

2nd GRUAN Implementation-Coordination Meeting (ICM-2)

Payerne, Switzerland
2-4 March 2010

Item 7.2.7

**Site report: CNR-IMAA Atmospheric Observatory (Potenza),
Italy**

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Summary and Purpose of Document

This document contains an overview of the measurement programme at the Potenza site with respect to GRUAN requirements, and addresses the questions to be discussed in this session. The description of the whole equipment of the facility is available on the CNR-IMAA website (www.ima.cnr.it).

CNR-IMAA Atmospheric Observatory (Potenza)

Status of Potenza site

The Potenza site, run by the Istituto di Metodologie per l'Analisi Ambientale (IMAA) of the Italian National Research Council (CNR), has been formally established as an advanced atmospheric observatory, named CIAO (CNR-IMAA Atmospheric Observatory).

At the end of 2009, the Italian Met Service and the Permanent Representative of Italy with WMO, on the basis of the invitation of the GCOS secretariat, has expressed to the president of the National Research Council (CNR) his positive opinion to the formal request of including the CNR-IMAA Atmospheric Observatory in the GRUAN global monitoring network. The agreement has been established also on the basis of an enhancement of the partnership between the Met Service and the CNR.

The CNR-IMAA Atmospheric Observatory is currently fully operational. Respect to the status of the facility at the time of the ICM-1 meeting, new automatic quality check procedures for providing quality-controlled data on the vertical profiles of clouds, humidity, temperature and aerosols are under implementation. Moreover, the writing of the instrument manuals/handbook is in progress and their publications on the CIAO website, along with the near-real time quicklooks of all the data from the instruments of the observatory, is expected for the mid 2010.

The new scanning unit of the 36 GHz radar, already operational in the zenith pointing mode, is expected for the end of March 2010. The acquisition of new instruments is planned with particular interest for the acquisition of a FTIR and devices for trace gases monitoring, as well as the acquisition of a new GPS receiver. The description of the whole equipment of the facility is available on the CNR-IMAA website (www.ima.cnr.it). An updated website for CIAO is under development.

Questions

1. Which of your existing radiosonde launches already meet the mandatory requirements (GCOS-121: once weekly best production quality radiosonde, once monthly stratospheric water vapour; recommended twice daily), and which additional launches need to be instigated or augmented?

Radiosoundings performed at CIAO were usually performed once per week contemporaneously with the Raman lidar regular night time measurements.

In the frame of the priority phase 1 of GRUAN, in order to match the GCOS mandatory requirements and to instigate additional launches respect to the past activities, the following launch schedule is proposed:

- a. once weekly best production quality radiosonde performed with the autosonde launcher;
- b. once monthly stratospheric water vapour, performed manually (simultaneously to the autosonde launch)

The stratospheric water vapour launch will be performed using the devices and the techniques suggested by the GRUAN expert community.

2. Which ground based measurements can you provide in addition to the mandatory GPS total water vapour column (microwave, FTIR, lidar, ...) and how can you use these additional observations to make sure that measurement uncertainty estimates will be consistent?

The observatory is already equipped with a Trimble GPS receiver. The data are freely accessible but the implementation of the suitable algorithms, in cooperation with experts in this field, is needed. A support from the GRUAN community is expected for establishing the GPS data processing.

CIAO is also able to provide continuous measurements of water vapour provided by a microwave profiler and a sun photometer, as well as the Raman lidar measurements operated on a systematic basis.

3. Do you have any limitations regarding the development of GRUAN launch protocols for routine and reference sonde launches (e.g. the use of autosonde launchers)?

There are no limitations for the development at the site of the GRUAN launch protocols. Balloon-based observations of temperature, pressure, humidity and winds using different measurement techniques can be performed with three different systems. The VAISALA AS13 autosonde system is able to perform up to 24 fully automatic launches. Other two manual VAISALA radiosounding systems are available (MW21 and PP15). The MW21 is able also to collect wind measurements. These three systems allow performing multiple radiosoundings.

