

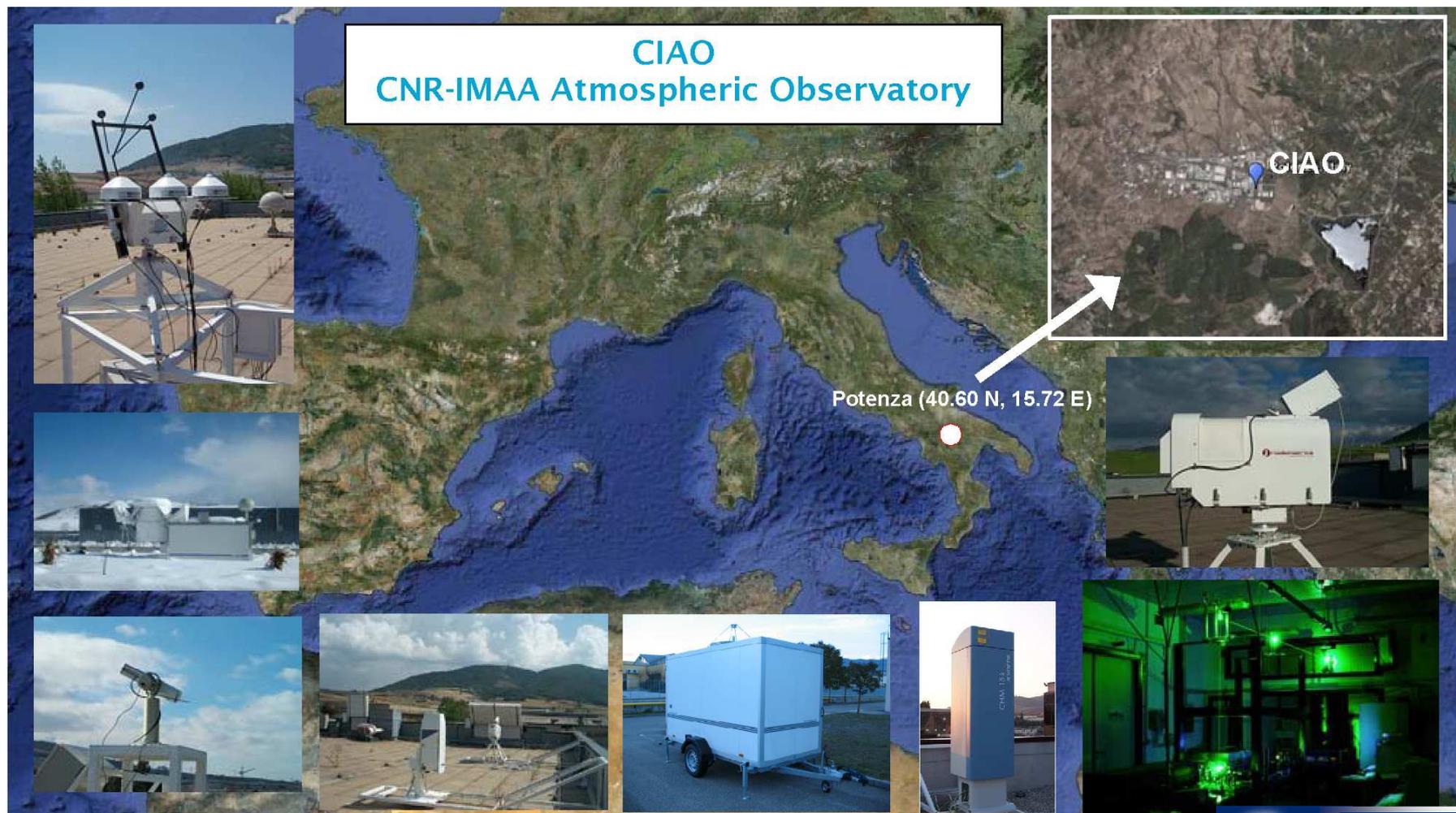
# CIAO (CNR-IMAA Atmospheric Observatory) Potenza GRUAN site

