

# “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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CIAI**



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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

## ❖ RBCC\_E

### RBCC\_E Tasks

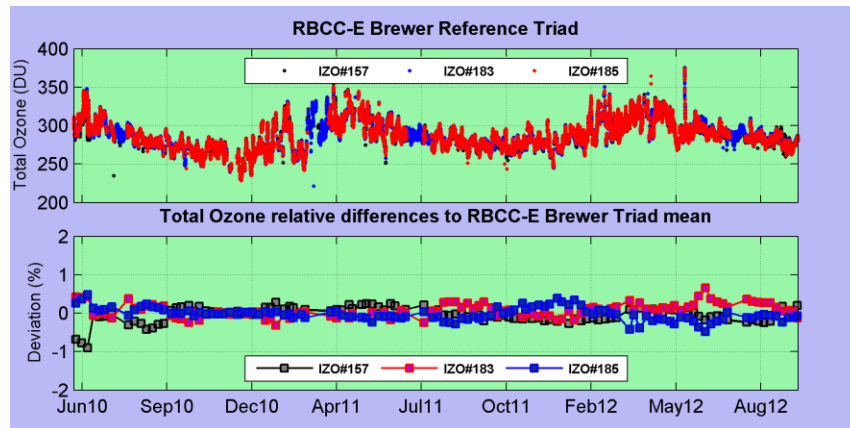
1. Implement a system for routine absolute calibrations of the European Brewer regional reference instruments at Izana, fully compatible with absolute calibrations of the world reference Triad at MLO (Mauna Loa Observatory, Hawaii) .
2. Perform periodical calibration campaigns using the Regional Primary Reference B157 (during intercomparisons held at Izaña) and the Regional Travelling Reference B185 spectrophotometer (traceable to B157) in continental campaigns.
3. Perform Regular comparisons of the Regional Brewer Primary Reference B157 with the Regional Dobson Reference D074 to monitor the relationship between both calibration scales in the Region.
4. Study the sources of errors of the absolute calibrations and to determine the accuracy of total ozone measurement achievable by this method due to atmospheric conditions or instrumental characteristics.

