

# “RBCC-E laboratory UV measurements at Izaña Atmospheric Research Centre”

## *PROJECT 2*

Training in standards measurements and new measurement techniques with Brewer spectrophotometers in the European Regional Brewer Calibration Centre (RBCC-E)

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**Izaña Atmospheric Research Centre  
CIAI**



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GOBIERNO  
DE ESPAÑA

MINISTERIO  
DE MEDIO AMBIENTE  
Y MEDIO RURAL Y MARINO

**AEMet**  
Agencia Estatal de Meteorología

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### - *RBCC\_E*

*What is?*

*Where is?*

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# INTRODUCTION

## ❖ RBCC\_E

### - What is?

European Brewer Calibration Centre at Izaña Atmospheric Research Centre (IARC/CIAI).

### - Where is?

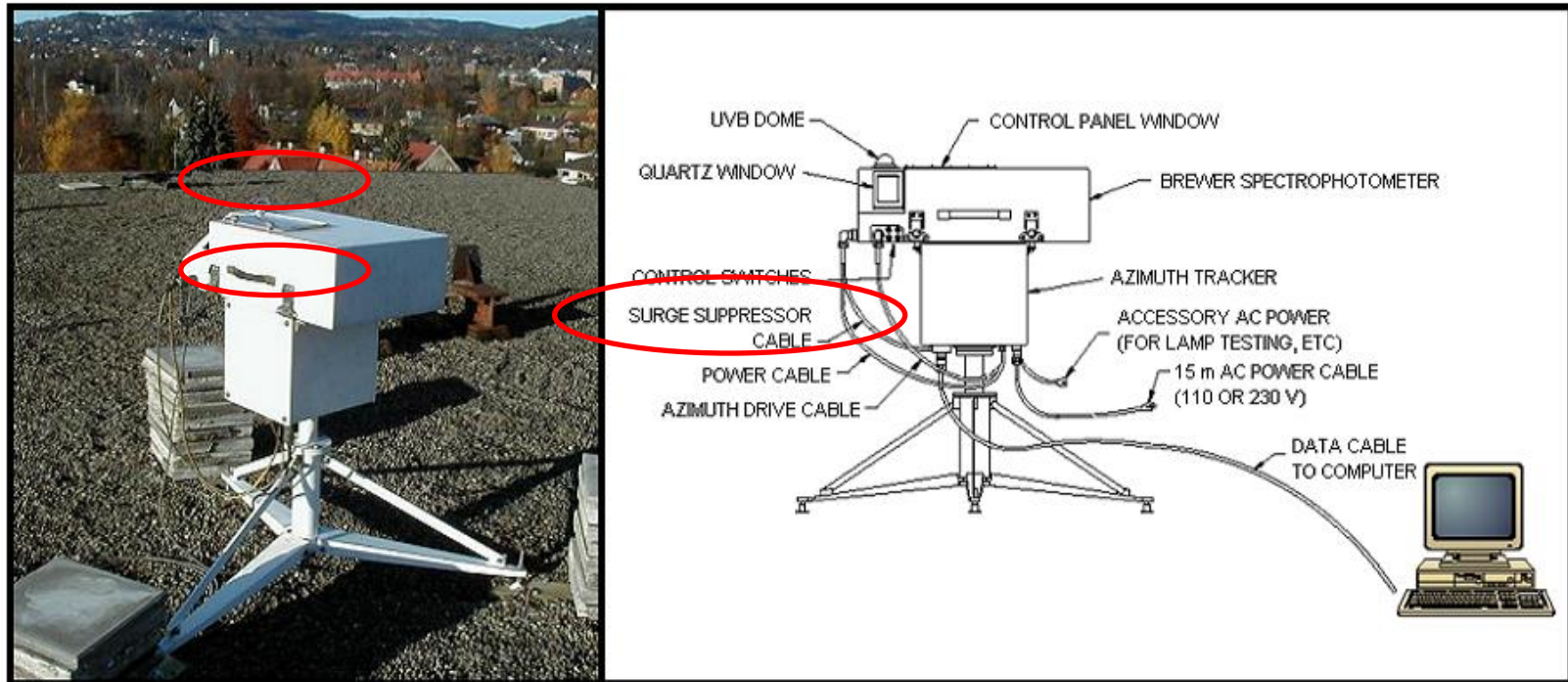
On the top of Izaña mountain (2367 m above the sea level) in Tenerife Island (28°N,16°E).



