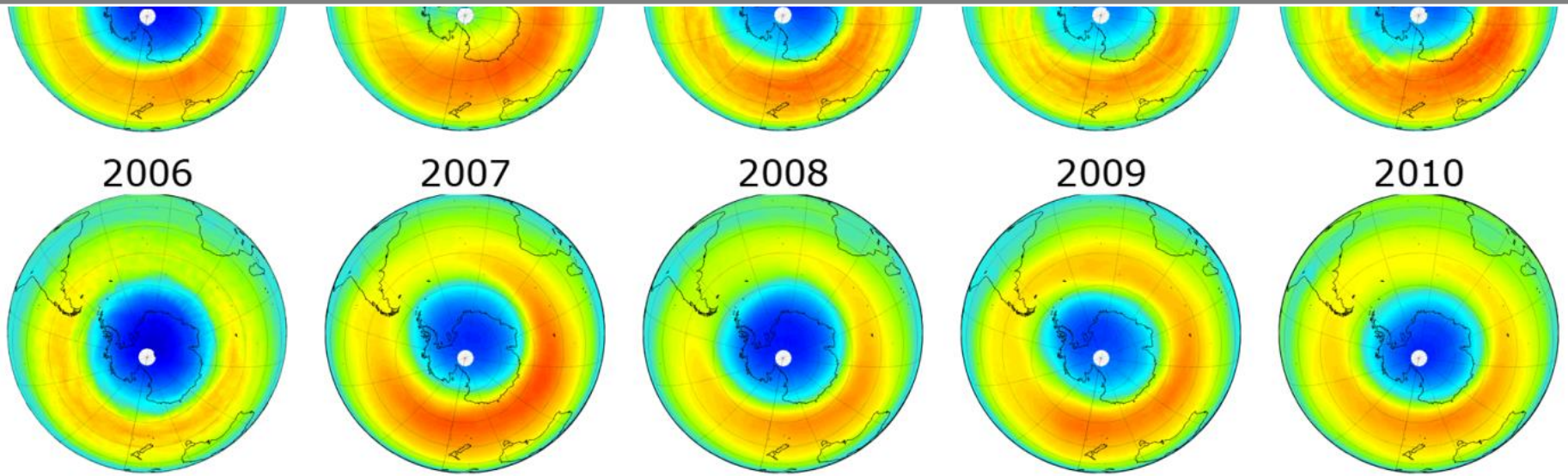
Ozone_CCI Contribution

Peter Braesicke (CRG) on behalf of the Ozone_CCI Team
Science Lead: Michel Van Roozendael, BIRA



Data sets

- Total ozone from nadir UV and TIR sensors
- Ozone profiles from nadir UV and TIR sensors (Trop/Strat)
- Ozone profiles from limb/occultation sensors (UTLS/Strat/Meso)

- Improved & harmonised level-2 algorithms
- Improved & harmonised level-3 algorithms
- Consistent NetCDF-CF formatting of all data sets
- Open distribution on Ozone_CCI web-site (CDRP)

- Common approach to error characterization for all products (ATBD)
- Validation and information content analysis → systematic assessment of status w.r.t. User Requirements (PVIR)

Data sets (phase-2 improvements)

- Algorithm improvements (level-2 and level-3)

