTP 37	01		VTHY
Switzerland		Mateohor / Thygan VTP 37 Airport	01		VTHY
Switzerland		Romnic RS127	02		VROT
UK/EMEI		Windsonic / T511 PS-D3	02		SWIN

Member Country	Photos	Type of sensor	Manufacturer	Acronym
Germany		431401	Fischer	VFIS
Germany		Hunicap HMT 337	Vaisala	SVAI
Germany		HMP 45 D	Vaisala	UBMP
Germany		Hygrosol 6337 9742	Testo	UTES
Italy		TUDAS	CAE	SCAE
Switzerland		Thygan VTP 37	Mateohor	VTHY
Switzerland		Thygan VTP 37 Airport	Mateohor	VTHY
Switzerland		Hygrosol S3	Romnic	VROT

Presentation of the Ancillary Measurements

To evaluate the effects of wind and radiation on temperature and humidity sensors, the field was equipped by an additional meteorological measurement.

Wind Measurements



Thies & Gill Ultrasonic anemometers

Radiation Measurements



Albedometer & Pyrgometer Pyranometer

Additional temperature Measurements

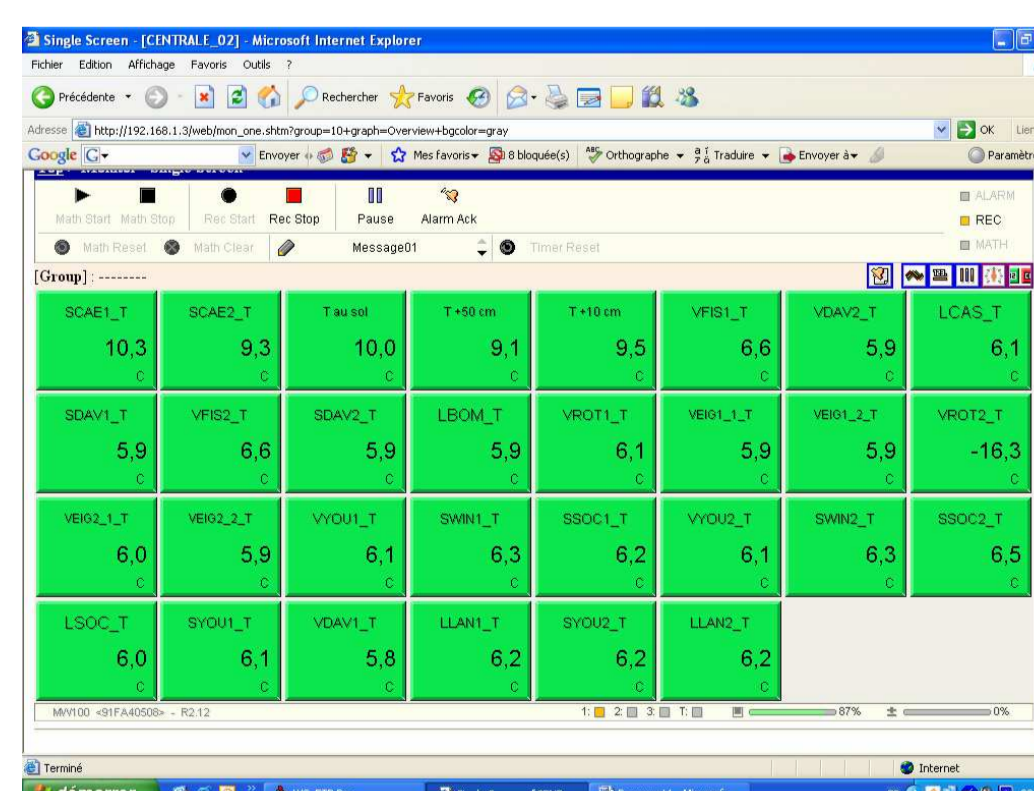


Temperature probes

Routing of the Data

All the data which are analog or Digital are stored on an acquisition Computer. This computer contains the two software of visualisation and storage of the data; one is for the analogue software and the other for digital data. The data are then transferred to a server PC, to facilitate the routing of the data to Trappes and Algiers for processing and analysis.