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# Potenza GRUAN site



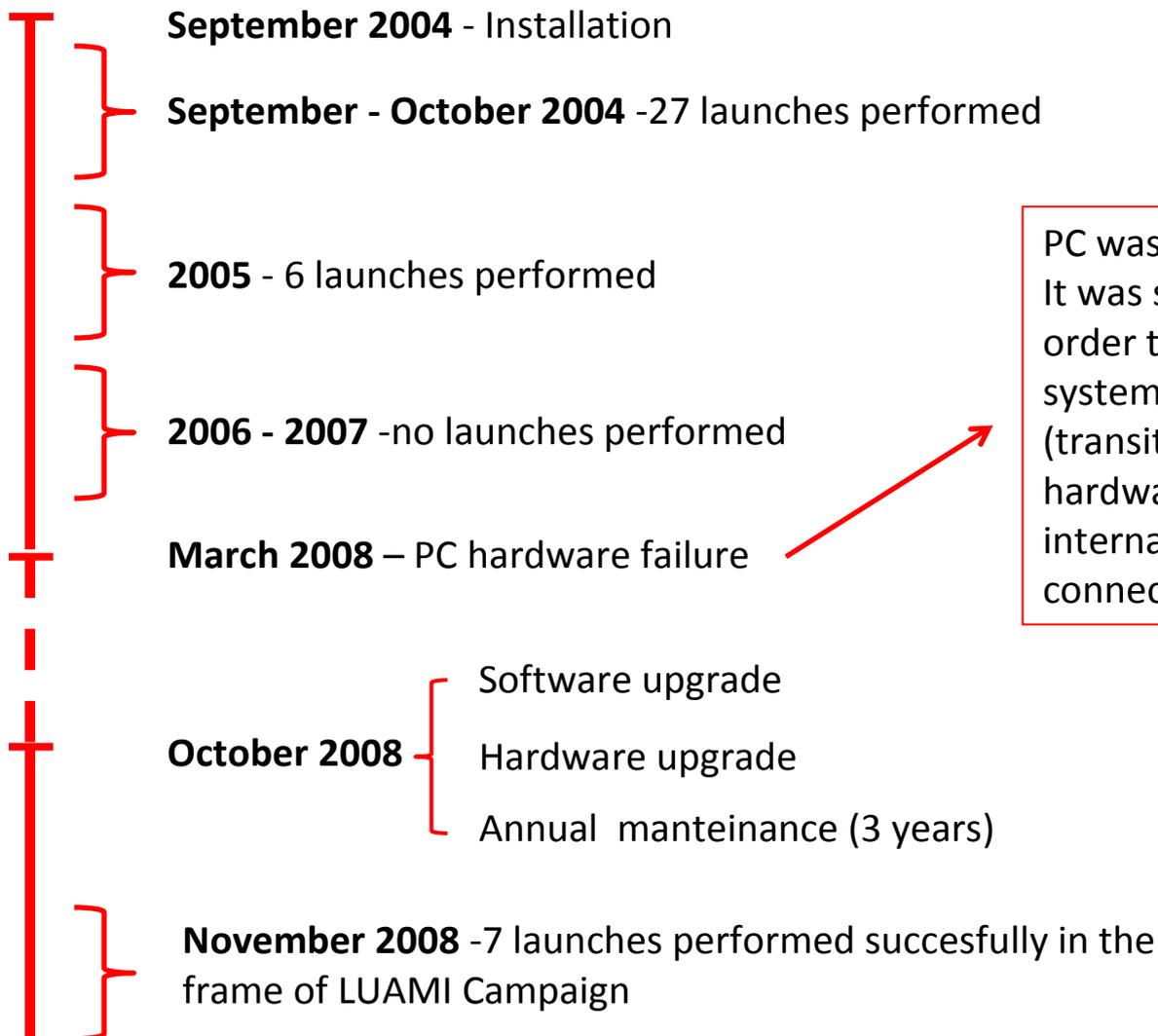
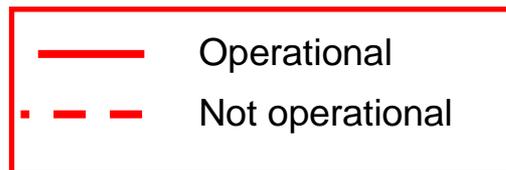
ICM-4, 5-9 March, Tokyo, Japan



