GOBIERNO DE ESPAÑA
MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE
AEMet Agencia Estatal de Meteorología

RBCC-E Triad

Update of the Triad Status

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Outline

- RBCC-E triad
- Triad maintenance
- Triad performance
- Calibration Transfer during campaigns
  - Comparison before and after the campaign
  - Langley before and after the campaign
  - Reference comparisons during campaigns
- Langley vs Travelling

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RBCC-E triad

Triad location

- IZO is located in subtropical region (28ºN) on top of the Izaña Mountain (2370 m.a.s.l.) with clear sky and small ozone variability. This allows routine absolute calibrations of the references similar to the MLO site on Hawaii.

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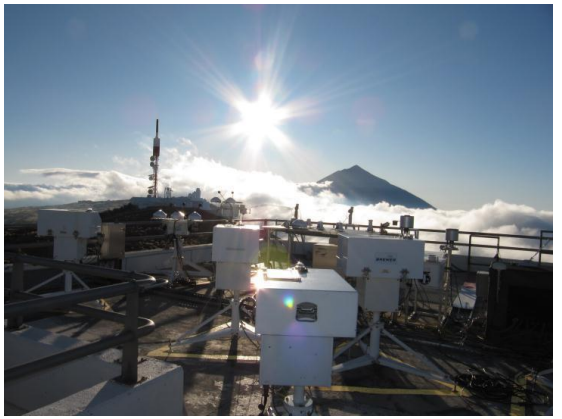
RBCC-E triad

The Regional Brewer calibration center for region RA-VI (RBCC-E) was established in 2003 November.

The triad comprises the Brewers 157, 183 and 185

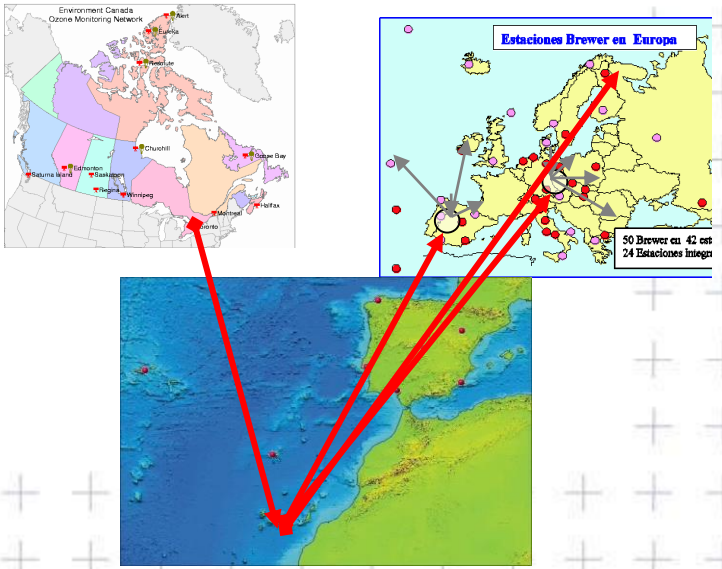
RBCC-E

In November 2003 the WMO/GAW Regional Brewer Calibration Centre for RA-VI region (RBCC-E) was established at the Observatory Izaña of AEMET, Canary Islands (IZO).



The IZO Triad is linked to the Environment Canada (EC) Triad by yearly calibrations towards the travelling reference BR 017(IOS)/145(EC).

Recently because of doubts about the support of the world triad by EC , the WMO SAG Ozone authorizes at the meeting of 2011, that the RBCC-E transfers its own calibration based on Langley at Izaña Station.



At the recent Arosa 2012 and Huelva 2013 campaigns the RBCC-E transferred his own Langley calibration

Triad maintenance

Dispersion test are performed monthly or more if needed.

200 w lamp calibrations are performed monthly or more if needed.

1000 w lamp calibrations are performed every 6 months or more if needed.

Daily check, including dome and window cleaning, levelling..

Monthly check, including tracker disc cleaning, silica gel change..