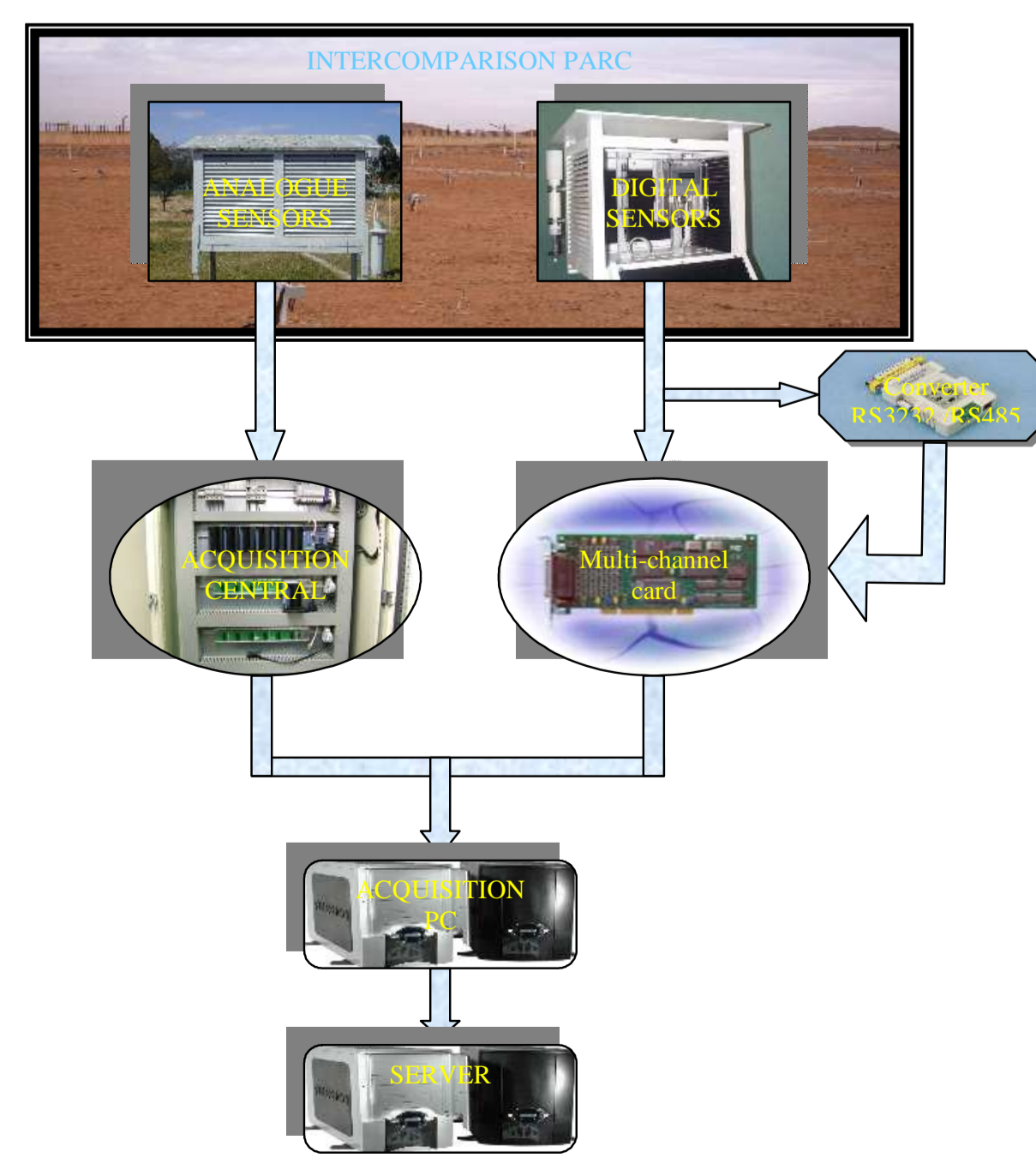
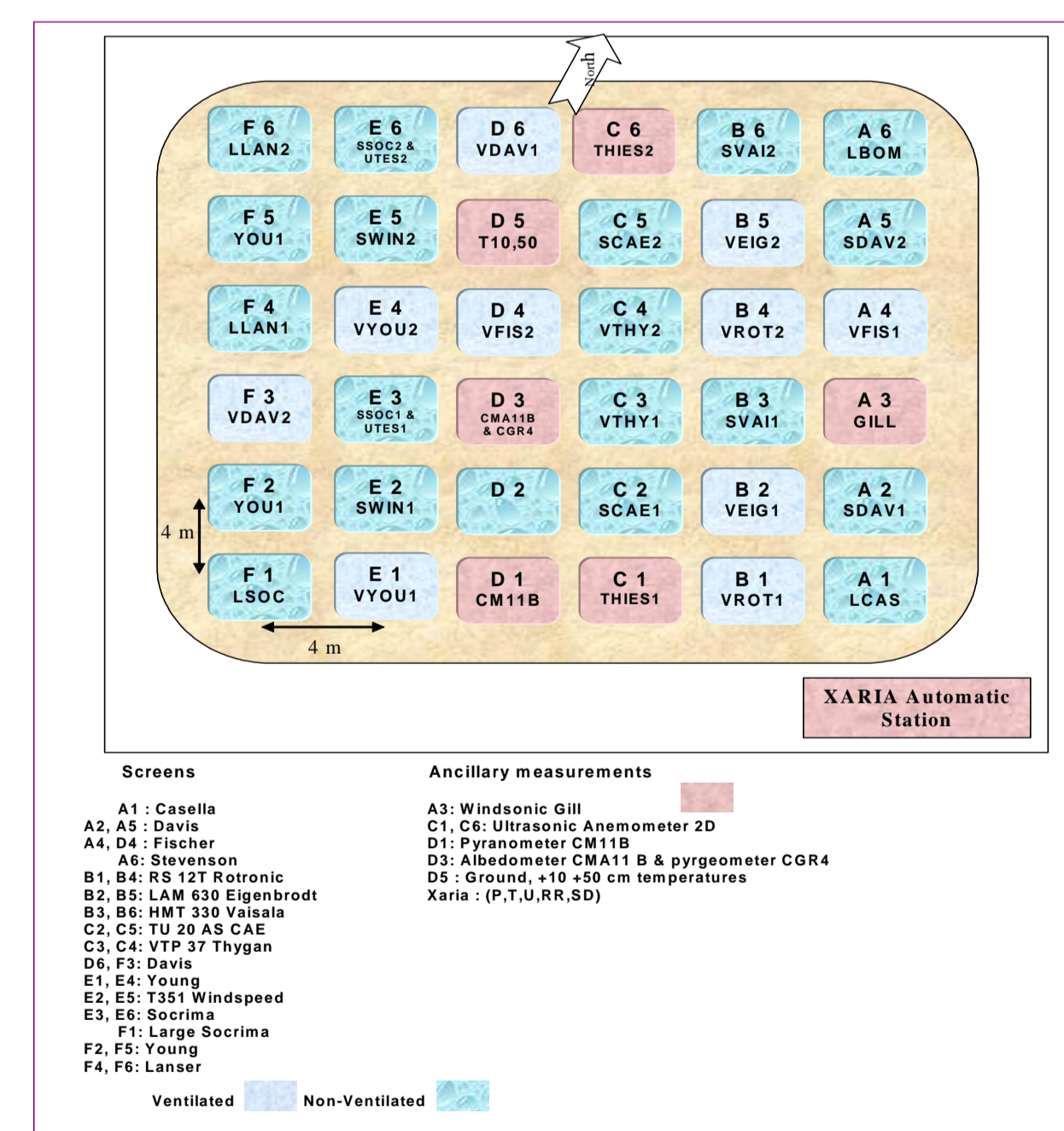
All the data collected are processed by BDDGEN software provided (Météo-France) and MySQL Server Database (Algeria).