# INTRODUCTION

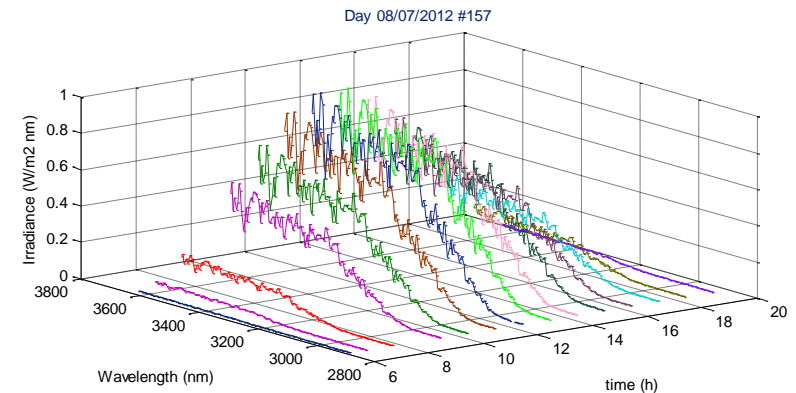
## ❖ Brewer spectrophotometers

### - Measurements

#### - Ozone measurements



#### - UV measurements

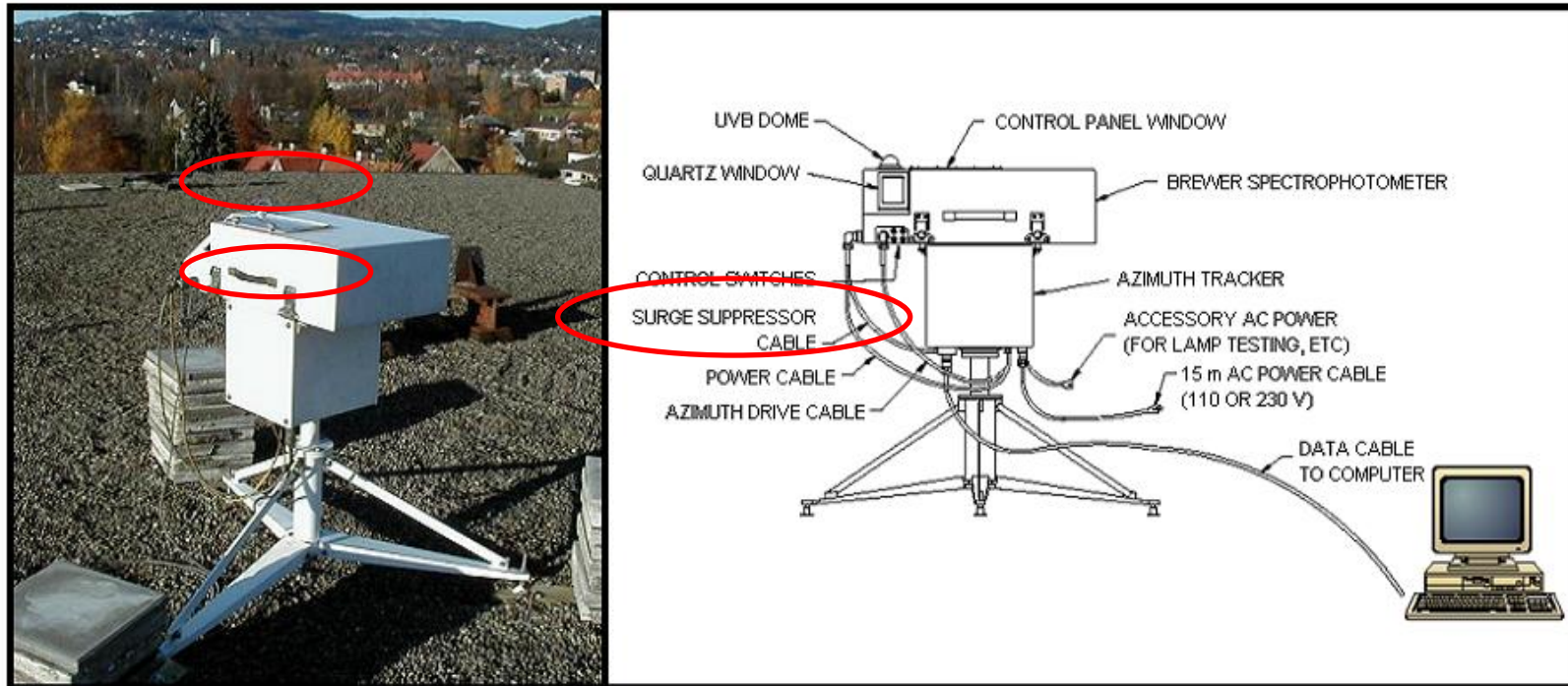


*Long term weekly comparison of the RBCC-E triad during the period March 2010 to October 2012. (a) Total Ozone content (DU) (b) and weekly relative percentage ozone differences of each triad instrument with respect to triad ozone mean.*

**Global spectral irradiance vs wavelength during 08/07/2012 for Brewer #157**

# INTRODUCTION

## - Brewer spectrophotometers



<b>(external weatherproof container)</b>	<b>weight: 34 kg</b>
<b>Power requirements Brewer and Tracker</b>	<b>3A @ 80 to 140 VAC (with heater option) 1.5A @ 160 to 264 VAC 47 to 440 Hz</b>

# MAINTENANCE, CHECKLIST AND CALIBRATIONS

## MAINTENANCE

- UV dome cleaning
- Changing silica gel
- Quartz window cleaning
- Levelling
- Sitings
- 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

