

The Izaña Atmospheric Research Center: GAW activities

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The Izaña Atmospheric Research Center (IARC) is part of the Meteorological State Agency of Spain (AEMET)



The IARC is a Joint Research Unit of the National Research Council (CSIC), through the Institute of Environmental Assessment and Water Research (IDAEA).

The IARC conducts monitoring and research related to atmospheric constituents that are capable of forcing change in the climate of the Earth (greenhouse gases and aerosols), and may cause depletion of the global ozone layer, and those play key roles in air quality from local to global scale.

The main objective of IARC's GAW program is to provide data and scientific added-value on the chemical composition and related physical characteristics of the atmosphere and their trends, required to improve understanding of the behaviour of the atmosphere and its interactions with the oceans and the biosphere.

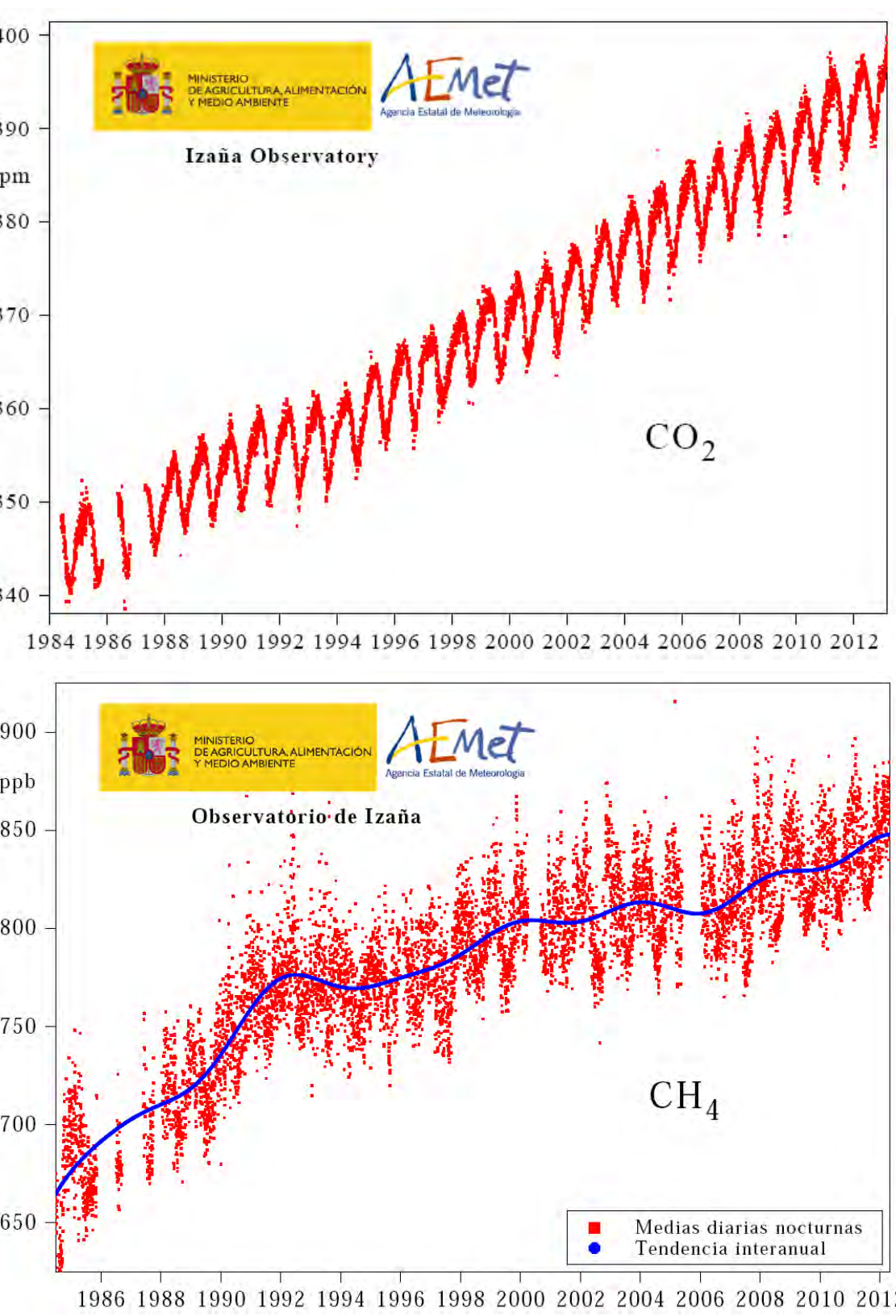


The IARC manages the global GAW Izaña Obs. (IZO), the urban air quality research Obs. at Santa Cruz (SCO), the Botanic ozonesonde Obs. (BTO), and the high mountain Pico Teide Obs. (PTO).