**IZAÑA ATMOSPHERIC  
RESEARCH CENTER**

# INTRODUCTION

## - Brewer spectrophotometers



*(external weatherproof container)*

**Weight: 34 Kg**

**Power requirements  
Brewer and Tracker**

**3A @ 80 to 140 VAC (with heater option)  
1.5A @ 160 to 264 VAC  
47 to 440 Hz**

## ❖ MAINTENANCE, CHECKLIST AND CALIBRATIONS

### MAINTENANCE

- UV dome cleaning
- Quartz window cleaning
- Levelling
- Sitings
- Changing silica gel
- Change internal lamps

### CHECKLIST

- BfilePro and O3Brewer (Daily)
- Intercomparison between instruments and individual analysis (Weekly)

### CALIBRATIONS

- 200W Lamps Calibration and dispersion Test (Monthly)
- 1000W Lamps Calibration

## UV radiation analysis

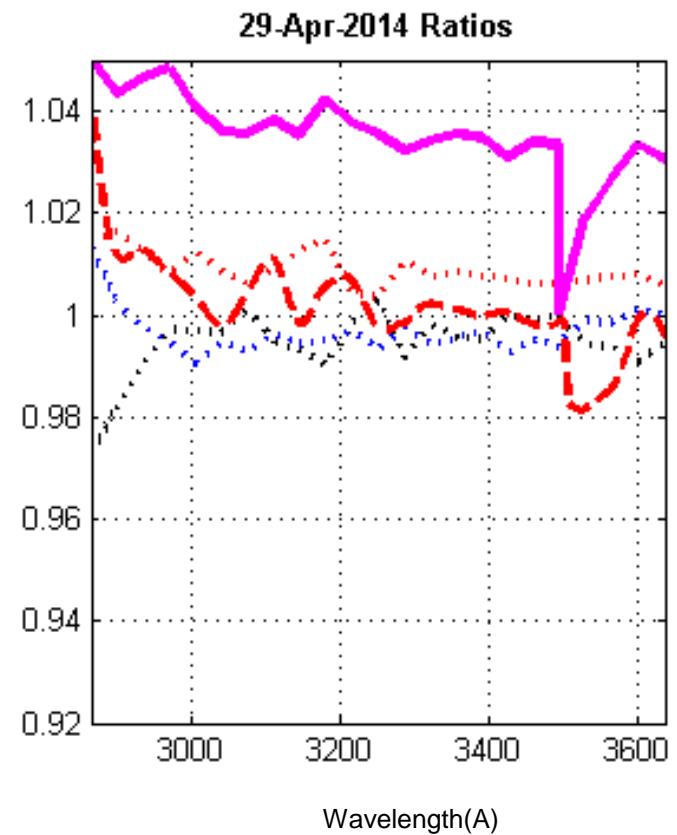
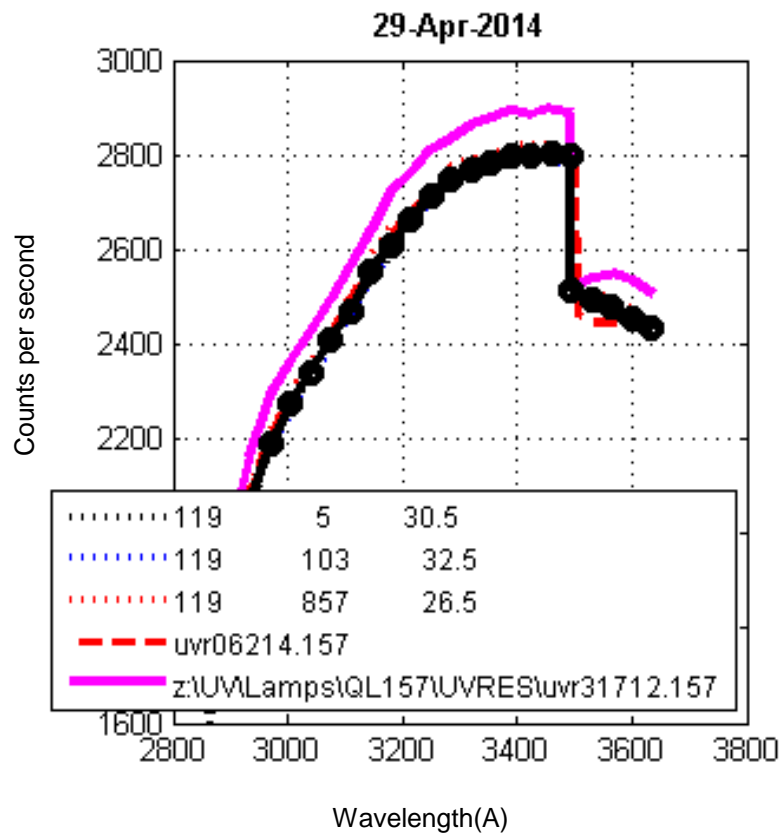
### ➤ *Quality control (QC)*