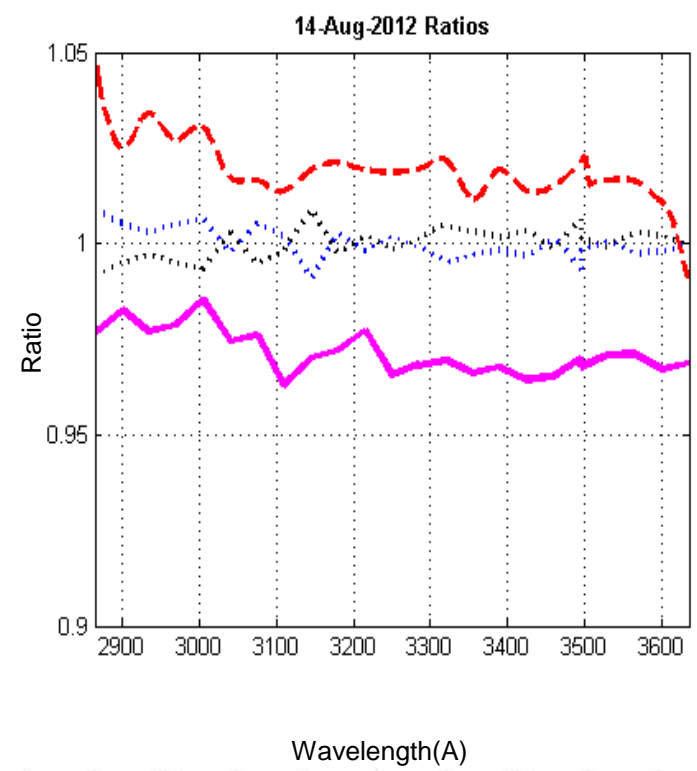
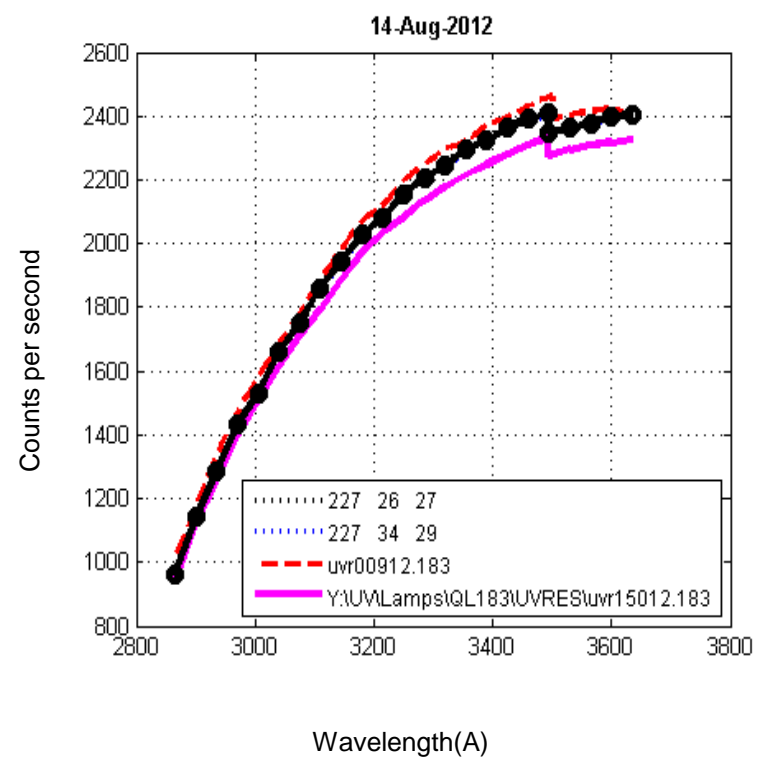
## UV radiation analysis