GREENHOUSE GASES

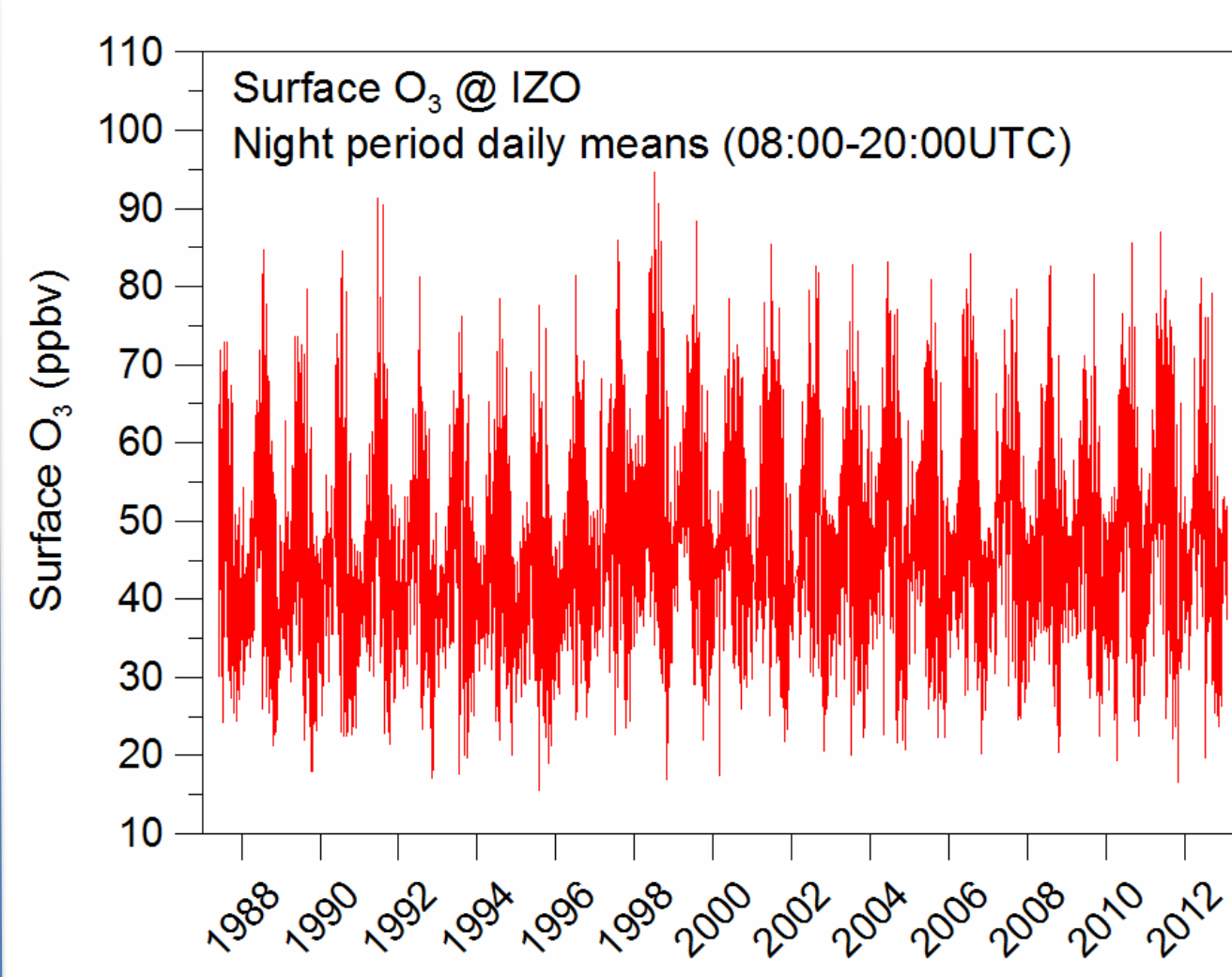
GAS	CONTINUOUS IN SITU MEASUREMENTS			COLLECTED SAMPLES FOR NON IN SITU ANALYSIS	
	Institution	Analysers	Since year	Type	Institution
CO ₂	AEMET	NDIR	1984	Discrete, weekly	NOAA-ESRL-GMD
CH ₄	AEMET	GC-FID	1984	Discrete, weekly	NOAA-ESRL-GMD
N ₂ O	AEMET	GC-ECD	2007	Discrete, weekly	NOAA-ESRL-GMD
SF ₆	AEMET	GC-ECD	2007	Discrete, weekly	NOAA-ESRL-GMD
CO	AEMET	GC-RGD	2008	Discrete, weekly	NOAA-ESRL-GMD
H ₂	---	---	---	Discrete, weekly	NOAA-ESRL-GMD
¹³ CO ₂	---	---	---	2-week integration	Heidelberg Univ.
¹³ CO ₂	---	---	---	Discrete, weekly	NOAA/INS TAAR
CO ¹⁸ O	---	---	---	Discrete, weekly	NOAA/INS TAAR