# Experience with Vaisala Autosonde AS13 at CNR-IMAA Atmospheric Observatory (CIAO)

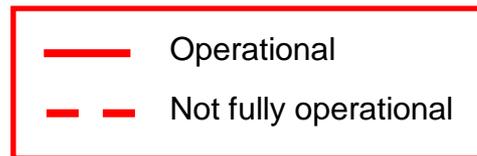
Aldo Giunta: CIAO GRUAN site Operator  
[giunta@imaa.cnr.it](mailto:giunta@imaa.cnr.it)

# History of autosonde system in Potenza



PC was sent to Vaisala for repairing. It was sent back on June, but in order to return operational the system needs a software upgrade (transition to version 3.52) and a hardware upgrade (removal of internal GC and replacement of all connection interfaces)

# History of autosonde system in Potenza



- July 2009** – Air conditioning failure. Replacement.
- October 2009** – Annual maintenance. A compressed air loss will cause main and spare compressor failure
- December 2009** – Replacement of main compressor, floating for flowmeter and UPS battery
- March 2010** – Logics I/O card failure. Replacement
- June 2010** – problem with sonde release from tray
- July 2010** – database corruption. Remote recover
- August 2010** – replacement of spare compressor, pressure gauge and adjustment of activation card
- February 2011** – the problem of telemetry was caused by a wrong data cable connection inside antenna
- Summer 2011** – replacement of all external air compressed hose

The temperature inside the system increased up to 40 Celsius degrees!

Spare compressor stress will cause the fixing points break and strong vibrations

Problem with telemetry. Data cover is only until 4 -5 km

36 launches performed successfully until January 2012

**The system needs an upgrade in order to use the new radiosonde with dry cell battery (the only available on the market now)**



# Comments , remarks and suggestions

## Advantages of Autosonde system:

- needs only one operator that takes care of sonde loading and ordinary maintenance saving about 50000 Euros per year
- up to 24 scheduled unattended launches
- remote control

## A long series of problem between November 2008 and February 2011 (poor use)

These problems are the result of the fact that:

1. Only a few launches have been performed
2. Unavailability of a person dedicated to the system in the past years.

However, although CNR-IMAA does not have dedicated funds to radiosounding from beginning of 2011 we have tried to perform systematic launches on a weekly basis

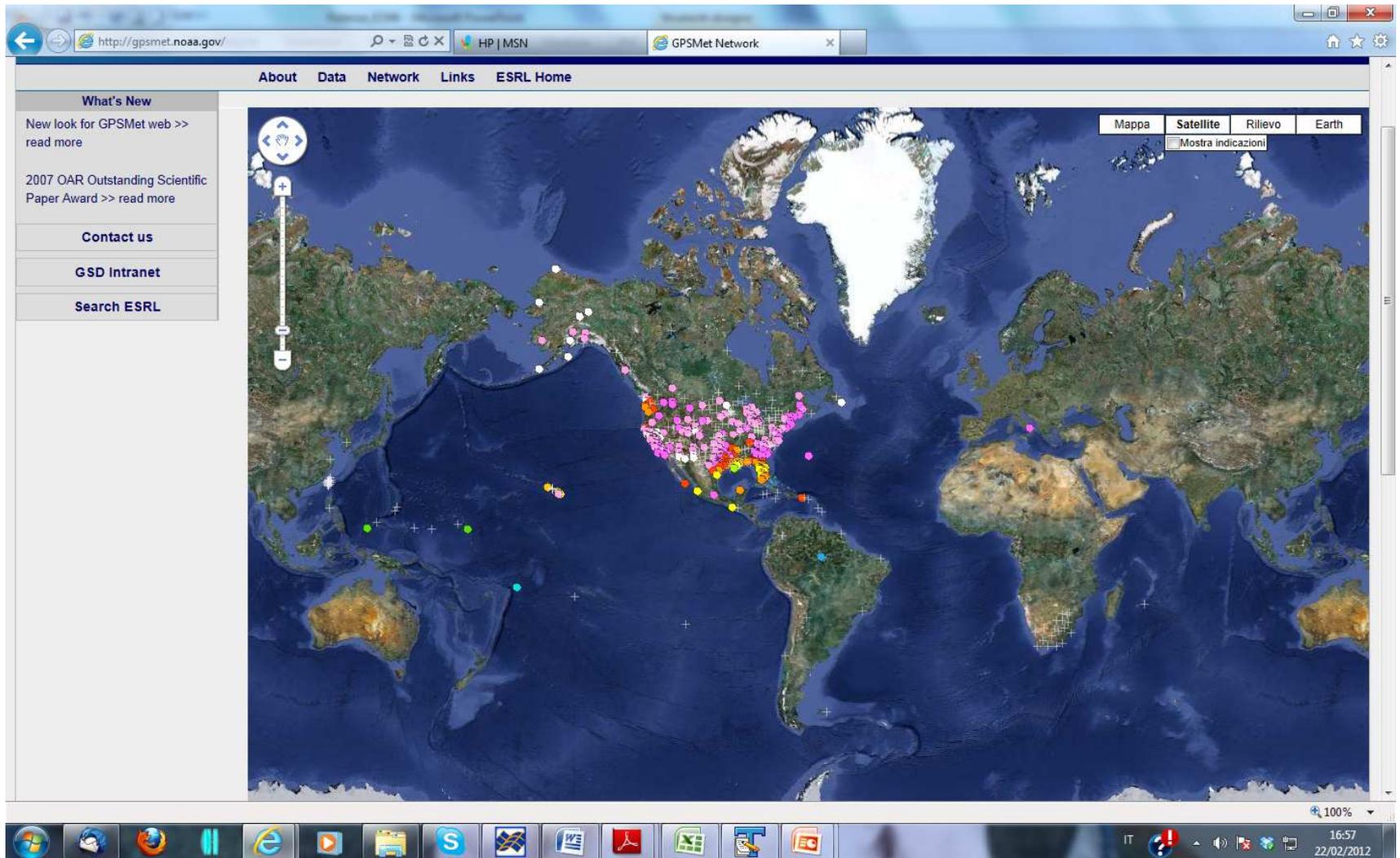
## But on the other hand...