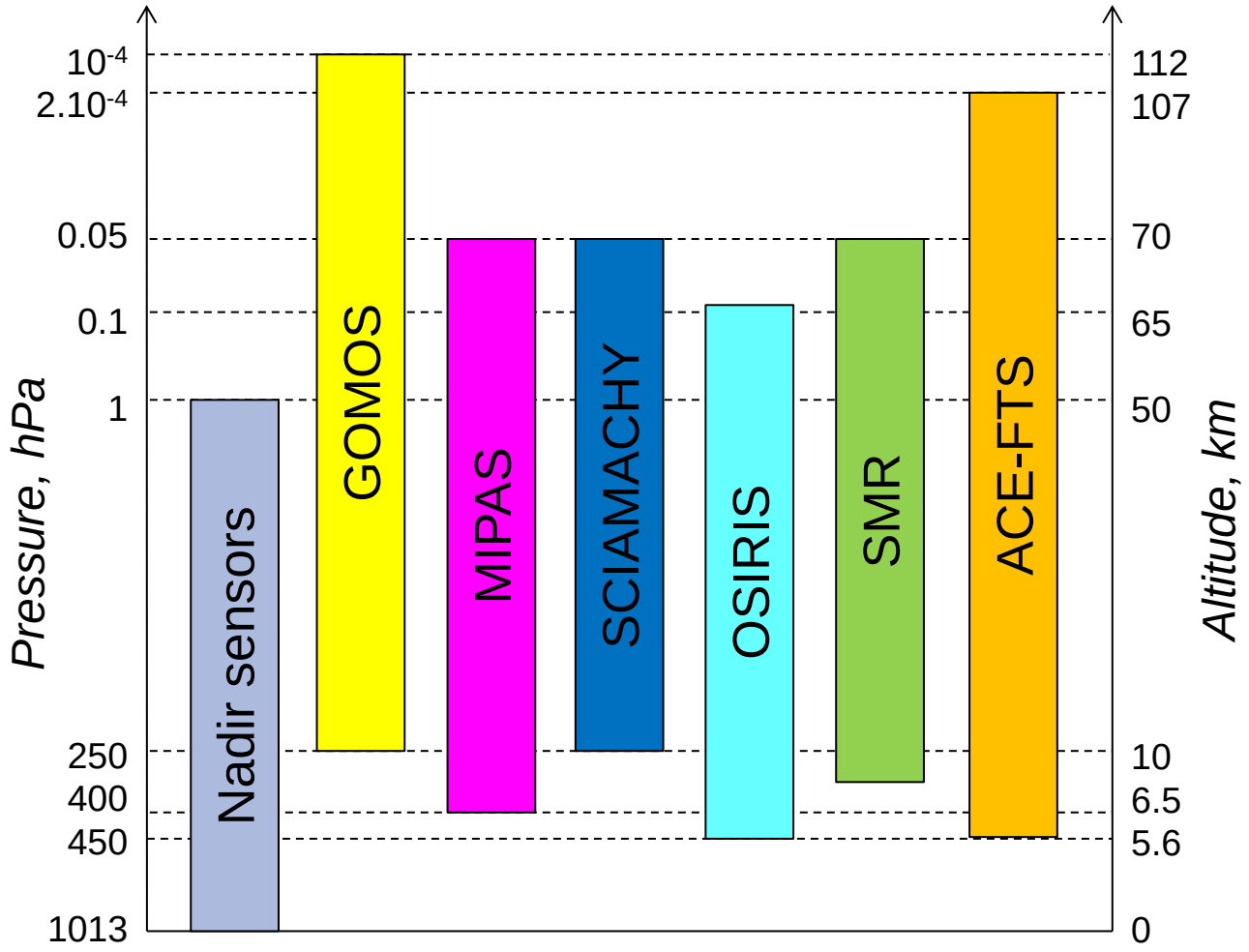
- Extend products in time forward and backward (full re-processing)
- Extend/improve products in troposphere and UTLS
- Extend/improve products in mesosphere
- Link European data sets to historical long-series from NASA

- Better match user requirements on accuracy, long-term stability, uncertainty characterization, validation
- Optimize (re)processing methodology and system(s)