Forthcoming developments:

- Implementation of flask analysis capabilities for airborne sampling campaigns.
- Level-1 ICOS atmospheric station at IZO.

REACTIVE GASES and OZONESONDES

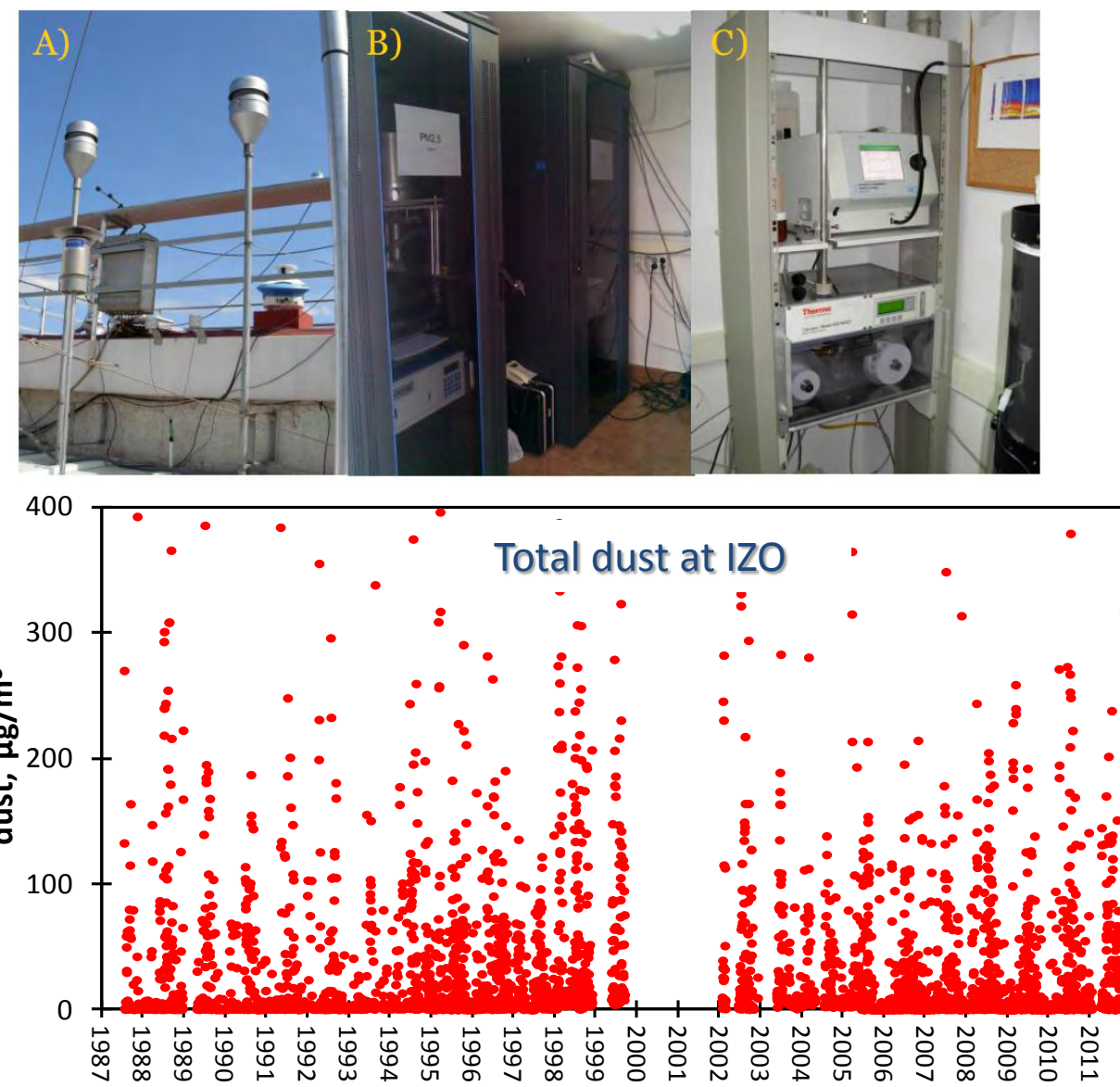


Station	Reactive gases	
	Since	Since
Surface O ₃	May-1987	May-1987
SCO	2001	2001
BTO	Oct-2010	Oct-2010
TPO	Planned 2014	Planned 2014
CO	Jun-2006	Jun-2006
SCO	Jun-2006	Jun-2006
SO ₂	Jun-2006	Jun-2006
NO-NO ₂	Jun-2006	Jun-2006
SCO	Jun-2006	Jun-2006
ECC O ₃ sonde	Nov-1992	Nov-1992
NDACC	Nov-1992	Nov-1992

Specific objectives:

- Long-range transport pollution.
- Analysis of STE processes.
- Impact of dust on tropospheric O₃.
- Characterization of the UTLS and Subtropical Jet
- Air quality studies.

In-situ AEROSOLS



This is the largest series of in-situ dust in the free troposphere over the North Atlantic

General objective: Identification of the processes that influence long term evolution (decades) of aerosols physicochemical properties that impact on climate and air quality.

Specific objectives:

- Composition and sources of aerosols transported to the subtropical North Atlantic free troposphere.
- Research on the transport of Saharan dust to the North Atlantic ocean.
- Research on the influence of desert dust on climate and air quality.

PARAMETER	SINCE	METHOD
chemical composition of total suspended particles	1987	Analysis of samples on filters
chemical composition of PM _{2.5}	2002	Analysis of samples on filters
chemical composition of PM ₁₀	2005	Analysis of samples on filters
scattering and back scattering coefficient (3λ)	2008	Integrating nephelometer
absorption coefficient (1λ)	2007	MAAP
absorption coefficient (7λ)	2012	Aethalometer
size distribution of fine and ultrafine particles	2008	SMPS
size distribution of coarse particles	2008	APS
total number concentration	2007	CPC

OZONE and UV

Specific objectives:

- Subtropical ozone layer long-term monitoring.
- Maintenance of the European Brewer triad at the Regional Brewer Calibration Center.
- Transference of the absolute ozone calibration to the Brewer network through annual international intercomparisons.
- Development of new techniques and methodologies for ozone measurements and calibration.
- Re-evaluation of the long-term spectral UV data series of the reference Triad.