### ➤ *Quality control (QC)*

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

# DATA EVALUATION AND MAIN RESULTS

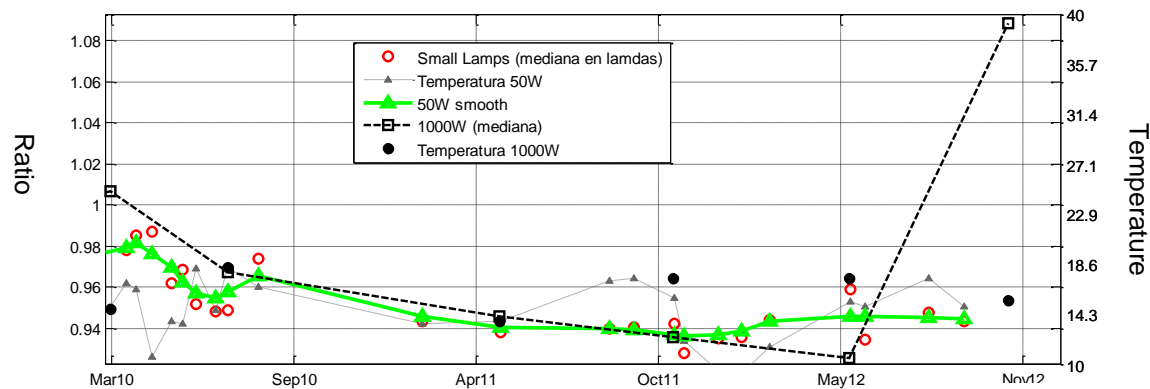
## ❖ Level 1



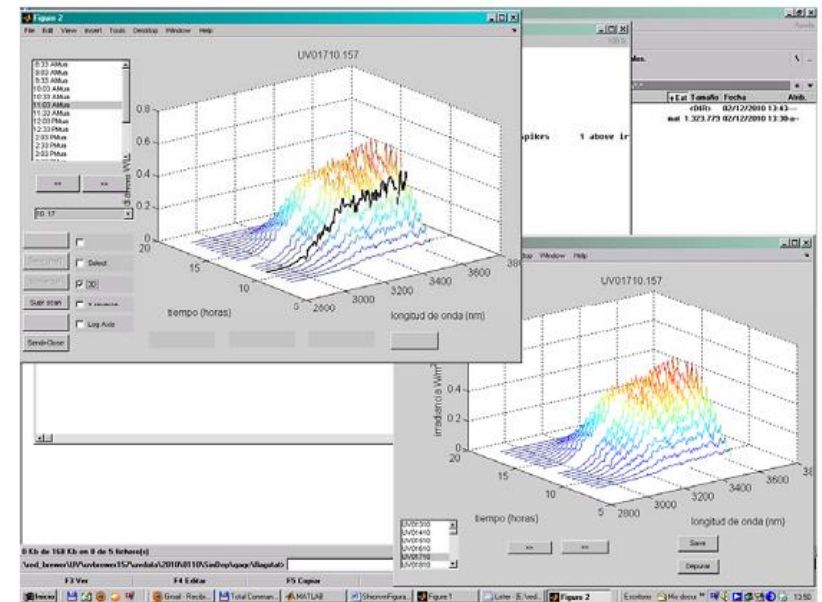
# DATA EVALUATION AND MAIN RESULTS

## ❖ Level 2

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



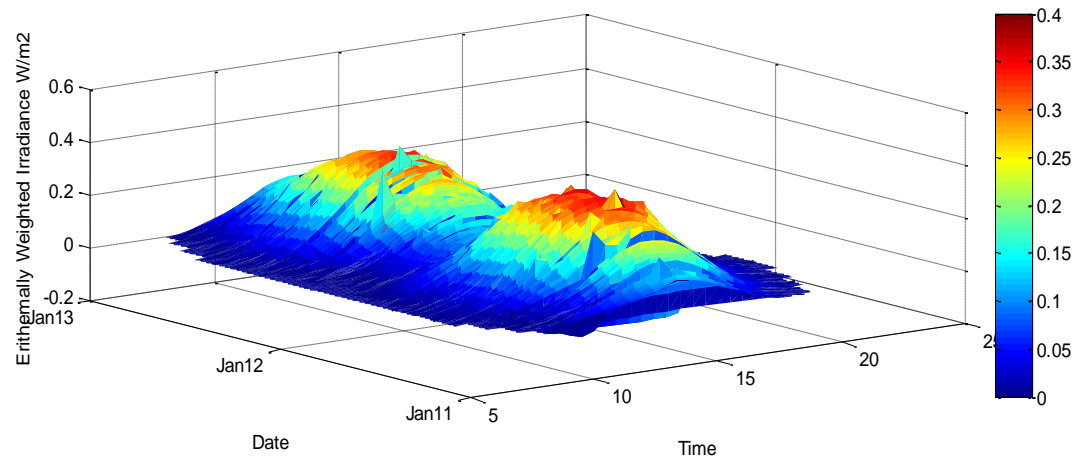
➤ The SHICrivism software tool (<http://www.rivm.nl/shicrivm>) is used to analyze several quality aspects of measured UV-spectra.