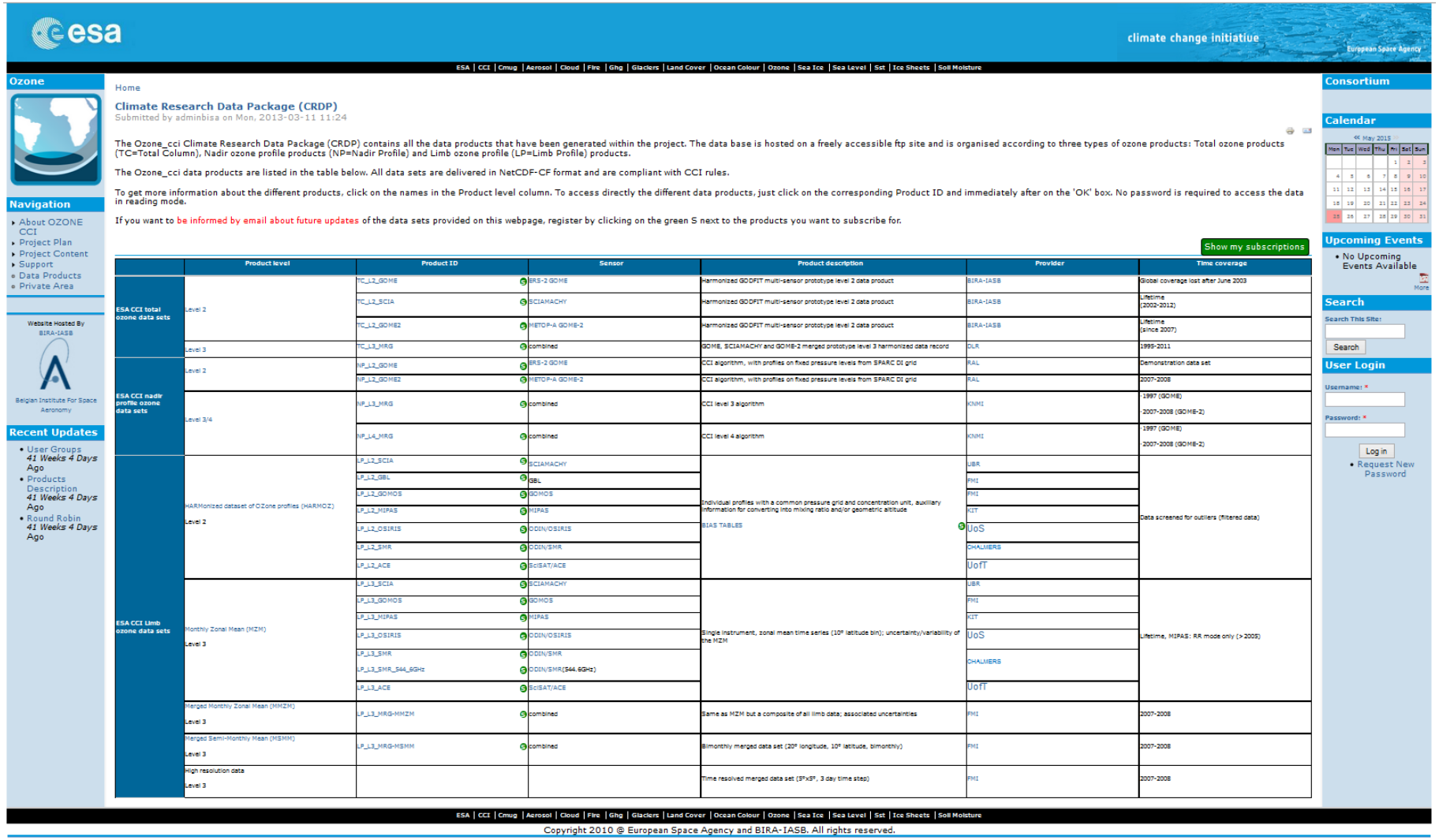
Platforms and sensors

Agency	Satellite platform	Sensor	Time period																		
			96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ESA	ERS-2	GOME																				
ESA	ENVISAT	SCIAMACHY																				
		GOMOS																				
		MIPAS																				
EUMETSAT	METOP-A	GOME2-A																				
		IASI-A																				
	METOP-B	GOME2-B																				
		IASI-B																				
NASA	NPP-Suomi	OMPS																				
SNSB CSA	ODIN	OSIRIS																				
		SMR																				
CSA	SCISAT	ACE																				