Regional Brewer Calibration Center for Europe

Brewer Triad

Brewer#157 Regional Primary Reference

Brewer#183 Regional Secondary Reference

Brewer#185 Regional Travelling Reference

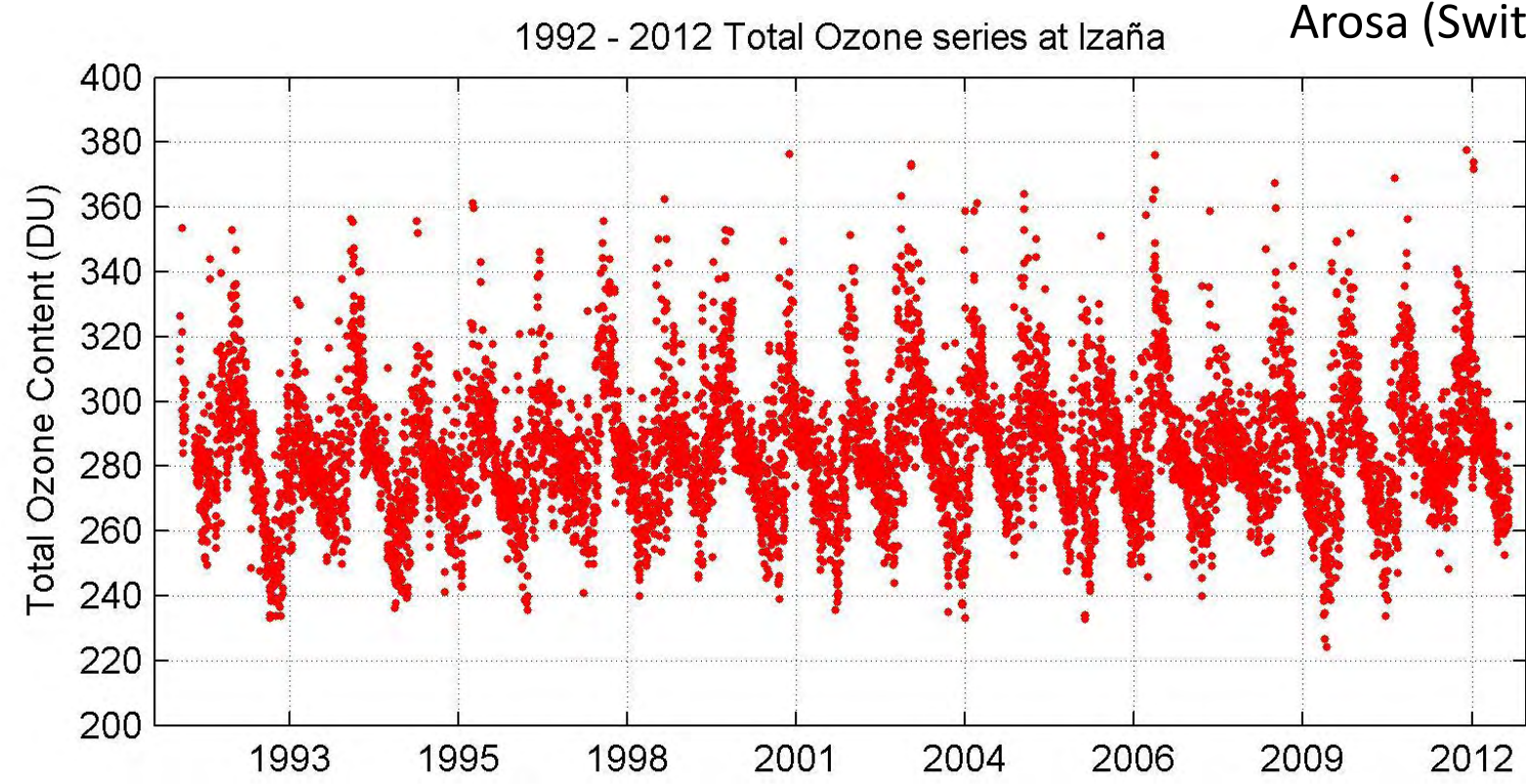
www.iberonesia.net

The absolute calibration from the European triad is transferred to operational Brewers during annual intercomparisons normally held at El Arenosillo (Spain) and Arosa (Switzerland)

Visit the poster on RBCC-E activities!

Other activities:

- Comparison of different techniques (FTIR, DOAS, UV, ECC-Sonde).
- NILU-UV radiometer network in Antarctica (Belgrano, Marambio and Ushuaia stations).
- New program with PANDORA photometer
- Brewer#201 at Tamanrasset-Algeria.
- NILU-UV radiometer at Assekrem-Algeria.