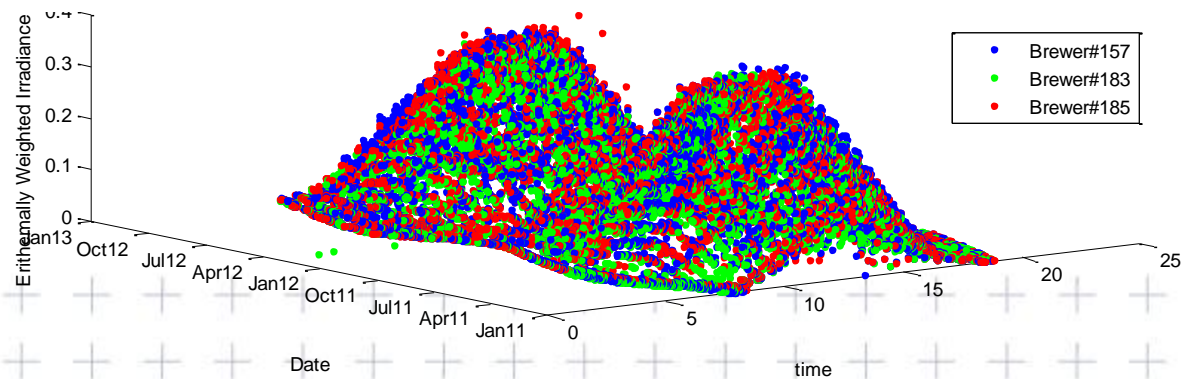
# DATA EVALUATION AND MAIN RESULTS

## ❖ Level 2

*Variation of the erythemally weighted irradiance during the 2011-2012 periods for Brewer#157*