Altitude range



Available Ozone CCI Data



esa — climate change initiative — European Space Agency

ESA | CCI | Cmug | Aerosol | Cloud | Fire | Ghg | Glaciers | Land Cover | Ocean Colour | Ozone | Sea Ice | Sea Level | Sst | Ice Sheets | Soil Moisture

Ozone

Navigation
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- Support
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- Private Area

Website Hosted By BIRA-IASB

Belgian Institute For Space Aeronomy

Recent Updates
- User Groups *41 Weeks 4 Days Ago*
- Products Description *41 Weeks 4 Days Ago*
- Round Robin *41 Weeks 4 Days Ago*

Home

Climate Research Data Package (CRDP)

Submitted by adminbisa on Mon, 2013-03-11 11:24

The Ozone_cci Climate Research Data Package (CRDP) contains all the data products that have been generated within the project. The data base is hosted on a freely accessible ftp site and is organised according to three types of ozone products: Total ozone products (TC=Total Column), Nadir ozone profile products (NP=Nadir Profile) and Limb ozone profile (LP=Limb Profile) products.

The Ozone_cci data products are listed in the table below. All data sets are delivered in NetCDF-CF format and are compliant with CCI rules.

To get more information about the different products, click on the names in the Product level column. To access directly the different data products, just click on the corresponding Product ID and immediately after on the 'OK' box. No password is required to access the data in reading mode.

If you want to be informed by email about future updates of the data sets provided on this webpage, register by clicking on the green S next to the products you want to subscribe for.

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	Product level	Product ID	Sensor	Product description	Provider	Time coverage
ESA CCI total ozone data sets	Level 2	TC_L2_GOME	ERS-2 GOME	Harmonized GODFIT multi-sensor prototype level 2 data product	BIRA-IASB	Global coverage lost after June 2003
		TC_L2_SCIA	SCIAMACHY	Harmonized GODFIT multi-sensor prototype level 2 data product	BIRA-IASB	Lifetime (2002-2012)
		TC_L2_GOME2	METOP-A GOME-2	Harmonized GODFIT multi-sensor prototype level 2 data product	BIRA-IASB	Lifetime (since 2007)
	Level 3	TC_L3_MRG	combined	GOME, SCIAMACHY and GOME-2 merged prototype level 3 harmonized data record	DLR	1995-2011
ESA CCI nadir profile ozone data sets	Level 2	NP_L2_GOME	ERS-2 GOME	CCI algorithm, with profiles on fixed pressure levels from SPARC DI grid	RAL	Demonstration data set
		NP_L2_GOME2	METOP-A GOME-2	CCI algorithm, with profiles on fixed pressure levels from SPARC DI grid	RAL	2007-2008
	Level 3/4	NP_L3_MRG	combined	CCI level 3 algorithm	KNMI	· 1997 (GOME) · 2007-2008 (GOME-2)
		NP_L4_MRG	combined	CCI level 4 algorithm	KNMI	· 1997 (GOME) · 2007-2008 (GOME-2)
ESA CCI Limb ozone data sets	HARMonized dataset of OZone profiles (HARMOZ) Level 2	LP_L2_SCIA	SCIAMACHY	Individual profiles with a common pressure grid and concentration unit, auxiliary information for converting into mixing ratio and/or geometric altitude BIAS TABLES	UBR	Data screened for outliers (filtered data)
		LP_L2_OBL	OBL		FMI	
		LP_L2_GOMOS	GOMOS		FMI	
		LP_L2_MIPAS	MIPAS		KIT	
		LP_L2_OSIRIS	ODIN/OSIRIS		UoS	
		LP_L2_SMR	ODIN/SMR		CHALMERS	
		LP_L2_ACE	SciSAT/ACE		UofT	
	Monthly Zonal Mean (MZM) Level 3	LP_L3_SCIA	SCIAMACHY	Single instrument, zonal mean time series (10° latitude bin); uncertainty/variability of the MZM	UBR	Lifetime, MIPAS: RR mode only (> 2005)
		LP_L3_GOMOS	GOMOS		FMI	
		LP_L3_MIPAS	MIPAS		KIT	
		LP_L3_OSIRIS	ODIN/OSIRIS		UoS	
		LP_L3_SMR	ODIN/SMR		CHALMERS	
		LP_L3_SMR_544_6GHz	ODIN/SMR(544.6GHz)			
		LP_L3_ACE	SciSAT/ACE		UofT	
	Merged Monthly Zonal Mean (MMZM) Level 3	LP_L3_MRG-MMZM	combined	Same as MZM but a composite of all limb data; associated uncertainties	FMI	2007-2008
	Merged Semi-Monthly Mean (MSMM) Level 3	LP_L3_MRG-MSMM	combined	Bimonthly merged data set (20° longitude, 10° latitude, bimonthly)	FMI	2007-2008
	High resolution data Level 3			Time resolved merged data set (5°x5°, 3 day time step)	FMI	2007-2008