- **Level 1:** Analysis of UV data deurate (provisional response)
- **Level 2:** Reprocess UV data (final response)
- **Level 3:** Cosine correction



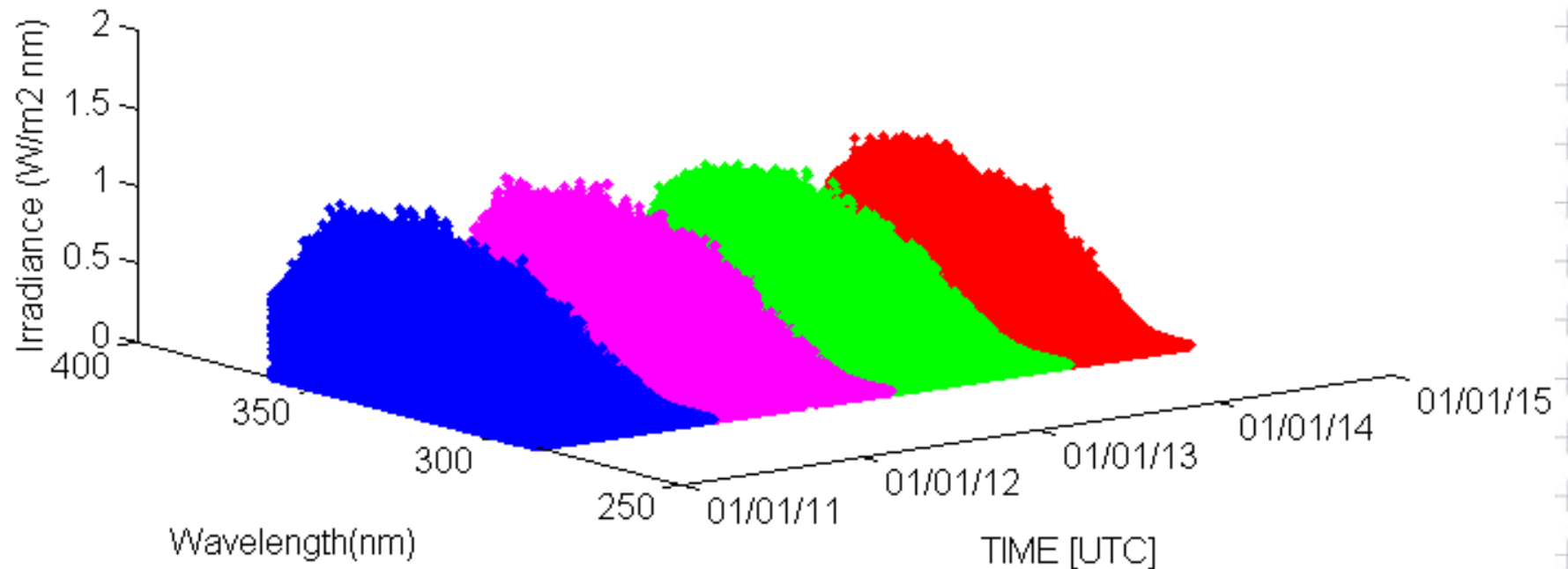
# DATA PROCESSING

## LEVEL 1



## LEVEL 1

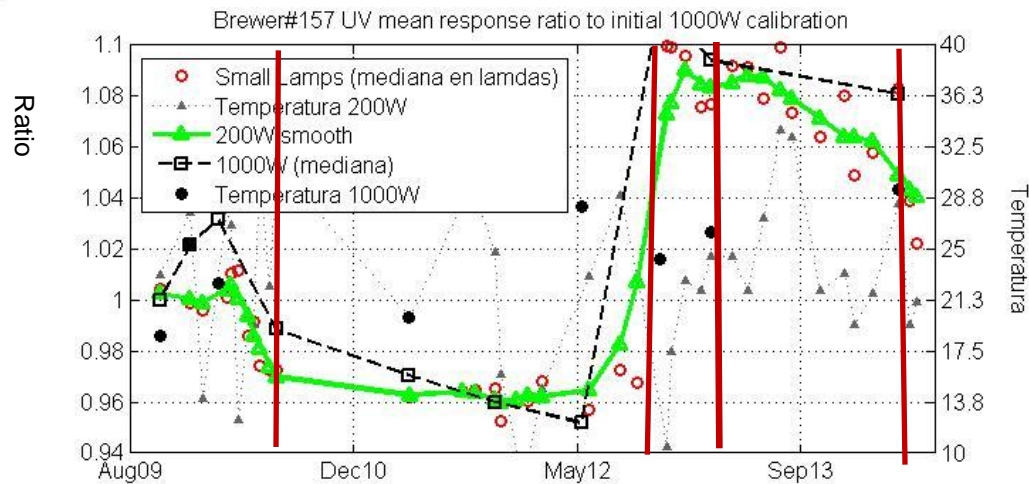
2011,2012,2013 and 2014