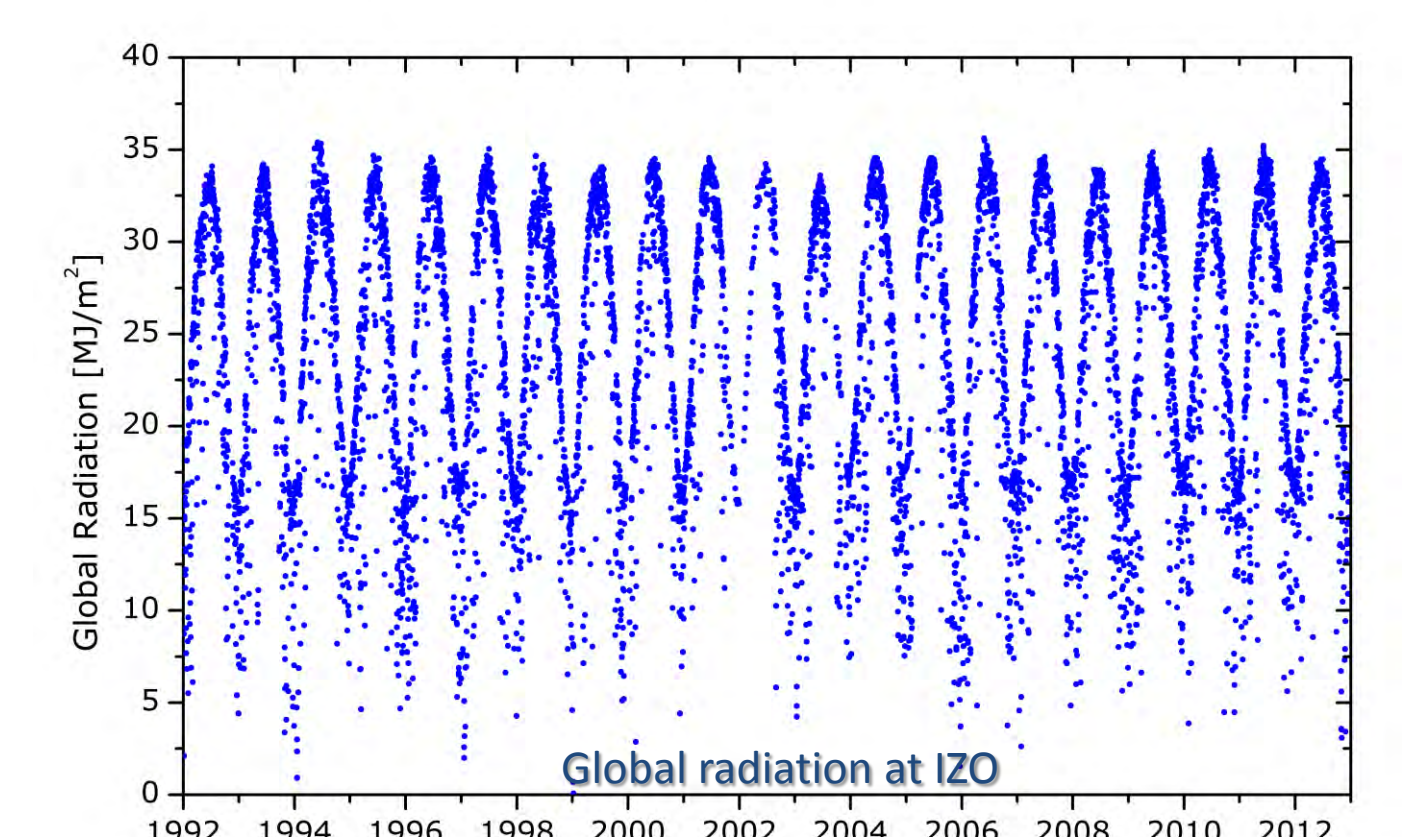
RADIATION

	RADIATION MEASUREMENTS		
	Station	Network	Since
Global SDR	IZO	CRN	Jan-1992
	SCO	BSRN	Sep-2005
	BTO	---	Oct-2010
	TPO	---	Jul-2012
Direct SDR	IZO	CRN	Sep-2005
	SCO	BSRN	Mar-2009
Diffuse SDR	IZO	CRN	Sep-2005
	SCO	BSRN	Mar-2009
DLR	IZO	CRN	Sep-2005
	SCO	BSRN	Mar-2009
UVB	IZO	CRN	Sep-2005
	TPO	BSRN	Mar-2009
UVA	IZO	BSRN	Mar-2009
	Net Rad.	BSRN	Mar-2009

SDR: Shortwave Downward Radiation
CRN: National Radiation Center-AEMET
BSRN: Baseline Surface Radiation Network

Specific objectives: (<http://bsrn.aemet.es/>)

- Radiative balance.
- BSRN maintenance and quality control.
- Aerosols/dust radiative forcing.
- Data-rescue & long-term data series analysis



Quality control/Quality assurance

- Absolute irradiance calibration
- Absolute radiance calibration
- Angular response
- Spectral response
- Slit function determination

• Near-real time BSRN-observations comparison with LibRadtran simulations

GAW TWINING

Twining with Tamanrasset/Assekrem GAW station:

Office National de la Météorologie (Algeria)

Cimel-AERONET statio since Sept-2005

Brewer at Tamanrasset since Oct-2011

NILU-UV at Assekrm since Oct-2011



SDS AERONET stations in North Africa:

Algeria, Egypt, Morocco and Tunisia

Objectives:

- Saharan Air Layer analysis
- Dust model validation
- Satellite verification
- Dust nowcasting

Moroccan Brewer network:

Direction de La Météorologie Nationale (Morocco); since Apr-2008.