Consortium

Calendar

« May 2015 »

Mon	Tue	Wed	Thu	Fri	Sat	Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Upcoming Events
- No Upcoming Events Available

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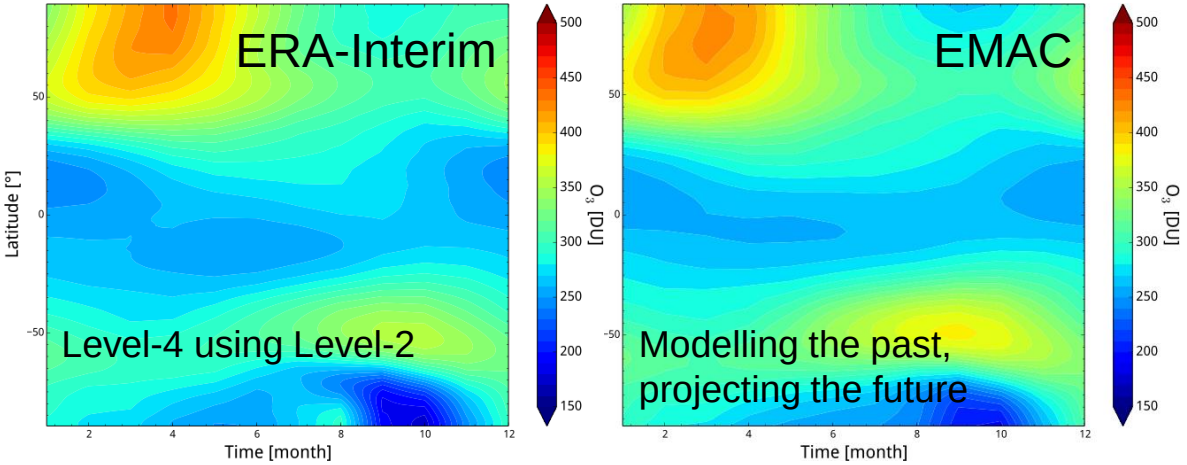
ESA | CCI | Cmug | Aerosol | Cloud | Fire | Ghg | Glaciers | Land Cover | Ocean Colour | Ozone | Sea Ice | Sea Level | Sst | Ice Sheets | Soil Moisture

