

Four new WMO/GAW Observatories for the investigation of trace gas and aerosol variability in the Mediterranean hot-spot

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2-minutes madness

Motivation

Measurement sites

I-AMICA Project

Preliminary results

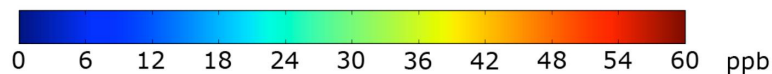
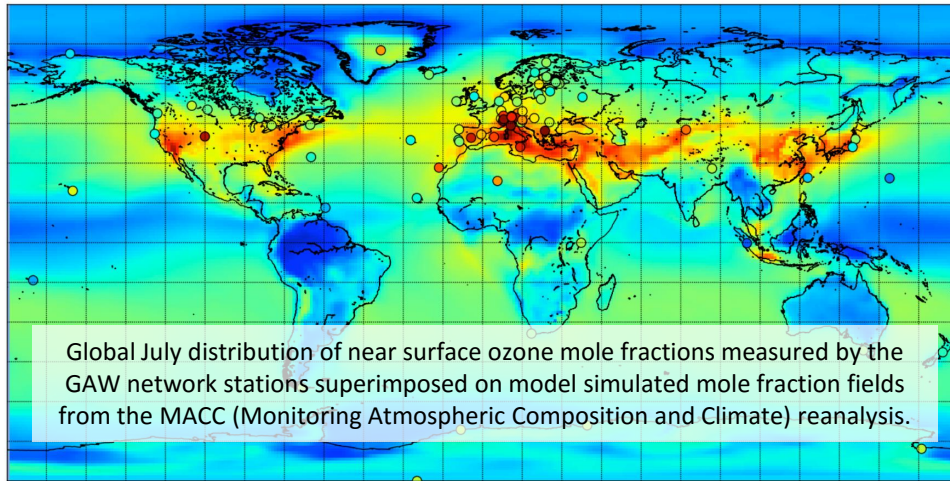
Summary and acknowledgments



Four new WMO/GAW Observatories in the Mediterranean basin – 2-minute-madness

The Mediterranean Basin, which encompassed 22 nations and about 1600 coastal cities, is home of more than 150 million people. The Mediterranean ecosystem is particularly sensitive to climate change: so its preservation is essential to ensure livability of people.

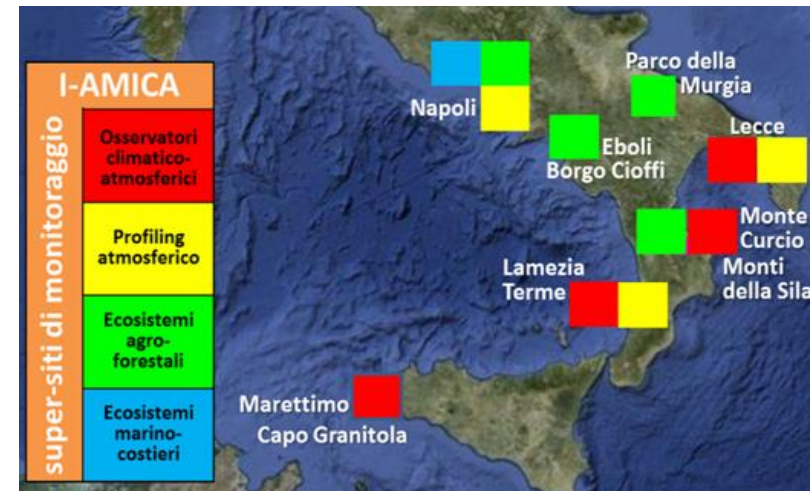
Mediterranean hot-spot.



Very few atmospheric research observatories exist in the central Mediterranean basin, able to provide continuous and high-quality information about atmospheric composition and reactive gases.