Brewers of Casablanca and Dakhla.



Twining with Ushuaia GAW station:

Servicio Meteorológico Nacional (Argentina). Ozonesonde station since April 2008 at the Ushuaia GAW stations



NILU-UV Antarctic network:

Dirección Nacional de la Antártida and CADIC (Argentina).

NILU-UV radiometer network at Ushuaia, Marambio and Belgrano bases, since early 2000, in collaboration with

FINNISH METEOROLOGICAL INSTITUTE

Continuous monitoring of total O₃, UV-A, UV-B, clouds transmission factor, biologically effective UV doses, in a transect extending from the interior to the exterior polar vortex.



Brewer at Artigas Antarctic base (Uruguay): The IARC has provided calibration, technical advice and data management support with the Iberonesia database/tool.

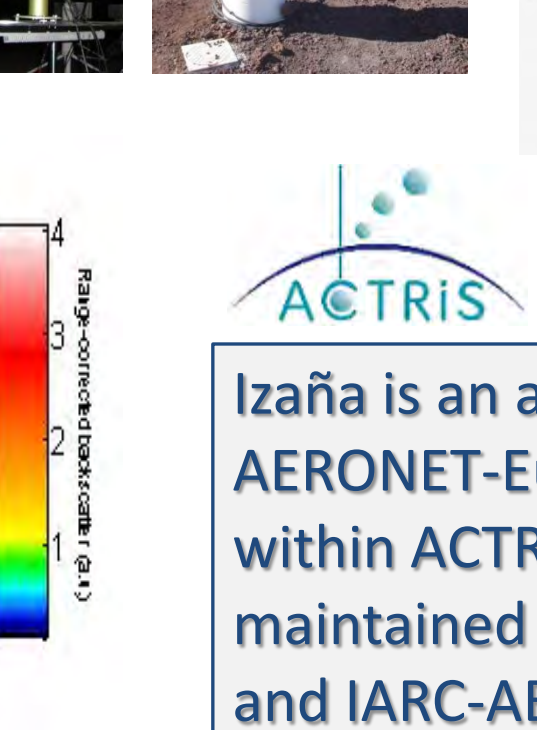
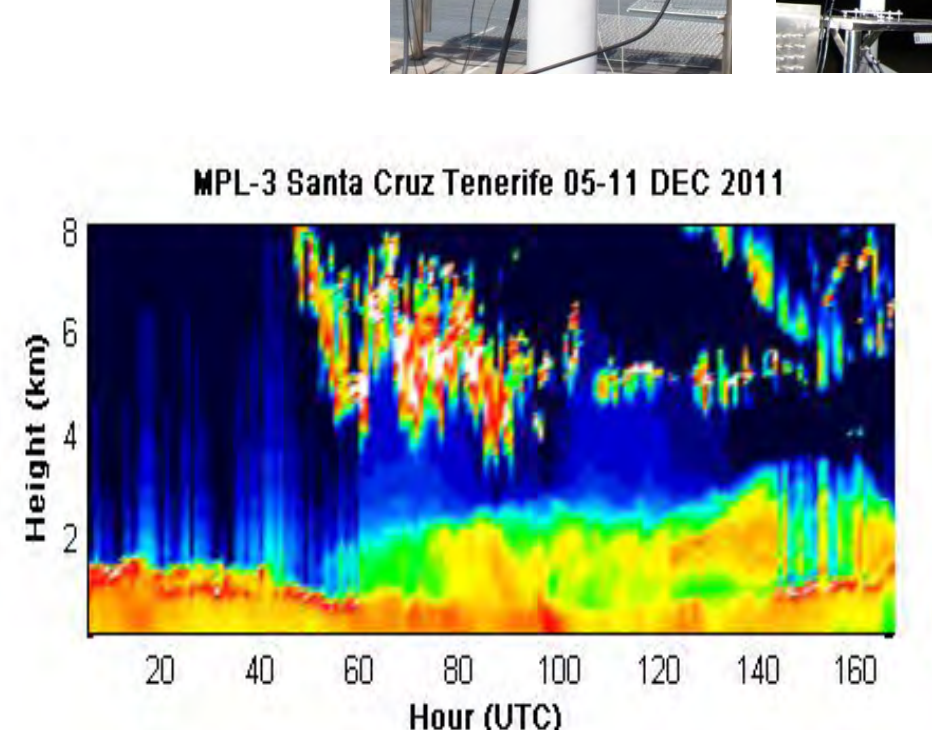