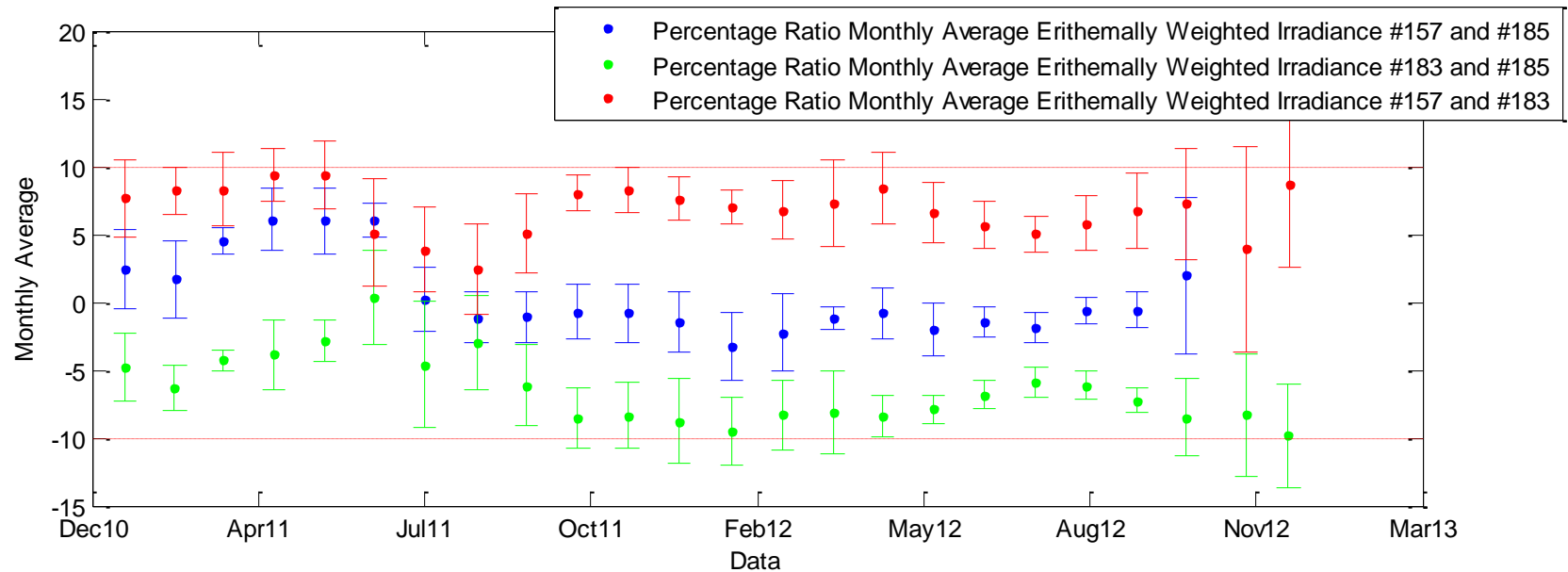
*Variation of the erythemally weighted irradiance during the 2011-2012 periods for Brewer#157, Brewer#183 and Brewer#185*



# DATA EVALUATION AND MAIN RESULTS

## ❖ Level 2

### Percentage Ratio Monthly Average Erithemally Weighted for three Brewers



▪ Differences +/- 10%

# DATA EVALUATION AND MAIN RESULTS

## ➤ *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)



# COMPLEMENTARY ACTIVITIES

## ❖ Campaign

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



# COMPLEMENTARY ACTIVITIES

## ❖ Communications

**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”**

*Marta Sierra, Juan José Rodríguez and Alberto Redondas*

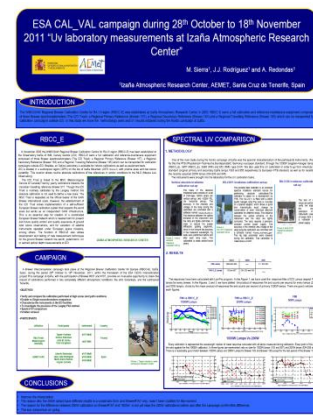
*Izaña atmospheric Research Center, AEMET, Santa Cruz de Tenerife, Spain*

**Regional Brewer Calibration Centre-Europe (RBCC\_E)**

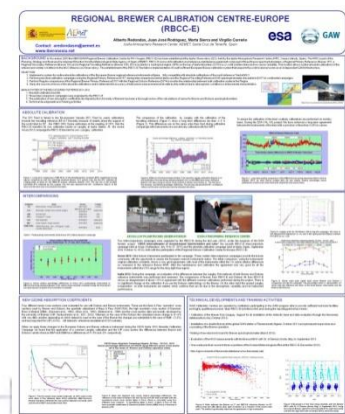
*Alberto Redondas , Juan José Rodríguez, Marta Sierra and Virgilio Carreño*

*Izaña atmospheric Research Center, AEMET, Santa Cruz de Tenerife, Spain*

**THE ANNUAL MEETING OF THE NORDIC OZONE AND UV GROUP, HELSINKI, 8-10 FEBRUARY, 2012**



**REGIONAL BREWER CALIBRATION CENTRE-EUROPE (RBCC\_E), GAW 2013 SYMPOSIUM 18-20 MARCH 2013 WMO SECRETARIAT GENEVA**



# 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



## FUTURE WORK

- Level 3  2011-2012
- Level 1, 2 and 3  2013



**Thank you for your attention**