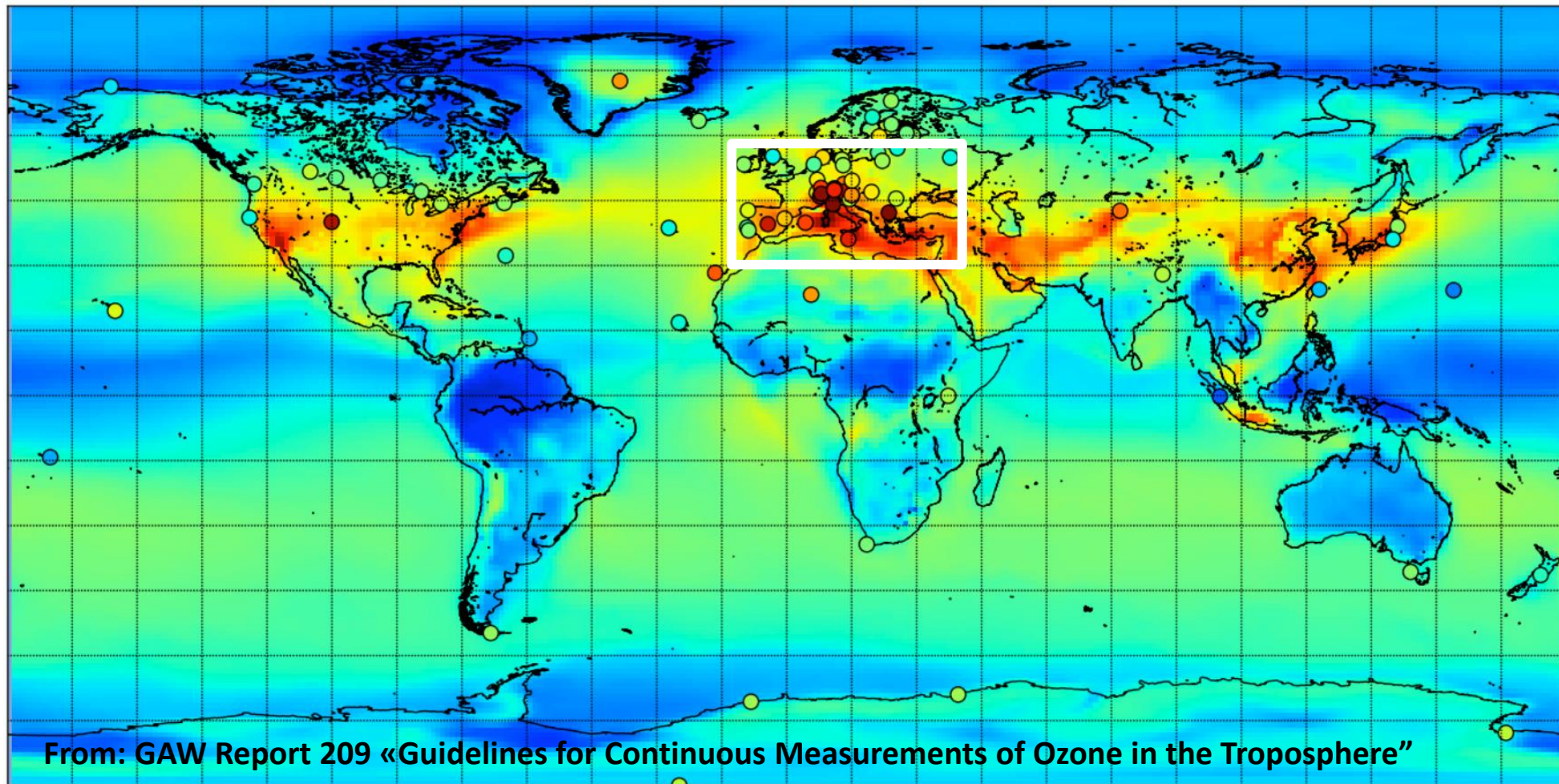
I-AMICA Project

By four development objectives (OR) **I-AMICA** promoted the strengthening of atmospheric/marine-coastal/agro-forestry Observing Systems, parallel computing infrastructures, air-quality services (forecast, advanced observations and analysis). **I-AMICA** fostered technology transfer actions to develop and integrate productive activities.