Example: Total Ozone



Chemistry-climate model

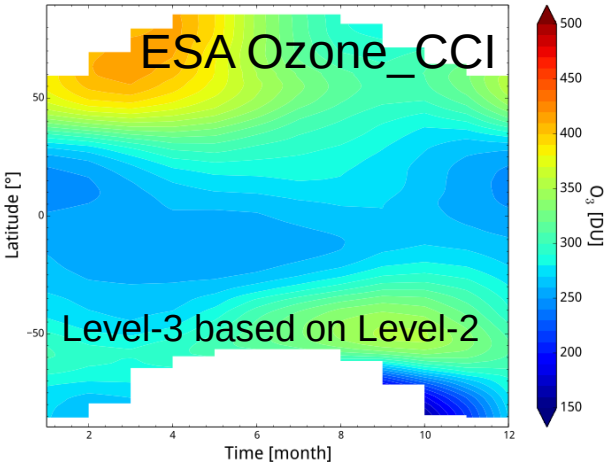


Image: ESA

ESA Ozone_CCI

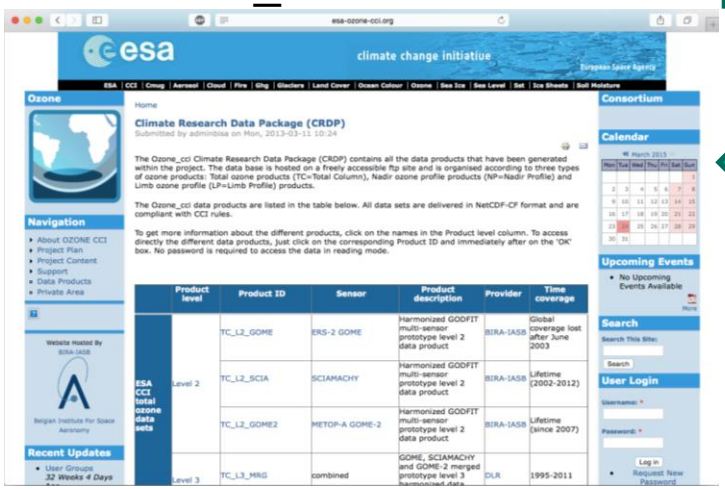


Image: ESA/EUMETSAT

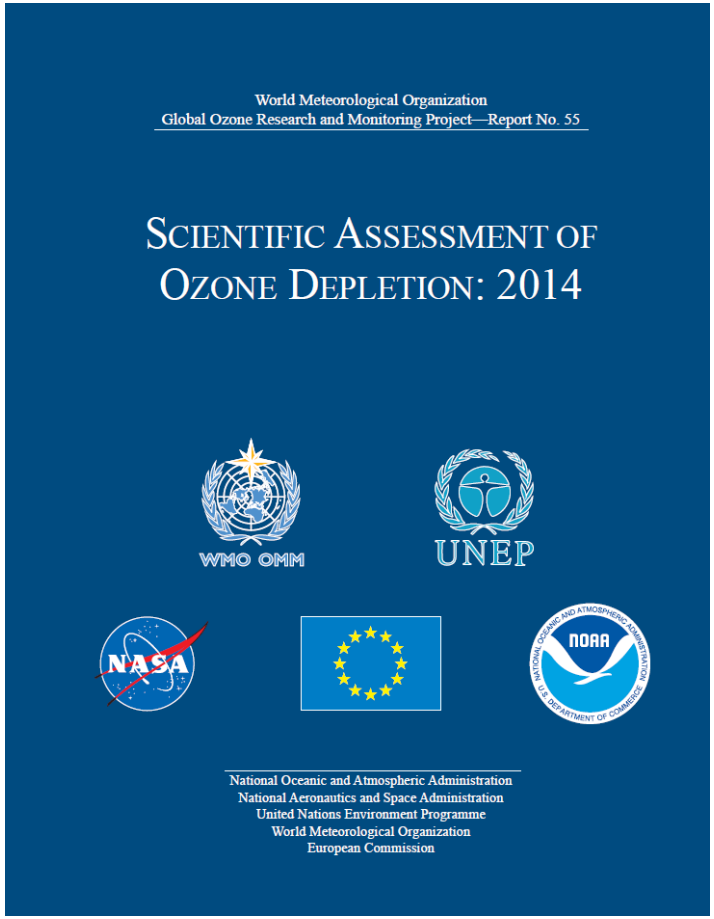
Why and how?