- Sometime reaction-time from Vaisala is too long
- Too often Vaisala has a “marketing” approach (e.g. trying to sell new parts instead of investigate the problems). I would suggest to provide a faster and preferential communication channel for scientific institutions involved in GRUAN

# Potenza RS92-SGP for GRUAN: status

- **36** once weekly best production quality radiosonde have been performed successfully until January 2012 (RS92-SGP) and uploaded on the GRUAN database. Launches have been performed once per week, all weeks, simultaneously with water vapour Raman lidar measurements, except during the occurrence of rain or snow. Now launches have been stopped because of a mandatory update of the auto-launcher system, needed to use the new VAISALA sondes, and also because of the maintenance of the manual system.
- For TT1: 2011 auto-launcher time GC25 time series have been collected for the whole period of operation and are currently under investigation by R. Kivi
- No dual launches using both the auto-launcher and the manual system have been performed due to the above mentioned maintenance and technical issues (small overlap period).
- Monthly observations of stratospheric water vapour to ~30 km
- Preparation of a reference intercomparison experiment with CFH (not yet done)
- Possible acquisition of a GRAW system

# GPS data



Acknowledgement: S. Gutman, K. Holub

ICM-4, 5-9 March, Tokyo, Japan



# GPS data



## Data available at:

RING: <http://ring.gm.ingv.it/station.php?stazione=TITO>

NOAA GPS-Met: <http://gpsmet.noaa.gov/>

Type: Passive

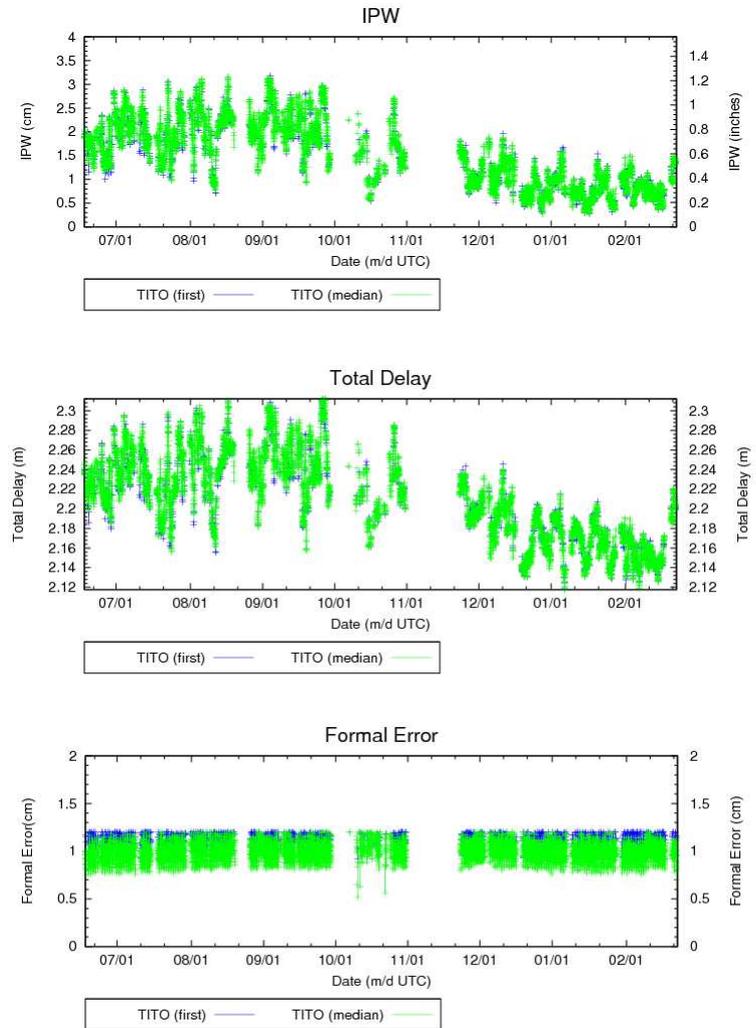
Category: GPS

Construction: Trimble

Installation: 2009-01 (permanent station)

Current state: data processed for IPW since 11 June 2011

Contact person: [Fabio Madonna](#)



# Remote sensing for GRUAN: status

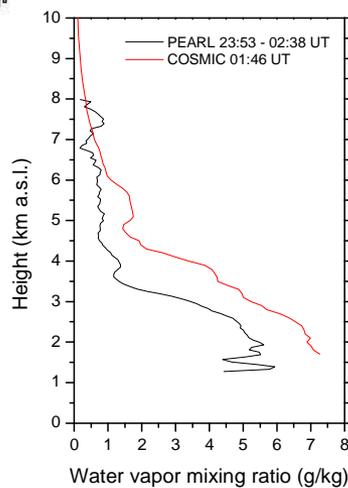
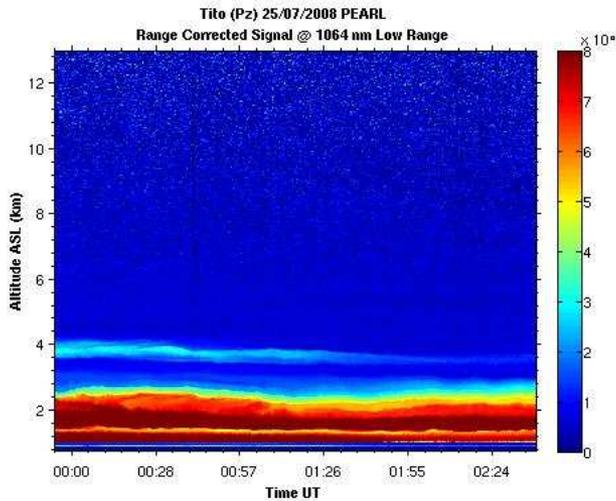
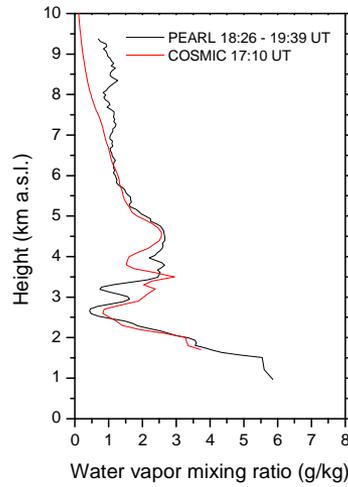
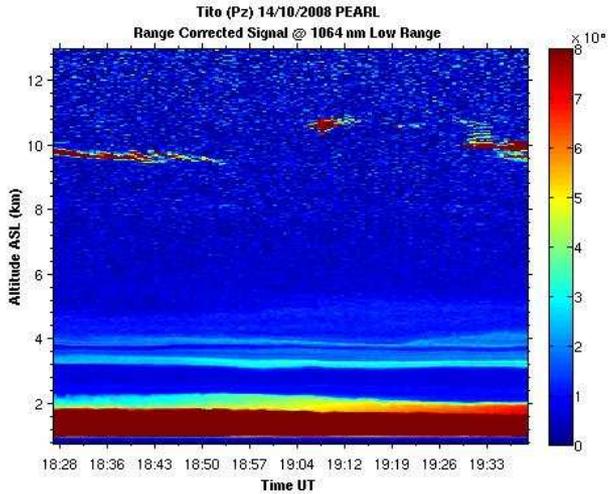
- Continuous/regular measurements with all the instruments (lidar, MWP, Sun photometer....)
- Raman lidar measurement co-located and simultaneous with RS92-SGP
- Microwave radiometer measurements are routinely performed according to the protocols agreed in the frame of MWRnet (including scanning). Each measurement cycle lasts 5 minutes and includes a full scan of the zenith vertical plane. Provision of errors on the neural network retrieval is currently under investigation.