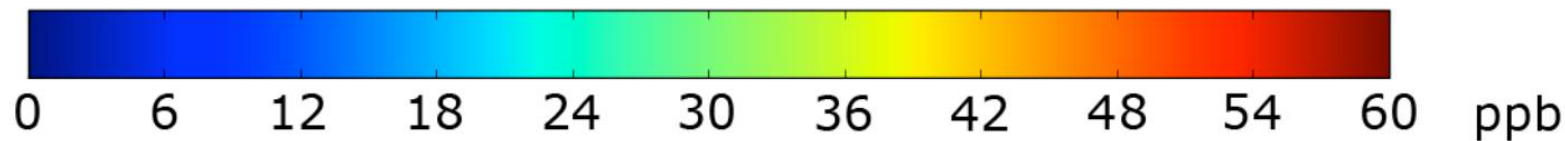


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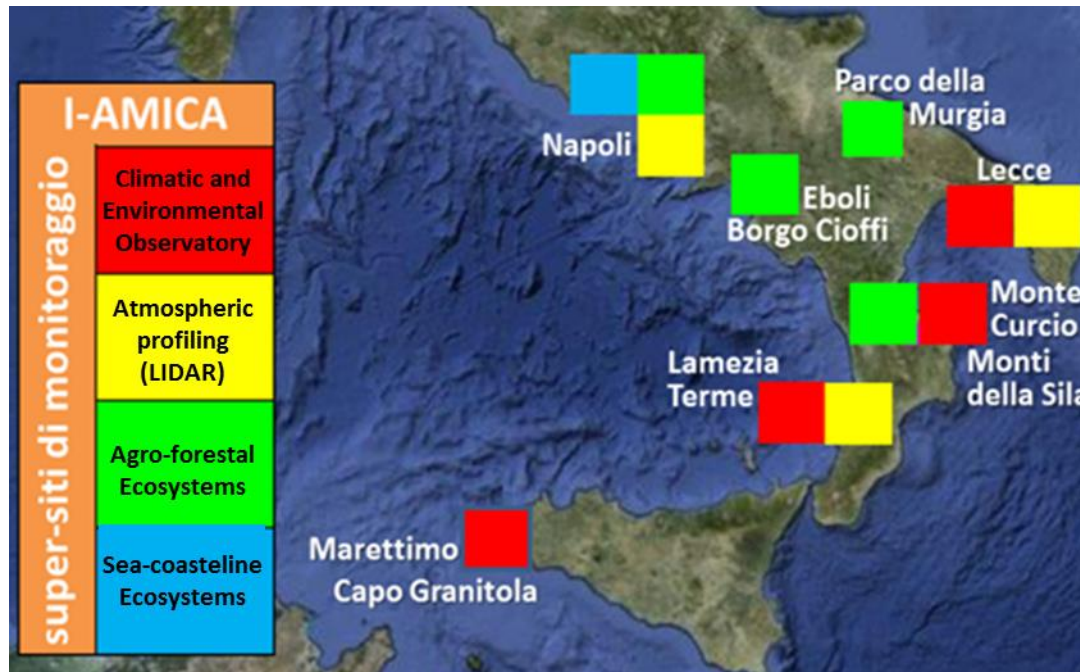
From: GAW Report 209 «Guidelines for Continuous Measurements of Ozone in the Troposphere»



The I-AMICA Project

I-AMICA: Infrastruttura di Alta tecnologia per il Monitoraggio Integrato Climatico-Ambientale **Infrastructure of High Technology for Integrated Climate and Environmental Monitoring**

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The National Operational Programme for "Research and Competitiveness" 2007-2013 (NOP for R&C) is Italy's means of contributing towards the development of a European Union Cohesion Policy for Italy's least- developed regions: **Apulia, Calabria, Sicily and Campania.**

The I-AMICA project has realized or strengthened eleven infrastructures for the continuous monitoring of the atmosphere, climate, agriculture and forestry systems.