In the past, several tests with multiple balloon launches using different radiosonde types (RS-80, RS-90 and RS-92) have been performed to assess and diagnose instrument failure and characterize instrument biases.

The autosonde system has been recently upgraded and recalibrated by the manufacturer. CIAO proposal for developing the GRUAN protocols is to perform routine launches using the autosonde launcher and to perform stratospheric water vapour or other additional launches using the manual system.

4. Do you have any limitations regarding the development of uniform GRUAN data processing schemes for remote sensing observations?

There are no limitations for the development of GRUAN data processing schemes for remote sensing. Actually we could build on the expertise already gained in other networks (EARLINET, Cloudnet, etc.).

5. What local analysis can you provide to assure that measurements uncertainties will be consistent across the network (analysis of redundant observations either dual sonde launches or sonde + remote sensing observations)?

CIAO archive contains several examples of dual sonde launches performed using the manual and the automatic launch system as well as co-located and contemporaneous radiosoundings and remote sensing measurements, in particular using the Raman lidar and the microwave profiler. This redundant dataset allow us redundant analysis for ensuring the consistency of the measurements uncertainties with the rest of the network. In particular, test relative to the representativeness and comparisons relative to the radiosounding uncertainties have been already performed.

As a GRUAN site and accordingly to the protocol we suggested above, the monthly stratospheric water vapour could be (manually) performed contemporaneously to the weekly autosonde launch, in order to increase the redundancy of the dataset collected at the GRUAN sites but also offering the opportunity to assess possible limitations in the routine use of the autosonde launchers in the frame of GRUAN.

6. For sonde observations: Can you provide all raw data for central archiving?

For sonde observations CIAO can provide all raw data for central archiving. No restrictions exists regarding the transfer of the data to a central collection unit; the raw data will be also stored in the CIAO central archive as well.

7. For remote sensing observations: Will you be able to archive all raw data for possible future reanalysis and reprocessing?

First of all, it is necessary to sort out the meaning of “raw data”. CIAO observatory has an archive that is already operative and routinely collects all the lv1 (e.g. radiances) raw data and processed data provided by in situ and remote sensing instruments operated at the observatory. For most of the devices also the lv0 (e.g. electrical signals) data are routinely stored in the data archive. Therefore, this means that it is necessary to clarify if “raw data” for GRUAN community means lv0 or lv1 data. Moreover, it should be considered that for some techniques (e.g. radar), lv0 data are represented by the single spectrum collected with a high temporal resolution that requires huge storage capacity. In this case, the option to consider the lv1 as the raw data is probably the most appropriate.

8. What help do you need from the Lead Centre / WGARO / GCOS Secretariat in moving forwards?

As already suggested at the ICM-1 meeting, we need an effort in a “fast response” support in case of questions about the network operation and about news on actions to gain support from the scientific community, sponsors, funding agencies, call for applications.

As already mentioned a support for the GPS data processing is requested. The GPS data are available at CIAO but the observatory has not yet the necessary expertise for processing the data. We expect from the Lead Centre the provision of possible links with GPS experts for starting the data processing and gain the preliminary information for running and critically using the routine for the data processing.

Moreover, we expect also a support from the Lead Centre / working group regarding to the methodologies to apply for the instrument calibration/intercomparison/validation and for the protocols for data dissemination.

9. Will you be able so host local intercomparison campaigns (yet to be scheduled)?

CIAO is an infrastructure particularly suitable for performing intercomparison campaigns.

The facility can host these experiments and it is also equipped with a guesthouse.

The infrastructure already hosted measurements campaigns as well as special experiments performed by manufacturer (e.g VAISALA) for the optimization of the data collection and processing using radiosoundings.

Moreover, in the near future possible funding could be available for such measurement campaigns from the trans-national access activities of EU FP7 proposals that are currently under evaluation.

10. Are there any special infrastructure needs that should be addressed?

Not at the moment.