# New instruments

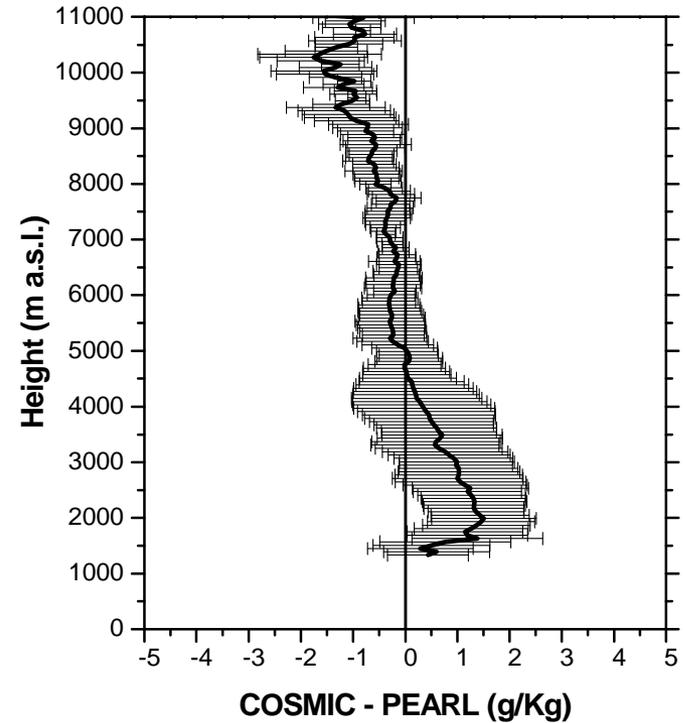
- UV lidar (water vapour, aerosols)
- GPS antenna
- Sky imager

All the instruments will be purchased by the end of 2012 (in the frame of a funded Italian project)