Triad maintenance

Izo Checklist

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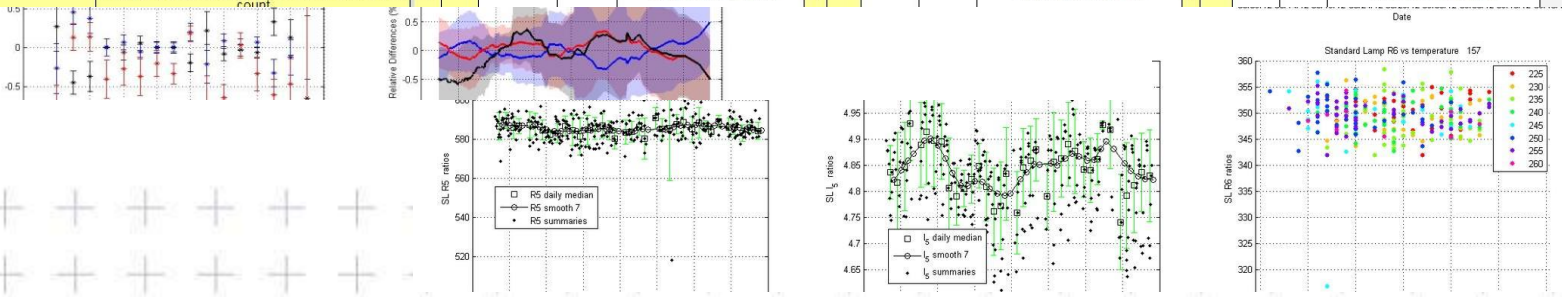
			Brewer#157					Brewer#183					Brewer#185				
	RBCC_E TRIAD	Description	Y	N	V1	V2	Comments	Y	N	V1	V2	Comments	Y	N	V1	V2	Comments
	Instrument operation:																
	Setup & Level	FV Az+/- 25 Ze +/- 5		N			Azimut out of range. Levelling on day 14013		N			Azimut out of range	Y				
	Location /time	Correct	Y					Y					Y				
	Sitting (periodically)		Y					Y					Y				
	Files Read		Y					Y					Y				
	Instrument Historic	**FROM AVG**															
	HP/HG	Hp/Hg tests repeatable	Y					Y				Too noisy, though	Y				Too noisy, though
	SH	Slits Test		NaN					NaN					NaN			
	RS	Run/Stop test within +/- 0.003 from unity for illuminated slits and between 0.5 and 2 for the dark count	Y				Dark slit not analized	Y				Dark slit not analized	Y				Dark slit not analized
	DT	Dead time is between 28 ns and 45 ns for multiple-board Brewers and between 16 ns and 25 ns for single-board Brewers	Y		28	32		Y		21	23			N	29	33	
	SL R6	Stable and not seasonal variations	Y		348	350			N	377	395	Large increasing in March due to slitmask trouble (lab., solved)		N	289	350	Big change due to focus realignment
	R6 temperature	Lower than 5 units/10 degrees	Y		-0.5				N	66		Not valid		N	46		Not valid
	SL R5	Stable and not seasonal variations	Y		589	590			N	653	690	Large increasing in March due to slitmask trouble (lab., solved)		N	446	335	Big change due to focus realignment
	R5 temperature	Lower than 5 units/10 degrees							N	122		Not valid		N	74		Not valid
	R5 intensity											But too variable (+/- 18%)		N			Big change due to focus realignment y/o SL rplc.
	Instrument weekly	**(This week)**															
	hp/hg	Hp/Hg tests repeatable	Y					Y					Y				Too noisy
	sh	SH shutter delay is correct		NaN					NaN					NaN			
	DT	Dead time is within 2 ns from the historical record		N	28	32		Y		21	23			N	29	33	
	DT High/Low	High / Low agree within std.	Y					Y					Y				
	RS	Run/Stop test within +/- 0.003 from unity for illuminated slits and between 0.5 and 2 for the dark count	Y				Dark slit not analized	Y				Dark slit not analized	Y				Dark slit not analized