Column AEROSOLS and WATER VAPOR

Station	Column Aerosols & water vapour measurements		Since
	Type/Network	Measurements	
IZO	Cimel/AERONET	PRR/GAW-PRR	Mar-2003
SCO	Cimel/AERONET	PRR/GAW-PRR	Jul-2001
TPO	Cimel/AERONET	PRR/GAW-PRR	Feb-1996
IZO	Cimel/IARC-LOA	PRR/GAW-PRR	Mar-2005
SCO	Cimel/IARC-LOA	PRR/GAW-PRR	Planned 2013
Lidar	SCO	MPL/MPLNet/PALENET (INTA)	Nov-2005
Cellometer	SCO	Vaisala CLS1/-	Apr-2011
GPS	IZO + 7 stations	Leika/E-GVAP	Jul-2008
Radioonde	SCO	RS92/GCOS-GUAN	1968

Specific objectives:

- Aerosols long-term monitoring of aerosols in the free troposphere and the marine boundary layer.
- Saharan Air Layer characterization.
- Water vapour long-term monitoring.
- Development of new photometric measurement calibration techniques.
- Dust model validation.
- Satellite validation.
- Photometer calibration facility.



ACTRIS

Izaña is an absolute calibration site of AERONET-Europe calibration service within ACTRIS. This service is maintained by LOA-CNRS, UVA-GOA and IARC-AEMET

ONGOING PROJECTS

MUSICA (<http://www.imk-asf.kit.edu/english/musica.php>) (MULTi-platform remote Sensing of Isotopologues for investigating the Cycle of Atmospheric water), funded by the European Research Council, FP7/2007-2013)/ERC Grant agreement n°256961.

NORS (<http://nors.aeronomie.be/>) (Network Of ground-based Remote Sensing observations) is funded by the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n°284421.

InGOS (<http://www.ingos-infrastructure.eu/>) (Integrated non_CO2 Greenhouse gas Observing System) is funded by EU funded IA (Integrating Activity).

Remote C (Remote Sensing of Greenhouse Gases for Carbon Cycle Modelling) is funded by the Emmy-Noether Programme of the National German Research Foundation (DFG).

VALIASI (Validation of IASI Level 2 products) supported by EUMETSAT.

NOVIA (Towards a Near Operational Validation of IASI level 2 trace gas products) supported by the Ministerio de Economía y Competitividad (Spain).

WATER-GOA (Estudio de la variabilidad espacio-temporal y caracterización del contenido de vapor de agua precipitable (PWV) mediante el uso de diversas técnicas de medida. Supported by the Ministerio de Economía y Competitividad (Spain).

ESA/CAL-VAL (http://uv-vis.aeronomie.be/projects/ESA_CEOS/) (CEOS Intercalibration of Ground-Based Spectrometers and Lidars), financed by ESA.

MACC-II (<http://gmes-atmosphere.eu/>) (Monitoring Atmospheric Composition and Climate) financed by the 7th Framework Programme.

ACTRIS (www.actris.net): Aerosols, Clouds and Trace gases Research Infrastructure Network (EU).

ICOS (<http://www.icos-infrastructure.eu/>) (Integrated Carbon Observation System)

COST ES1207 EUBREWNET (http://www.cost.eu/domains_actions/essem/Actions/ES1207) (A European BREWer NETWORK)

POLLINDUST (www.pollindust.aemet.es): Composition, sources and multi-decadal evolution of the dust and particulate pollutants observed in the subtropical Saharan Air Layer (Ministry of Economy and Competitiveness of Spain; grant CGL2011-26259).

REDMAAS (www.redmaas.com): Red Española de DMAs Ambientales (Ministry of Economy and Competitiveness of Spain; grant CGL2011-15008-E).

GAW-Sahara and SDS-Africa, financed by an AECD-WMO Trust-Fund