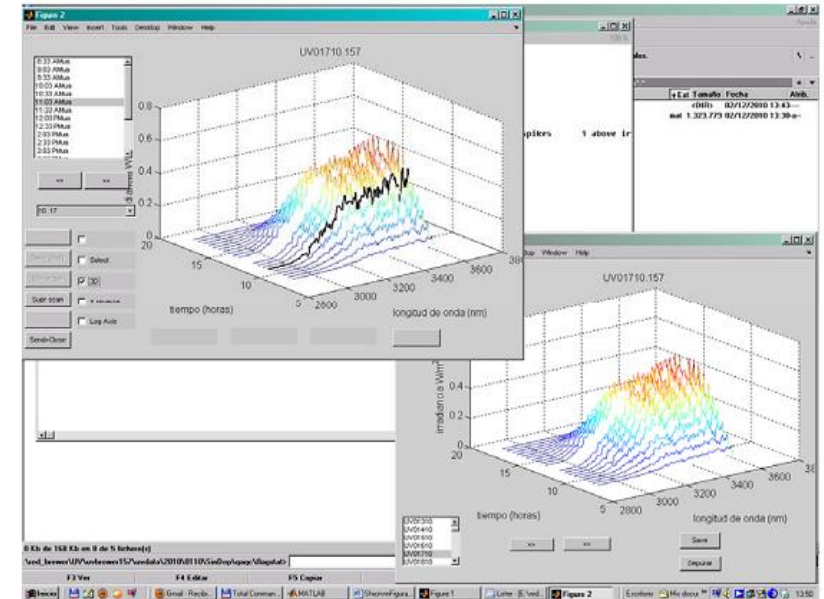


## LEVEL 2

Brewer#157 UV mean response ratio to initial 1000W calibration



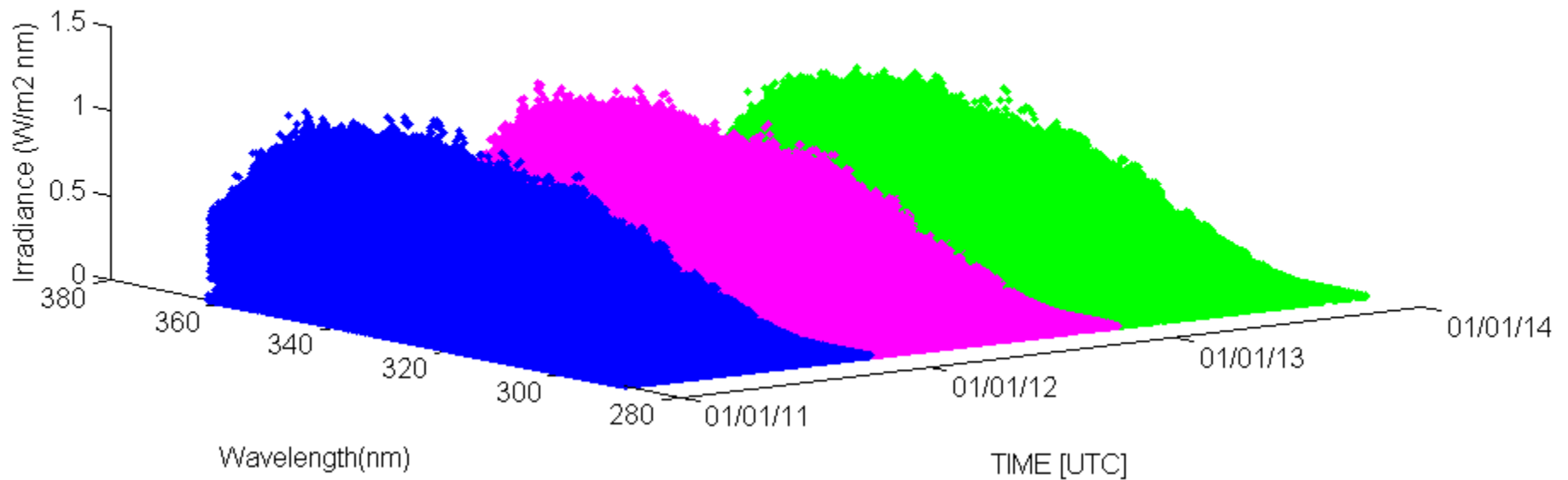
- The SHICrivism software tool (<http://www.rivm.nl/shicrivm>) is used to analyze several quality aspects of measured UV-spectra.