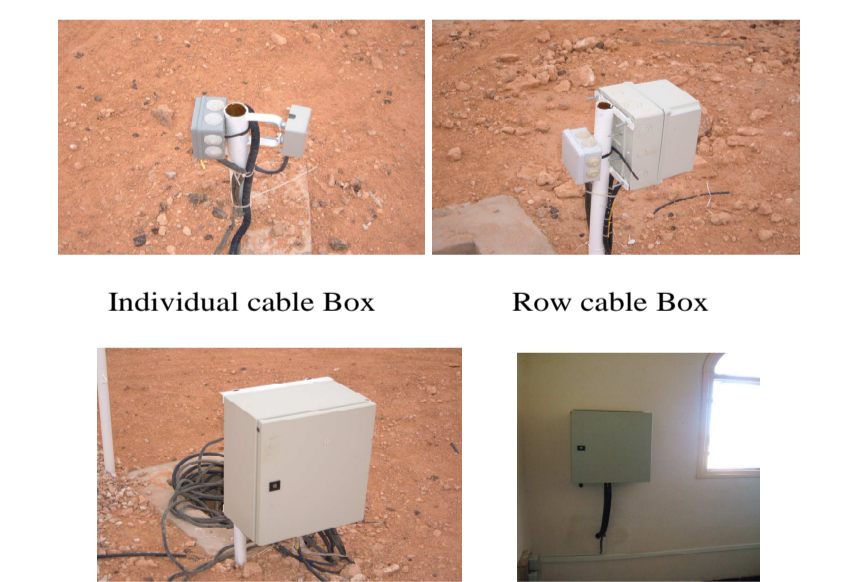
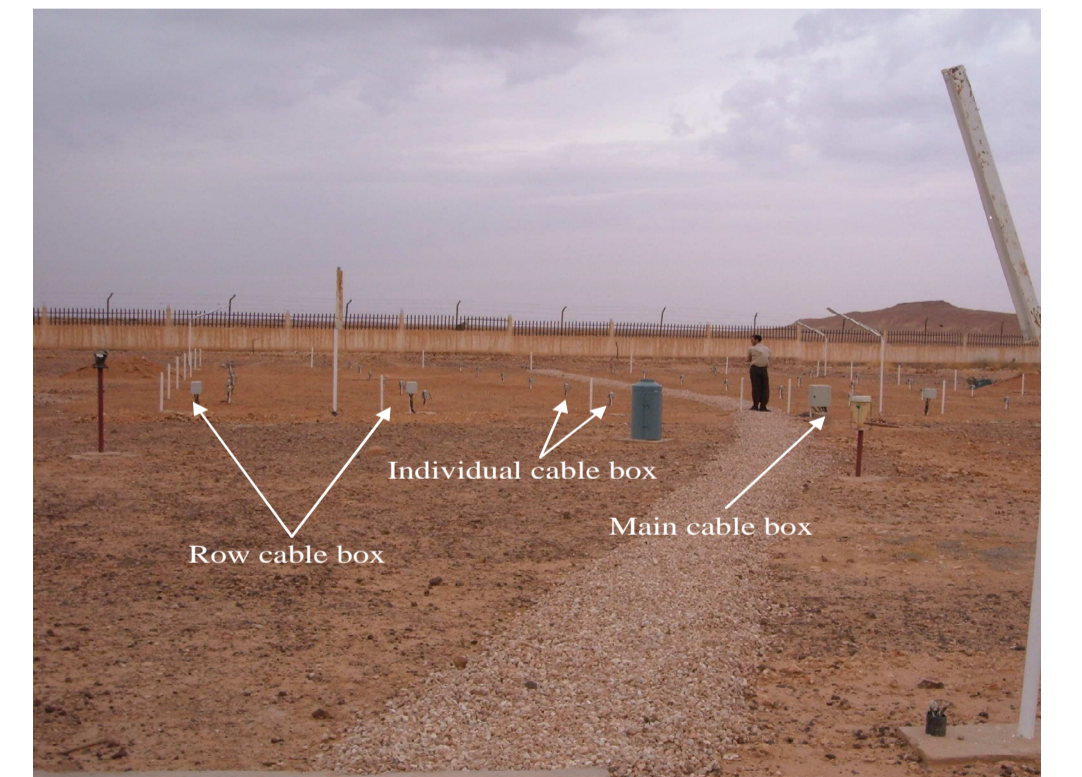
Software for the Analog sensor