Weekly web based detailed checklist



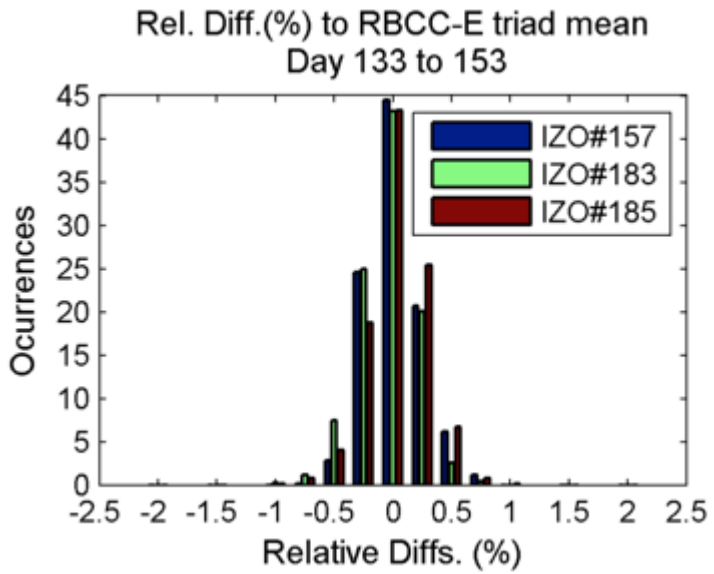
Triad maintenance. Dispersion tests

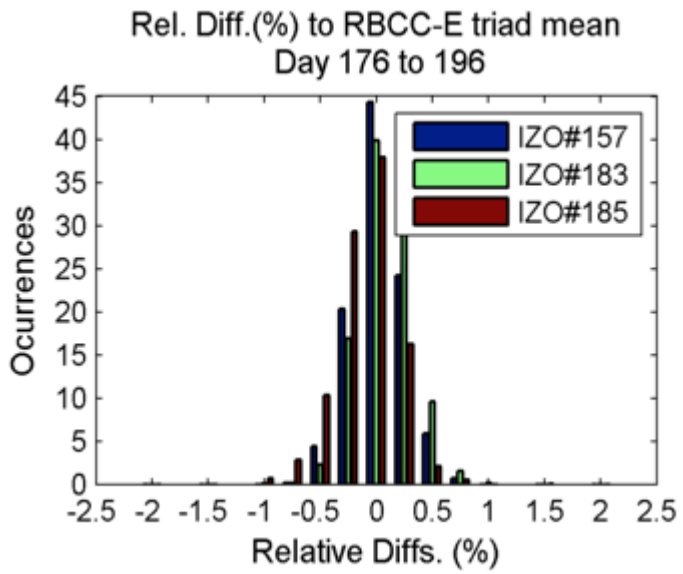
Julian Day	COEF ICF	COEF DISPRO	Cal Ste
047	0		
102	0		
105	0		
122	0		
182	0		
217	0		

Julian Day	COEF ICF 183	CO DIS 1
35	0.3435	0.3
73	0.3435	0.3
97	0.3435	0.3
100	0.3435	0.3
176	0.3435	0.3
182	0.3435	0.3
220	0.3435	0.3
232	0.3435	0.3
246	0.3435	0.3

Julian Day	COEF ICF 185	COEF DISPRO 185	Cal Step 1018 Zero 1733
73	0.3422	0.3386	Calc S. 1018 -> 1014
76	0.3422	0.3381	Hg int, Cd y Zn
77	0.3422	0.3381	Hg ext, Cd y Zn
100	0.3422	0.3370	Zn, Cd y Hg int
122	0.3422	0.3444	Hg y Cd
132	0.3422	0.337	Hg int, Cd y Zn
140	0.3422	0.3422	dcf14013.185
163	0.3422	0.3404	
172	0.3422	0.3410	
176	0.3422	0.3410	
211	0.3422	0.3434	
220	0.3422	0.3415	Hg int, Cd