# DATA PROCESSING

## LEVEL 2

2011, 2012 and 2013

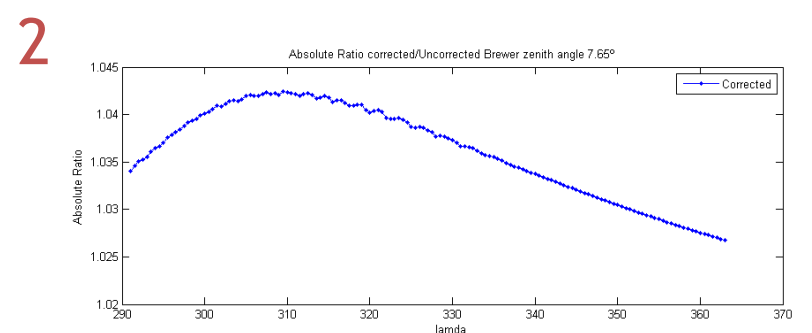
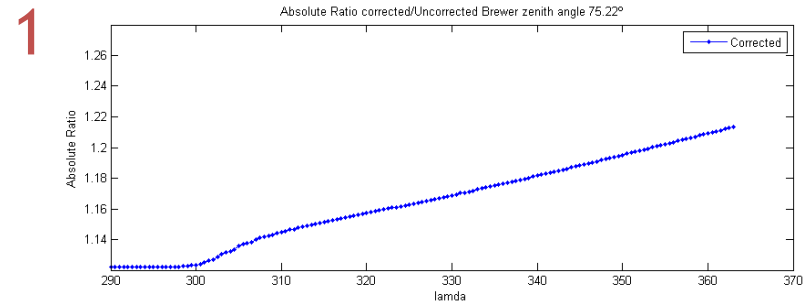
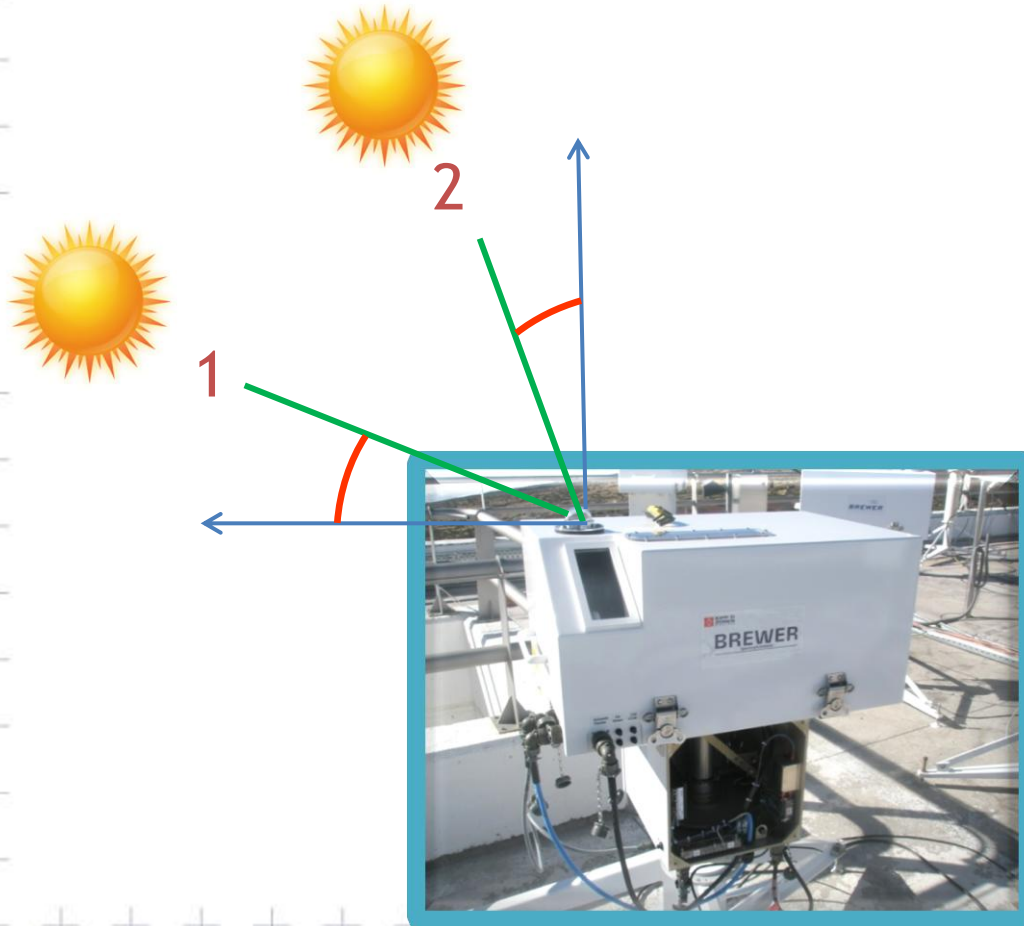