# COSMIC water vapor profiles



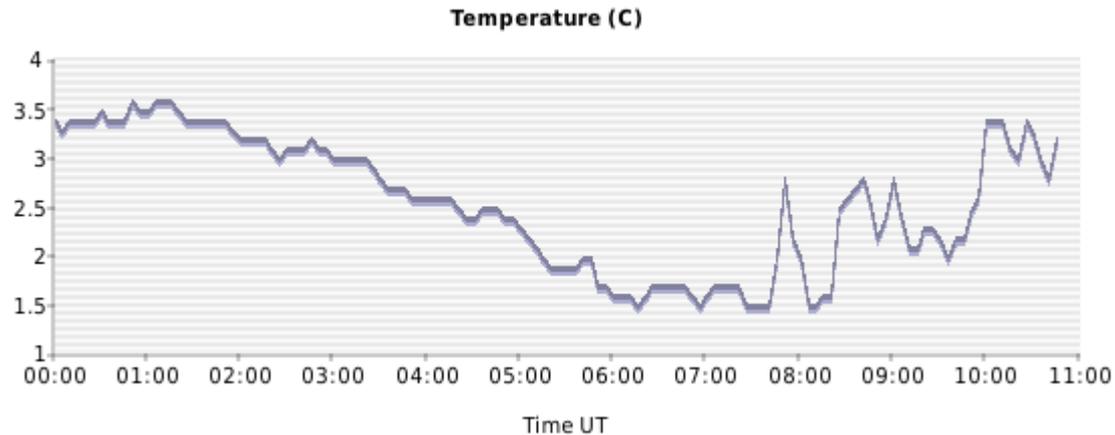
Comparison over 20 matches



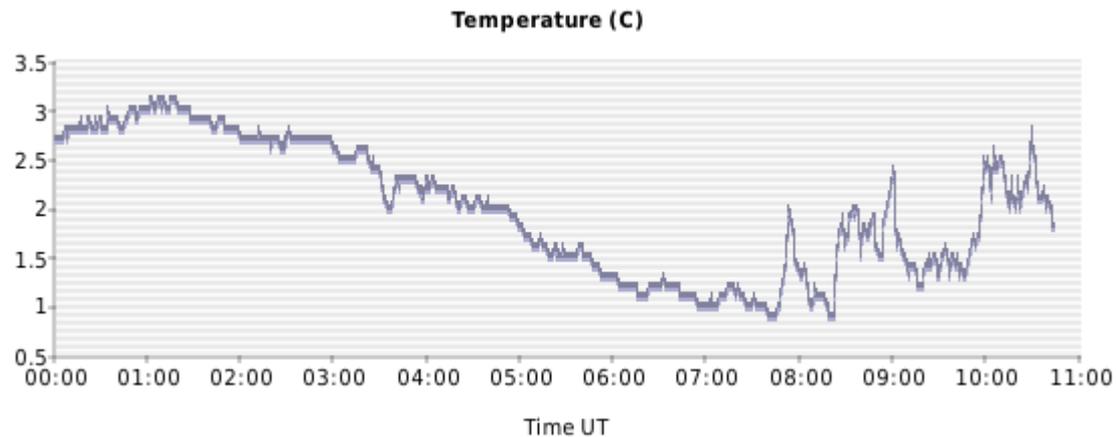
Comparison using 2011-2012 CIAO  
GRUAN sonde dataset and  
simultaneous lidar data will be  
performed

# Surface temperature: "building effect"

MWP  
internal  
sensors



Milos  
AWS



# Plans and perspectives

## Plans and perspectives

- A new Trimble GPS system (L1, L2, L5) will be available by end of 2012 (PON italian project).
- A Doppler wind lidar will be available by end of 2012 (PON italian project).
- A dedicated water vapour Raman lidar will be available by end of 2012 (PON italian project).
- The update of the auto-launcher system will be performed by end of 2012. Manual system will be repaired by the end of April.
- Request has been submitted to VAISALA for the purchase of a set of RR01 (still pending)
- A first contact with GRAW has been established for the purchase of a new radiosounding system (a free trial offered).

# CIAO GRUAN site: a paper

A paper describing CIAO facility for the atmospheric observations and its scientific activities (including GRUAN) has been published on Atmospheric Measurements Techniques (available at <http://www.atmos-meas-tech.net/4/1191/2011/amt-4-1191-2011.html>).

Atmos. Meas. Tech., 4, 1191–1208, 2011  
[www.atmos-meas-tech.net/4/1191/2011/](http://www.atmos-meas-tech.net/4/1191/2011/)  
doi:10.5194/amt-4-1191-2011  
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## CIAO: the CNR-IMAA advanced observatory for atmospheric research

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Revised: 20 May 2011 – Accepted: 7 June 2011 – Published: 24 June 2011

**Abstract.** Long-term observations of aerosol and clouds are of crucial importance to understand the weather climate system. At the Istituto di Metodologie per l'Analisi Ambientale of the Italian National Research Council (CNR-IMAA) an advanced atmospheric observatory, named CIAO, is operative. CIAO (CNR-IMAA Atmospheric Observatory) main

### 1 Introduction

Aerosol, water vapour, and clouds as well as their reciprocal interactions play a crucial role as drivers of weather and climate system. Difficulties over their representation with sufficient accuracy within numerical models are responsible for

# CIAO data archive and website

1. Since June 2011, CIAO is equipped with a new data archive with a capacity of 42 Tb
2. CIAO new website is ready for being published (including a link to GRUAN website).