Calibrations

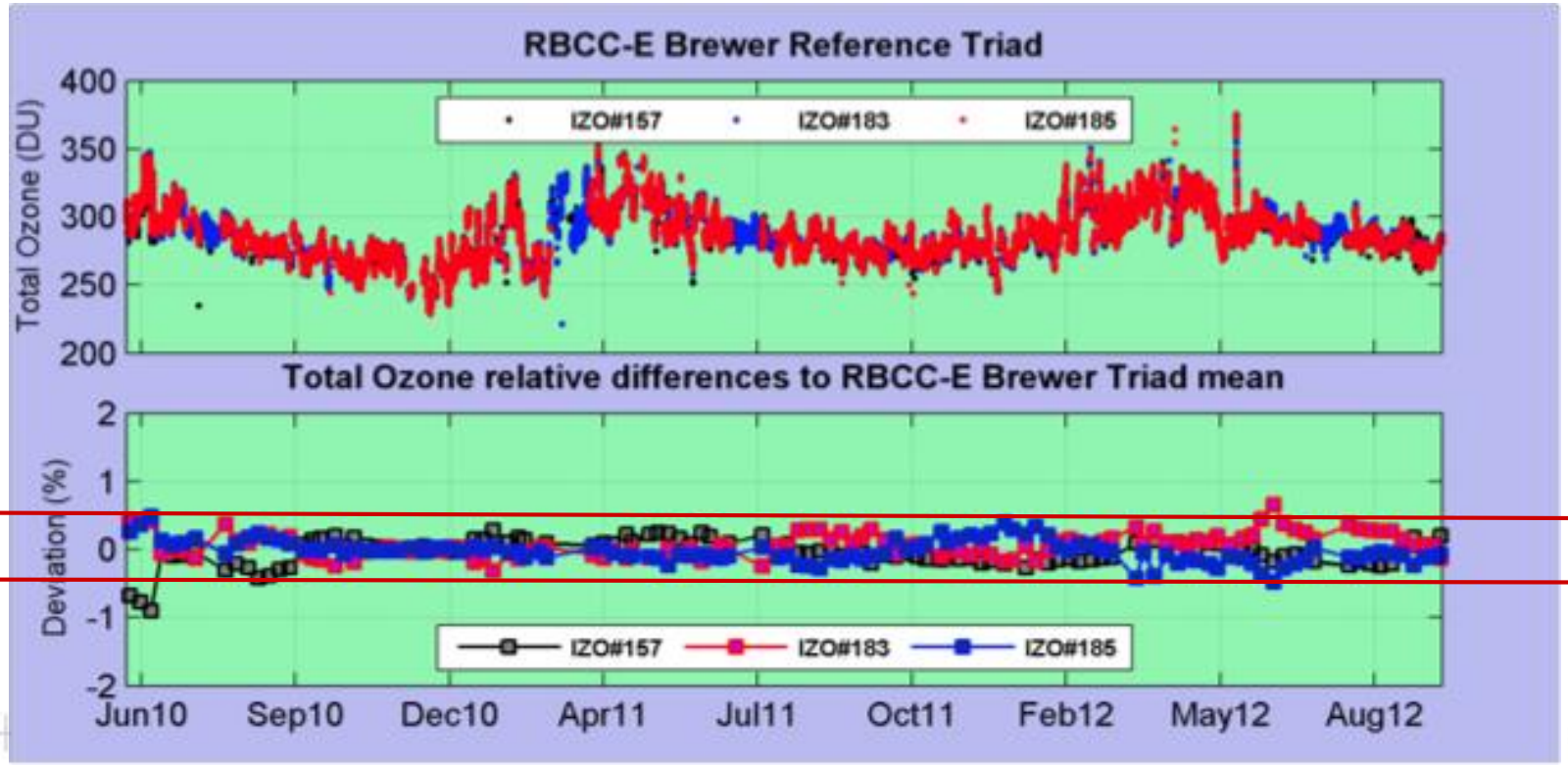




	#157	#183	#185	Nobs
Before	0.0 +/- 0.23	-0.1 +/- 0.24	0.0 +/- 0.25	778
After	0.0 +/- 0.23	0.1 +/- 0.25	-0.1 +/- 0.27	1193

Triad performance

This is what we get !!, Deviation of ±0.25% from mean.



RBCC-E Campaigns

CEOS Intercalibration of Ground-based Spectrometers and Lidar, aims to homogenize the European ozone ground network.

Nordic campaigns

Investigate the calibration methodology at two different ozone atmospheric conditions.

a. Instrumental issues

b. Ozone ETC sensitivity Calibration

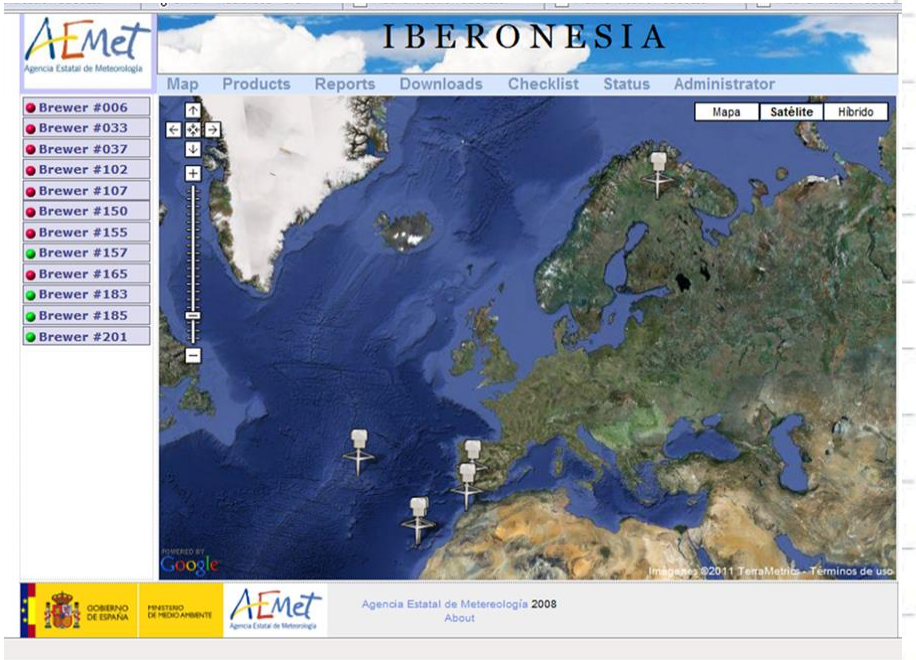
RBCC-E campaigns

a. Status of the network (comparison with reference instruments)

b. Brewer – Dobson comparison

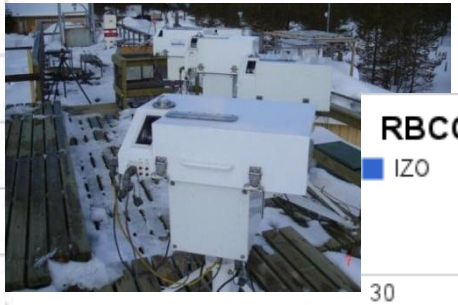
Absolute Calibration(Langley)