Software for the digital sensor



Synopsis of the data collect



Positioning of the Instruments

References

- Final report of the 4th (reduced) session of the Expert Team on Surface-Based Instrument Intercomparisons and Calibration Methods and of the 4th (reduced) session of the International Organizing Committee on Surface-Based Instrument Intercomparisons, Ghardaia, 19-23 March 2007.
- Meteorology -- Air temperature measurements -- Test methods for comparing the performance of thermometer shields/screens and defining important characteristics, ISO/FDIS 17714:2007, Edition 1, 2007

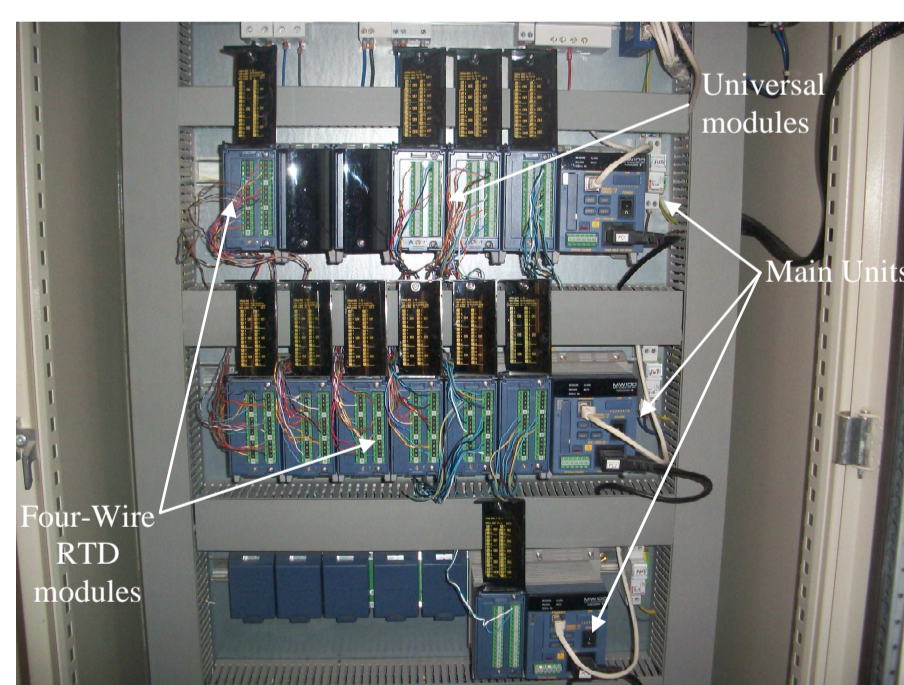
Data Acquisition System

The acquisition data from the sensors and systems under test was done using two systems

Acquisition of analogue sensors

The acquisition of data from the analogue sensors for the Intercomparison was done using a data acquisition system (DAS) manufactured by Yokogawa (Japan). The Yokogawa DAS is a complex system that enables the acquisition of analog and digital signals. The DAS is composed by the following modules:

- Three main units, Model MW100.
- Five universal input modules, model MX110-UNV-M10.
- Seven four-wire RTD input modules MX110-4VR-M06.
- One high speed digital input module model MX115-D05-H10.



The system is equipped with a battery and an inverter, as a backup for the main power system, to ensure its continuity in operations. Each main unit comes with a web server function, allowing users to easily enter settings and monitor measured data from PC using a web browser.

The five universal input modules, MX 110-UNV-M have been used for the acquisition of measurements from a sensor with a DC voltage output. Each of these modules has 10 inputs. The highest resolution is 100 µV for 2 V measurements range. The seven four-wire RTD input modules MX110-4VR-M06 were used for the acquisition of data from the Pt100 temperature sensors. Each module has 06 inputs. The maximum resolution is 0.01 °C.

Acquisition of digital sensors

The acquisition of data from the digital instruments was done using two multipoint acquisition cards model AccelePort Xr920, manufactured by Digi International. Each of these cards has eight RS232 serial ports, with baud rates up to 921600 bps. Given the fact that the distance between sensors and the acquisition computer exceeds 15 meters, RS232/RS485 converters were used, to ensure the quality of data received. A dedicated software was developed by Météo-France to acquire the data from all digital sensors. The acquisition rate for the wind sensors (Thies and Gill) was 2 samples per second. The software processed and recorded one-minute messages with 2-minute and 10-minute averages.

The Thies temperature measurements were stored every 10 seconds and the virtual air temperature was processed later.



AccelePort Xr920 Card RS 232/RS485 Converter