# DATA PROCESSING

## LEVEL 3

What is?

## Cosine correction



## LEVEL 3

$$f_g(\theta, \tau, \lambda) = f_b(\theta) * r(\theta, \tau, \lambda) + f_d [1 - r(\theta, \tau, \lambda)]$$

$F_b$  = Direct correction factor

$F_d$  = Diffuse correction factor

$r$  = Direct-to-global ratio correction

$r$

| Input                             |
|-----------------------------------|
| Albedo                            |
| Ozone total Column                |
| Aerosol optical Depth (AOD 440nm) |

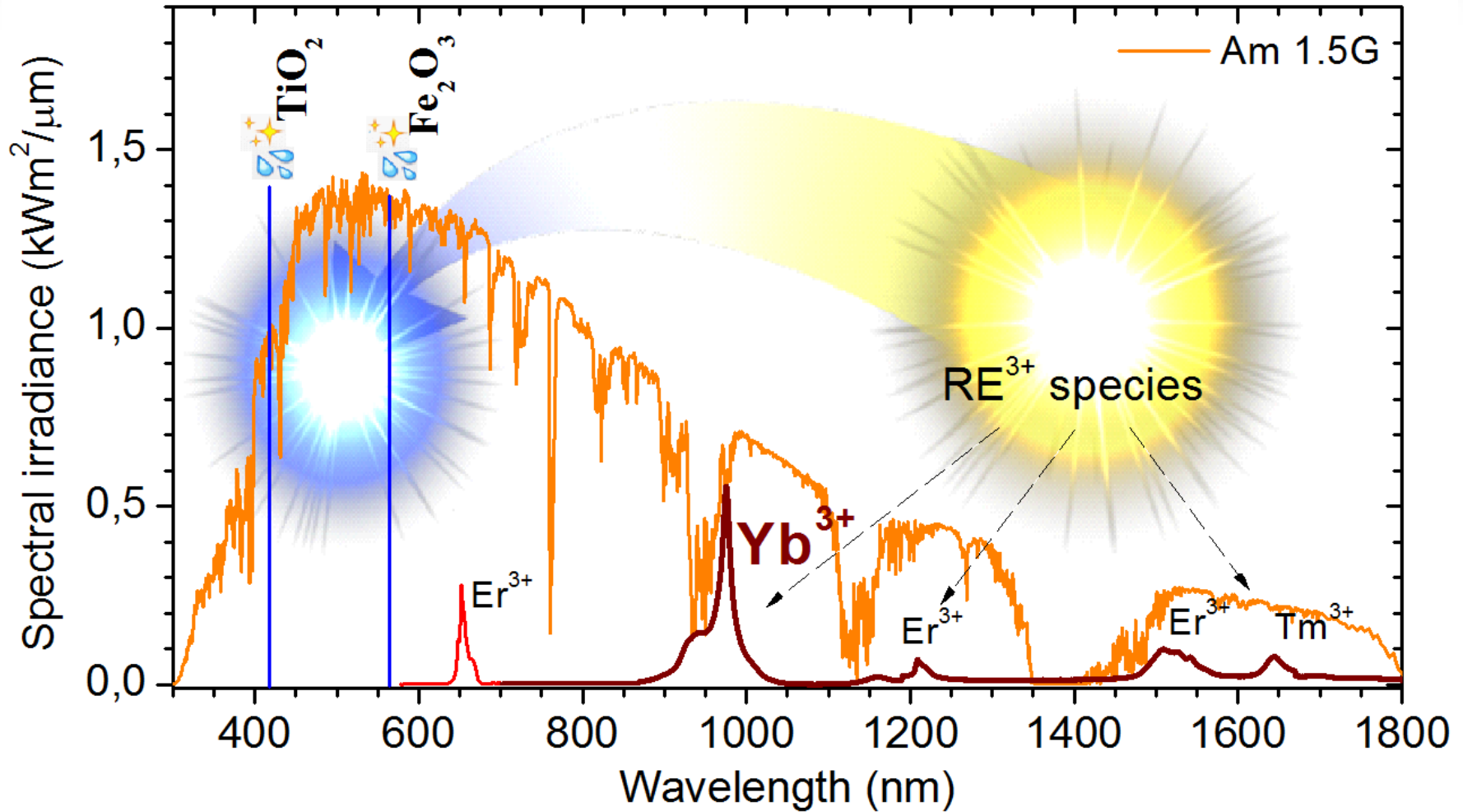
## ➤ *Quality Assurance (QA)*

- Compared with the International portable reference spectroradiometer QASUME (Quality Assurance of Spectral Ultraviolet Measurements) from PMOD/WRC (Physikalisch-Meteorologisches Observatorium Davos / World Radiation Center)





# TECHNICAL APPLICATIONS

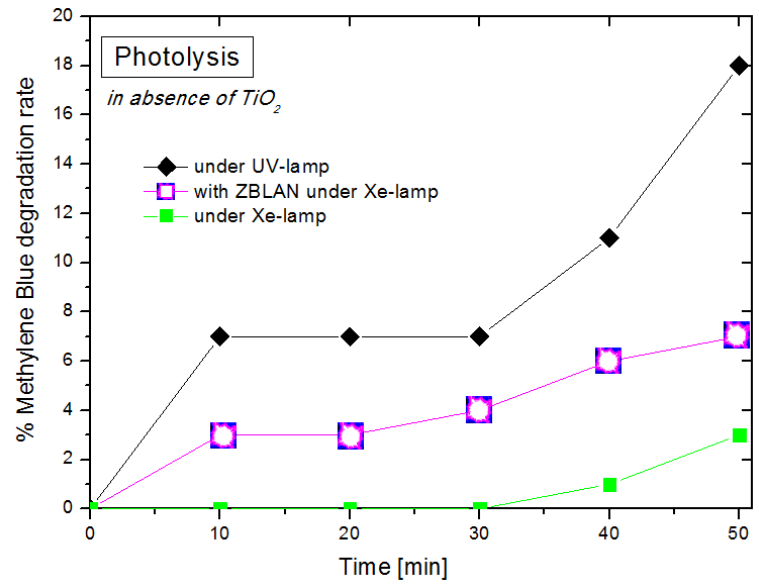
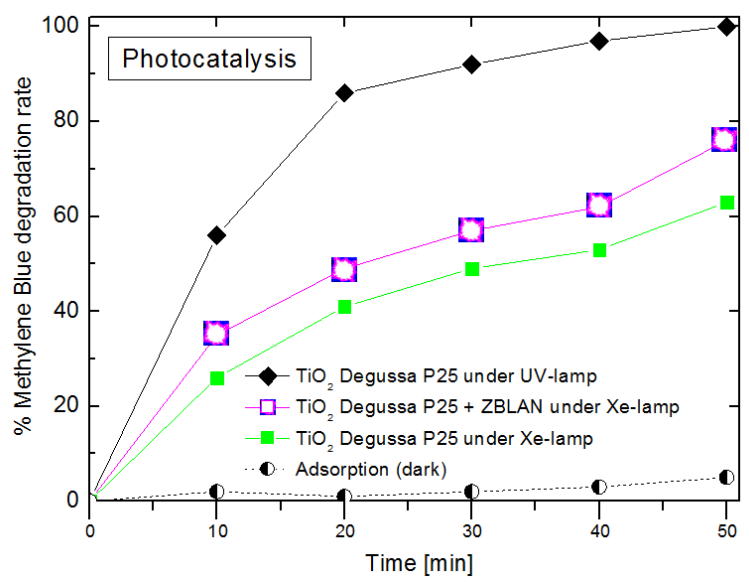