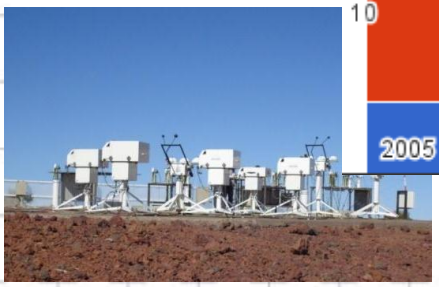
a. Reference instruments calibration

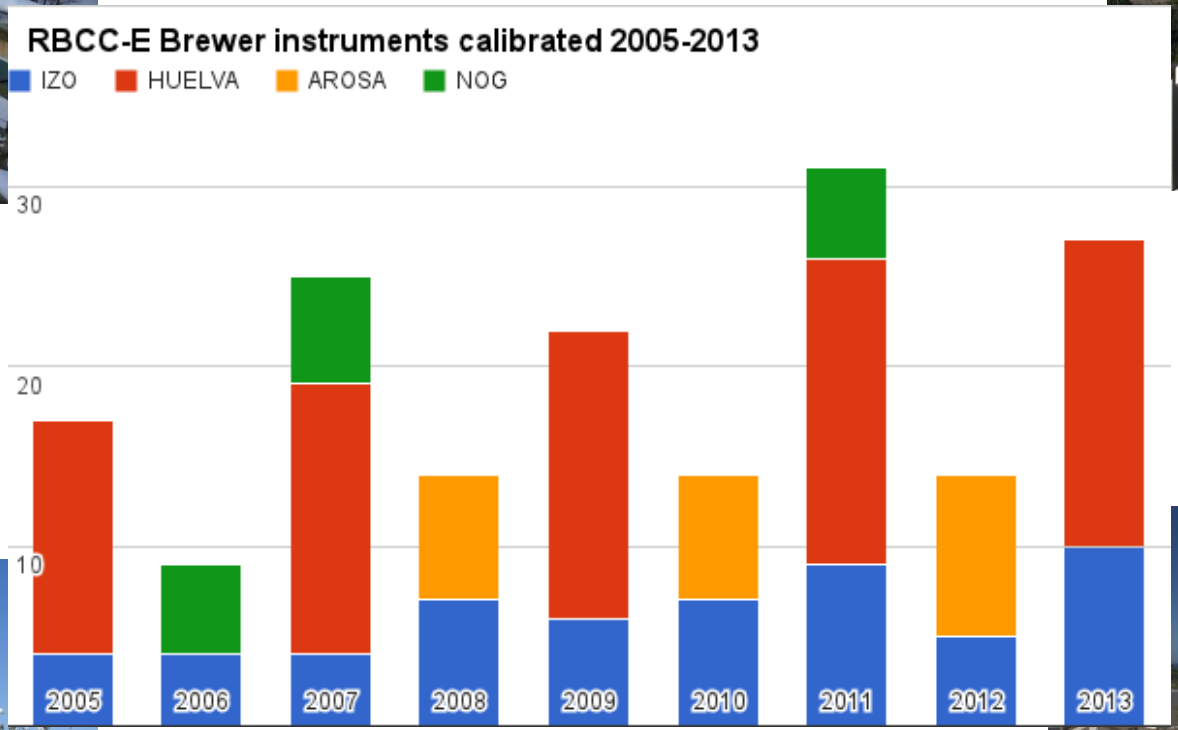


http://uv-vis.aeronomie.be/projects/ESA_CEOS/

RBCC-E Campaigns





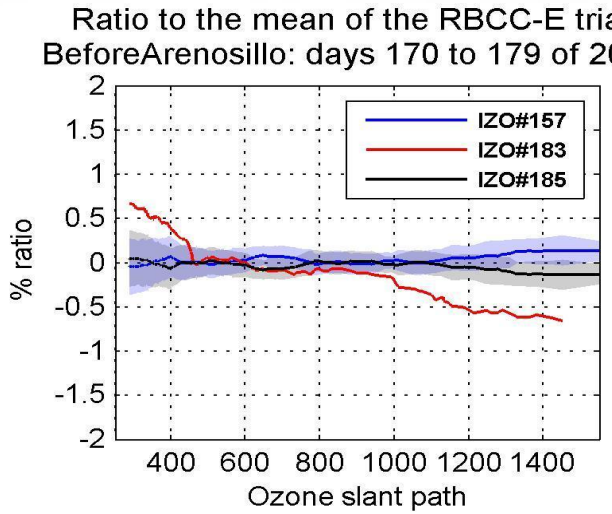


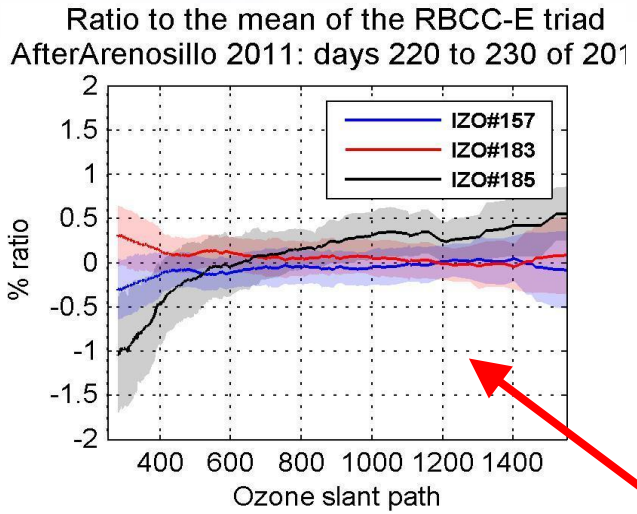
RBCC-E Intercomparison Campaigns

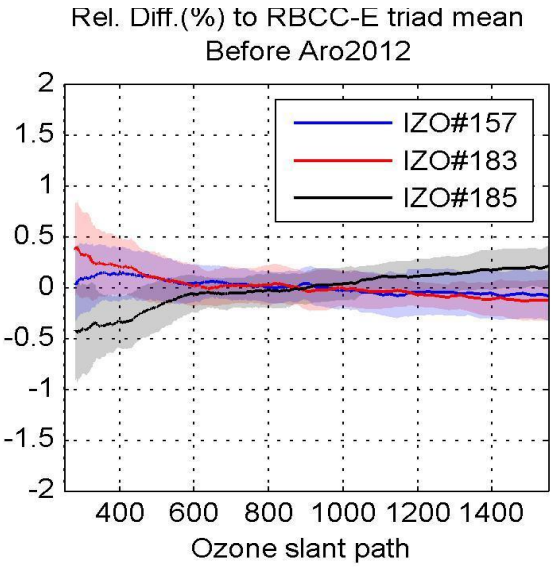
As a Regional Brewer Calibration Center for RA-VI region, RBCC-E performs regular intercomparison campaigns in Europe, mainly taking place in Central and South Europe.

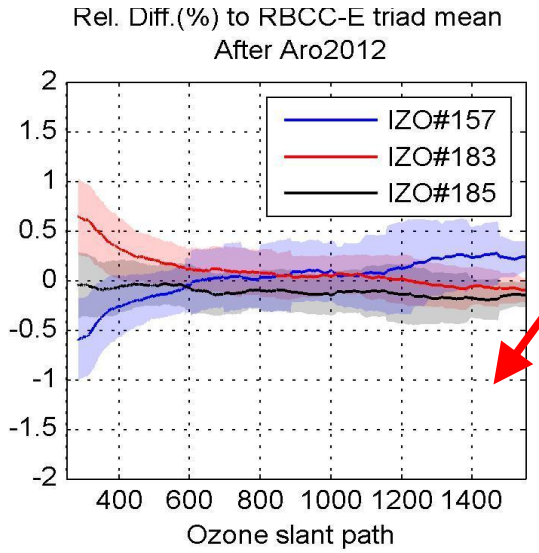
Event	Description	date
Arenosillo 2013 (Spain)	Intercomparison campaign	Summer 2013
Izana2012 Langley	Intercomparison campaign	Autumm 2012
Arosa2012 (Switzerland)	Intercomparison campaign	Summer 2012
Izana2011 Langley	Intercomparison campaign	Autumm 2011
Arenosillo 2011 (Spain)	Intercomparison campaign	Summer 2011
Nordic campaign 2011	Intercomparison campaign	Spring 2011
Arosa 2010 (Switzerland)	Intercomparison campaign	Summer 2010
Arenosillo 2009 (Spain)	Intercomparison campaign	Summer 2009
Arosa 2008 (Switzerland)	Intercomparison campaign	Summer 2008