**Table 1.** (first part) List of the instruments operative at CIAO along with the corresponding lv1 and lv2 products, the retrieval algorithm currently in use for obtaining lv2 products, the corresponding quality assurance protocol and the advanced products obtained from the synergy and integration of different techniques.

Instrument	lv1 products	lv2 products	Algorithm	Quality assurance protocol	Advanced and Synergetic products
PEARL (Potenza EARliner Raman Lidar)	RCS at 355, 386, 407, 532, 532 parallel, 532 cross, 607, 1064 nm	$\beta$ at 355/532/1064, $\alpha$ at 355/532, $\tau$ at 355/532, $\chi$ at 355/532 and at 532/1064, $\delta$ at 532 nm	Ansmann et al., 1990 Pappalardo et al., 2004b Freudenthaler et al., 2009 Di Girolamo et al., 1995	EARLNET Quality assurance programme	Aerosol Microphysical properties (Mueller et al. 2009)
MUSA (Multiwavelength System for Aerosol) lidar	RCS at 355, 386, 407, 532, 532 parallel, 532 cross, 607, 1064 nm	$\beta$ at 355/532/1064, $\alpha$ at 355/532, $\tau$ at 355/532, $\chi$ at 355/532 and at 532/1064, $\delta$ at 532 nm	Ansmann et al., 1990 Pappalardo et al., 2004b Freudenthaler et al., 2009 Di Girolamo et al., 1995	EARLNET Quality assurance programme EARLNET reference mobile system	Aerosol Microphysical properties (Mueller et al., 2009)
CIAO water vapour Raman lidar	RCS at 355, 386, 407 nm	$\beta$ , $\alpha$ , $\tau$ at 355 nm, WVMR	Raman retrieval (Mona et al., 2007)	Intercomparison within Italian NDACC stations	Water vapour Raman lidar + microwave profiler for water vapour retrieval using Kalman filtering
MIRA-36 Ka-band Doppler Polarimetric radar	SNR, Z, Ze, Doppler velocity, LDR	LWC, IWC, Target classification	Cloudnet Retrieval Scheme (Illingworth et al., 2007)	Cloudnet quality assurance	Radar reflectivity + microwave temperature profile for melting layer retrieval
MP3014 Microwave Profiler	K-band and V-band Tbs	Temperature, WVMR, relative humidity and liquid water profiles, IPWV, LWP	Neural network algorithm (Solheim et al., 1998)	Intercomparison with radiosoundings and water vapour Raman lidar	
CIMEL CE-318 sun photometer	Radiances at 330, 380, 440, 500, 670, 880, 1060, 1640 nm	AOT, $\chi$ at 440/880, IPWV, Microphysical properties	AERONET automatic retrieval (aeronet.gsfc.nasa.gov)	AERONET lv2.0 quality assured data	Multiwavelength lidar + sun photometer for the retrieval of aerosol microphysical properties (to be implemented, Mueller et al. 2009)

$\alpha$ : Extinction coefficient;  $\beta$ : Backscattering coefficient;  $\delta$ : Depolarization ratio;  $\tau$ : Optical depth;  $\chi$ : Angstrom coefficient; AOT: Aerosol Optical Depth; IPWV: Integrated Precipitable Water Vapour; IWC: Ice Water Content; LDR: Linear Depolarization Ratio; LWC: Liquid Water Content; LWP: Liquid Water Path; RCS: Range-Corrected Signal; SNR: Signal-to-Noise Ratio; Tb: Brightness Temperature; WVMR: Water Vapour Mixing Ratio; Z: Reflectivity factor; Ze: Equivalent reflectivity factor; ZTD: Zenith Total Delay.

- All the data follows a quality assurance programme from the network CIAO is involved in (RS in GRUAN)
- lv3 products available and classified as synergetic and integration products

# Plans for 2012-2013

- Upgrade of auto-launcher (including a design study for a new GC in the auto-launcher)
- Restart soundings (hopefully next week) using the manual system. An independent GC to be included also in this system.
- Operativity of new instruments, including the new Raman lidar
- COSMIC vs Raman lidar comparison
- Analysis of 2011-2012 Raman lidar data: calibration using sondes (GRUAN and non GRUAN products), MWP, GPS

# Thanks

ICM-4, 5-9 March, Tokyo, Japan