The I-AMICA "supersites" constitute an opportunity for the early warning activities related to the monitoring and detection of episodes of pollutant transport in the atmosphere (EU Directive 1999/30/CE).

Measurement sites

Capo Granitola
(37° 34' N, 12° 39' E, 5 m a.s.l.)

Lamezia Terme
(38° 52' N, 16° 13' E, 6 m a.s.l.)

Lecce
(40° 20' N, 18° 07' E, 37 m a.s.l.)



Capo Granitola (Sicilia)

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- Located along the south-western coast-line of Sicily.
- Nearest town (10 km) Mazara del Vallo and Campobello (51k and 12k inhabitants, NW and NE directions respectively)
- Affected by sea-land breeze system
- Synoptic circulation often related to northern Africa
- Useful to investigate ship, background conditions, long-range transport.

Click on the station images or more details



External views of Observatories (1), day-time and night-time wind roses (2) and gridded HYSPLIT back-trajectory frequency (3) for GRA (A), LMT (B) and ECO (C).



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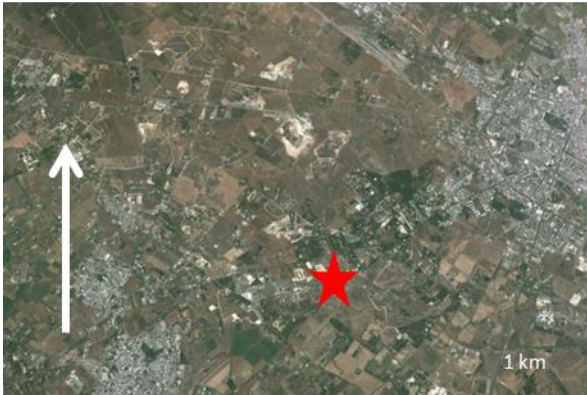
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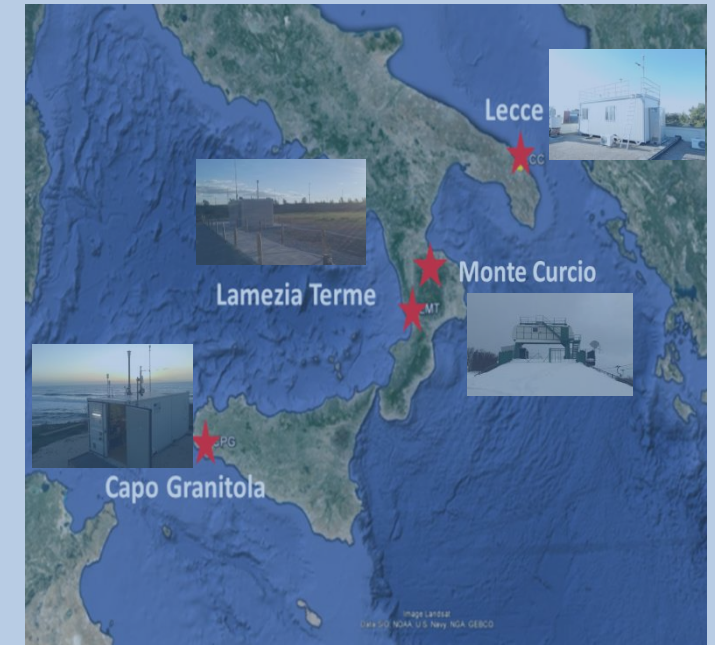
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Lecce (Apulia)

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- Located within the Apulia region, in the Lecce (95k inhabitants) sub-urban area.
- 11 km from the Adriatic Sea and Brindisi harbor
- Useful to investigate urban and harbor emissions, secondary pollutants formation in the gaseous and aerosol phase



External views of
Observatories (1), day-
time and night-time wind
roses (2) and gridded
HYSPLIT back-trajectory
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(A), LMT (B) and ECO (C).