Campaigns





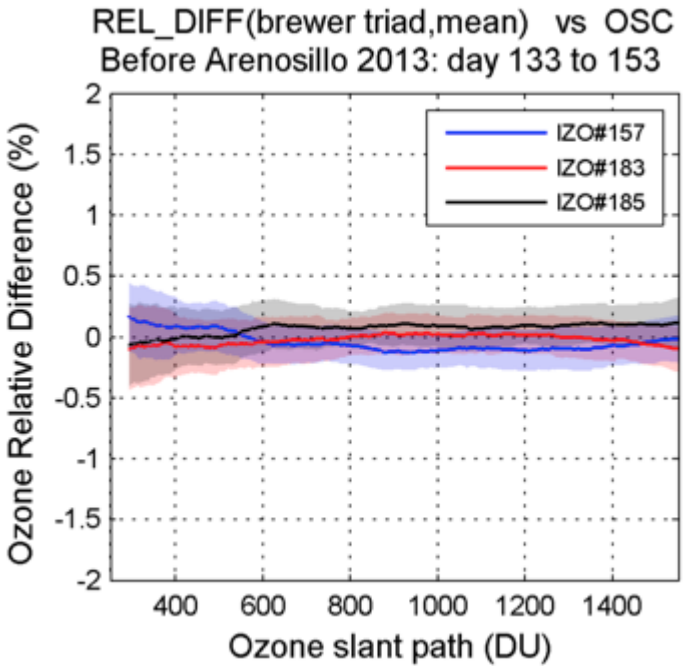


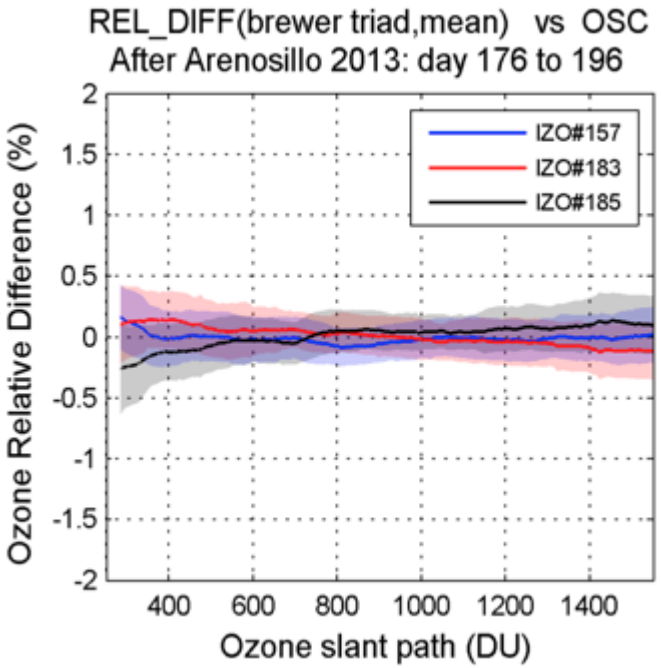


Good agreement before and after the campaigns

Campaigns

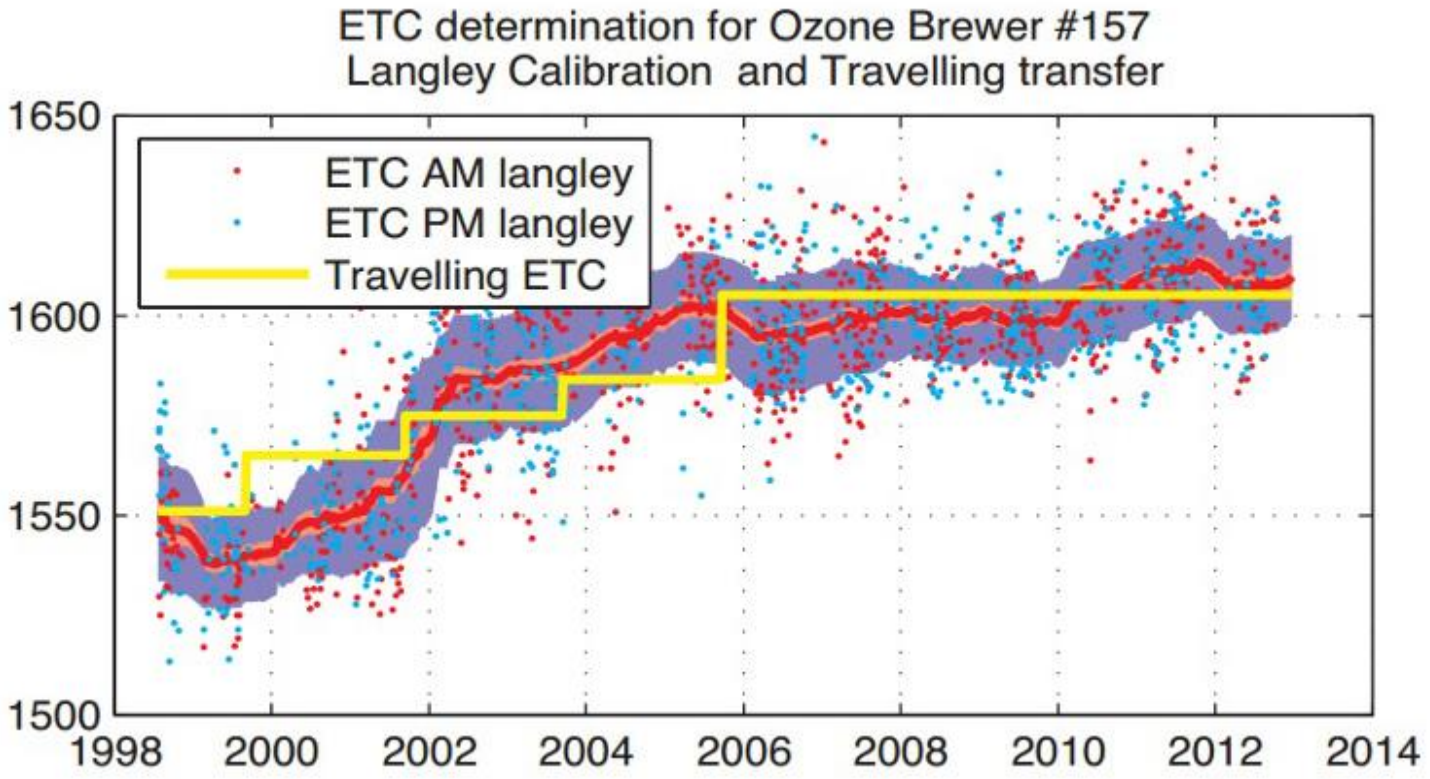
And in this year….