## Slurry-type photocatalysis reactor



20% improvement of  $TiO_2$  photocatalytic action in the decomposition of MB, and also an enhancement by a factor of about 2.5 of the photolytic degradation rate



# TECHNICAL APPLICATIONS



# COMPLEMENTARY ACTIVITIES

## ❖ **Communications 2011-2014**

- **Marta Sierra**, Juan José Rodríguez and Alberto Redondas; **ESA CAL\_VAL campaign during 28<sup>th</sup> October to 18<sup>th</sup> November 2011 “Uv laboratory measurements at Izaña Atmospheric Research Center”**, the annual meeting of the nordic ozone and uv group, helsinki, 8-10 february, 2012.
- -Alberto Redondas , Juan José Rodríguez, **Marta Sierra** and Virgilio Carreño; **Regional Brewer Calibration Centre-Europe (RBCC\_E)**; Regional brewer calibration Centre-Europe (RBCC\_E), GAW 2013 symposium 18-20 march 2013 WMO secretariat Geneva.
- -**M.Sierra**, Juan José Rodríguez and Alberto Redondas ; **“ESA CAL\_VAL campaign during 28<sup>th</sup> October to 18<sup>th</sup> November 2011 “Improvements UV laboratory measurements at Izaña Atmospheric Research Center”** ; Cost Action es1207 Eubrewnet opencongress/14th WMO- GAW brewer users group meeting march 24-28, 2014, Tenerife, Spain.
- **M. Sierra**, J. Méndez-Ramos, M. E. Borges, A. Redondas, P. Acosta-Mora, P. Esparza and J. C. Ruiz-Morales ; **Up-conversion photonics in rare-earth doped materials for enhancing incoming UV solar irradiation; UVNET WORKSHOP 2014 July 15–16,2014, Davos, Switzerland.**
- J. Méndez-Ramos, P. Acosta-Mora, J.C. Ruiz-Morales, **M. Sierra**, A. Redondas, E. Ruggiero, L. Salassa, M.E. Borges and P. Esparza;**Rare-earth doped colour tuneable up-conversion ZBLAN phosphor for enhancing photocatalysis**, Optical Materials, November 2014
- Carreño V, Redondas, A, Rodriguez J, **Sierra M**, **RBCC-E Update Huelva Campaign.** COST 1207 European Brewer Network , Manchester UK, 26-27 Septiembre **2013.**
- Redondas, A, Rodriguez J, **Sierra M**, Carreño V, **RBCC-E Update Huelva Campaign** COST 1207 European Brewer Network , Manchester UK, 26-27 Septiembre **2013.**

# COMPLEMENTARY ACTIVITIES

## ❖ Course



- **Workshop in Malaga -program cost -UV** ; Training school on Methods for Research on the effect of UV-B on plants, University of Málaga, Málaga 16-18<sup>th</sup> April 2012.
- **COST ACTION ES1207 EUBREUNET OPEN CONGRESS/14<sup>th</sup> WMO- GAW BREWER USERS GROUP MEETING** celebrated in Santa Cruz de Tenerife, Spain from Monday 24<sup>th</sup> to Friday 28<sup>th</sup> March 2014.

## ❖ Trainer in practical session “Lamp calibration and Evaluation”

- **COST ACTION ES1207 EUBREUNET OPEN CONGRESS/14<sup>th</sup> WMO- GAW BREWER USERS GROUP MEETING** celebrated in Santa Cruz de Tenerife, Spain from Monday 24<sup>th</sup> to Friday 28<sup>th</sup> March 2014.

## ❖ Organizer of activities

- **COST ACTION ES1207 EUBREUNET OPEN CONGRESS/14<sup>th</sup> WMO- GAW BREWER USERS GROUP MEETING** celebrated in Santa Cruz de Tenerife, Spain from Monday 24<sup>th</sup> to Friday 28<sup>th</sup> March 2014.

## ❖ Campaign

- **Arosa, Switzerland, Campaign(16<sup>th</sup> -27<sup>th</sup> July, 2012)**





**Thank you for your attention**