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Lamezia Terme

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- Located along the north-western coastline of the Calabria Region
- Strongly affected by sea-land breeze system (westerly wind during day-time and easterly winds during the night)
- Nearest towns (10 km): Nicastro (40k inhabitants, SE direction) and S. Eufemia (5 km, 5K inhabitants), N direction.
- Useful for investigating urban emissions, background variability, secondary pollutants formation in the gaseous and aerosol phase, volcanic (Stromboli and Mt. Etna) emissions



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External views of Observatories (1), day-time and night-time wind roses (2) and gridded HYSPLIT back-trajectory frequency (3) for GRA (A), LMT (B) and ECO (C).



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Monte Curcio

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- Located at 1800 m a.s.l. in the Sila (Calabria Region)
- Characterized by a 360° free horizon. For the most part of the year (except some periods during warm months) above the PBL
- Nearest town Longobucco (20 km). Cosenza at 20 km.
- Useful for investigating Mediterranean background, processes occurring in free troposphere, long-range transport



Click on the station images or more details



External views of Observatories (1), day-time and night-time wind roses (2) and gridded HYSPLIT back-trajectory frequency (3) for GRA (A), LMT (B) and ECO (C).



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Measurement sites: experimental set-up

GAW FOCAL AREA	Parameter	Instrument	Monte Curcio (39°2' 16°0')	Granitola (37°34'; 12°39')	Lamezia Terme (38°52'; 16°14'E)	Lecce (40°28'; 18°7'E)
Ozone	Total Ozone	Microtops sunphotometer 521			X	X
GHG	CO ₂ , CH ₄	Picarro G2401	X	X	X	X
Reactive gases	O ₃	Thermo 49i		X	X	X
	O ₃	Teledyne	X			
	CO	Picarro G2401	X	X	X	X
	NO, NO ₂ ^{mo}	Thermo 43i TLE (chemiluminescence)		X	X	X
	NO, NO ₂ ^{mo}	Teledyne (chemiluminescence)	X			
	SO ₂	Thermo 43i TLE		X		
	O ₃ , NO ₂ , SO ₂ BrO	DOAS				X
Aerosol	Mercury (HgO, RGM, Hg(p))	Tekran	X			
	Size distribution (10 nm – 800 nm)	SMPS (TROPOS)	X		X	X
	Size distribution (0.28 nm – 10 µm)	OPC Monitor (FAI Instruments Srl)	X	X	X	X
	PM10, PM2.5	SWAM dual channel (FAI Instruments Srl)	X	X	X	X
	Aerosol scattering coefficient	TSI Nephelometer	X	X	X	X
	Aerosol absorption coefficient/equivalent BC	Thermo MAAP 5012	X	X	X	X
	Integrated aerosol particle number (4nm-3 µm)	TSI 3775	X	X	X	X
	AOD	Microtops sunphotometer 540			X	X
		Cimel AERONET Sunphotometer			X	
Ancillary observations	Meteorological parameters	Vaisala WXT520		X	X	X
	Meteorological parameters	Lastem LSI	X			
	Short-wave and long-wave downwelling and upwelling radiation	Kipp&Zonen CNR4	X	X	X	X

Sampling systems

Lamezia Terme (LMT) and Lecce (ECO): air intake by a Teflon tube (length: 130 mm), with a manifold of 50 mm inner diameter. Air is sampled 1 m above the station roof (3.7 m from the ground at LMT and 15.7 m from the ground at ECO). Internal temperature is continuously monitored and heated to prevent water condensation.

Capo Granitola (CGR): the air intake is composed by a Teflon tube (length: 2600 mm) with 50 mm inner diameter. Air is sampled 1.5 m above the station roof. Internal temperature and relative humidity are continuously monitored and temperature is kept 4°C higher than ambient temperature to prevent condensation. Flow as well as internal T and RH are continuously monitored and recorded by the acquisition system.


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Summary

- In the framework of the national Project I-AMICA, four new WMO/GAW Regional Stations were implemented in the South of Italy by ISAC-CNR and IIA-CNR for trace gas and aerosol observations and investigations.
- Here we provided a first characterization of reactive gas(RG) variability at three of that Stations: Lecce (ECO), Lamezia Terme (LMT) and Capo Granitola (CGR).



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