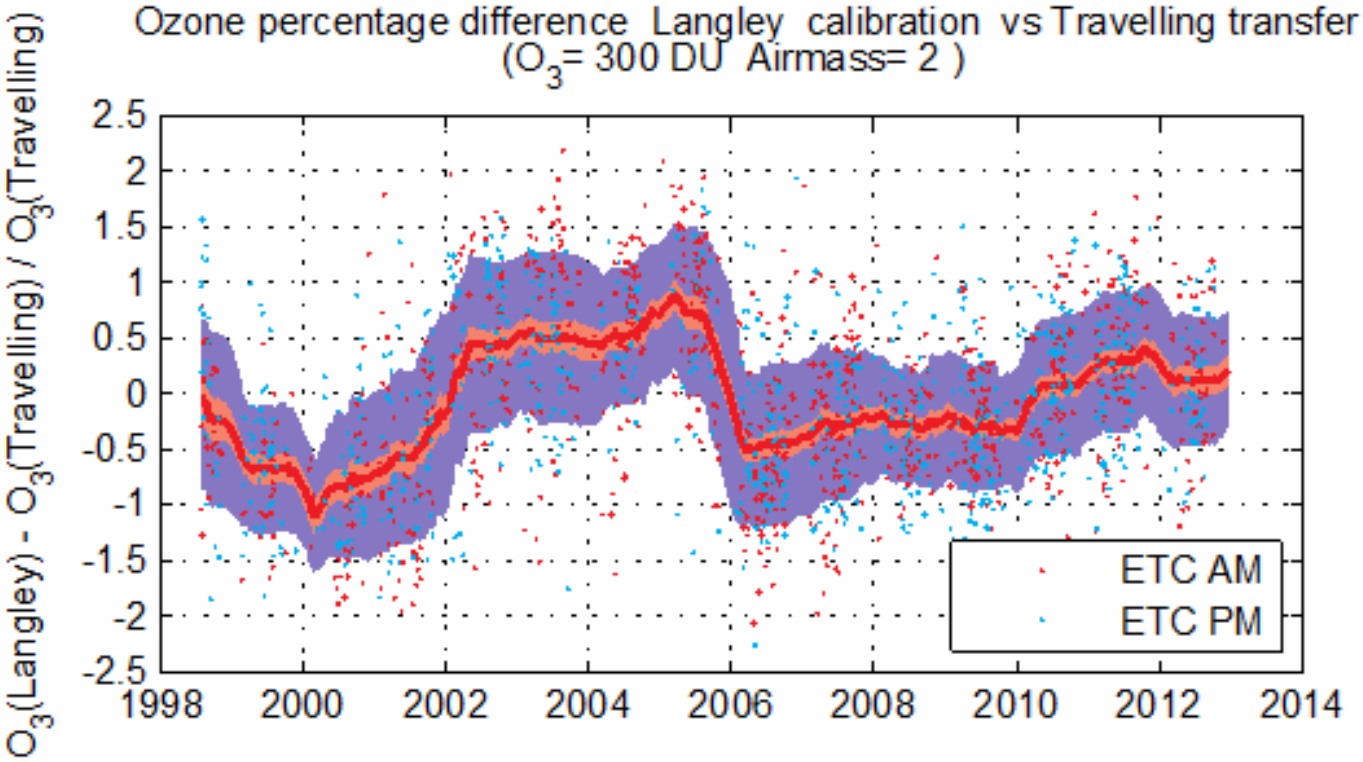
...even better results.

Langley vs Travelling



The red line is the monthly smoothed ETC obtained by the Langley. The red area represent the 95% confidence interval of the mean and the blue area the standard deviation.

Langley vs Travelling



The agreement with the travelling transferred reference is in most of the cases ± 2%, and better in the last years.

Thank you for your attention !