- Monitoring: long-term trends and changes
  - Is the Montreal Protocol working?
  - Data assimilation (KNMI, ECMWF)

- Climate sensitivity
- Attribution of variability:
  - QBO induced ozone changes
  - ENSO fingerprinting
- Climatic relevance of systematic changes:
  - Polar processes, e.g. PSC formation potential
  - Ozone hole and surface climate change
  - Other examples: Monsoon anticyclone, cold surges

- Data mining

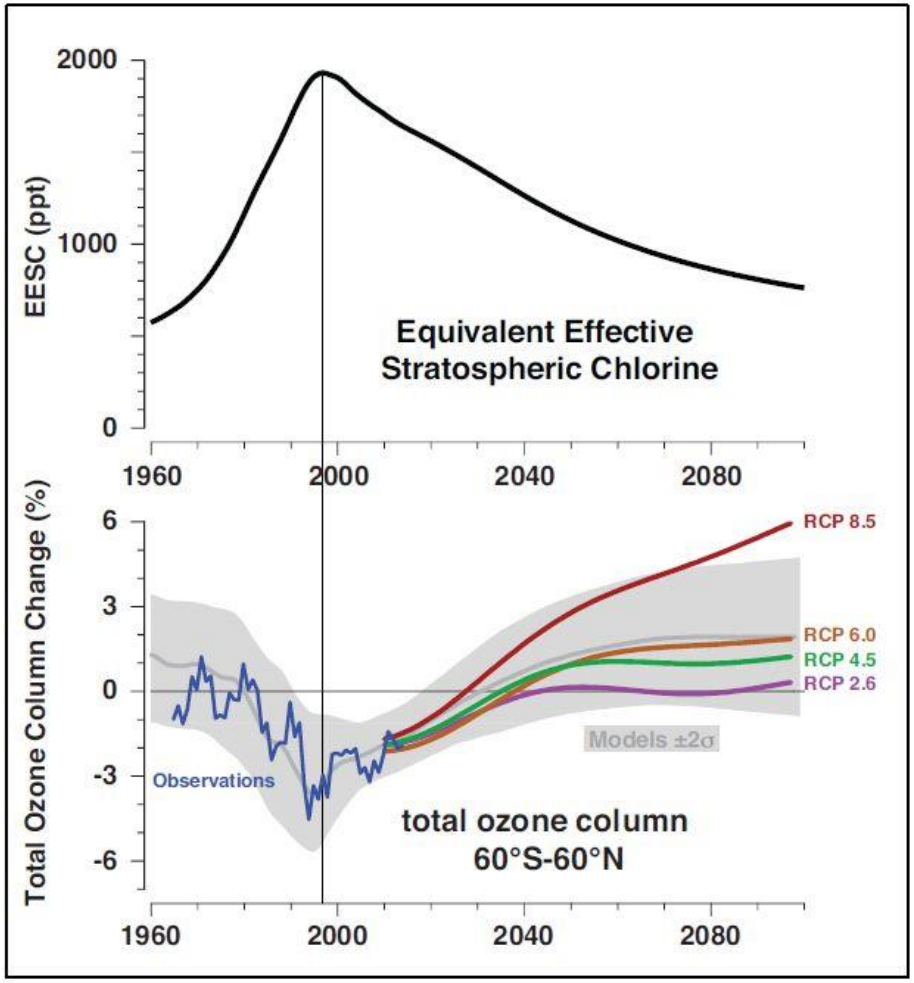
UNEP/WMO Ozone Assessment



- The current UNEP/WMO ozone assessments has been published in December 2014.
- Members of the Ozone_CCI CRG have contributed significantly to the UNEP/WMO ozone assessment.
- Ozone_CCI data products and CRG data from (Chemistry-)Climate Model simulations have been used in the assessment.

After the current assessment is before the next one …

Evolution of the stratospheric ozone layer



Top figure:
Variation of EESC in midlatitudes from 1960 to 2100.

Bottom figure:
Evolution of the total ozone column depending on (four) different greenhouse gas scenarios (with different concentrations of CO_2, CH_4 and N_2O):
The four scenarios correspond to a global radiative forcing of

- +2.6 (blue),
- +4.5 (green),
- +6.0 (brown), and
- +8.5 (red) in W m^{-2}.

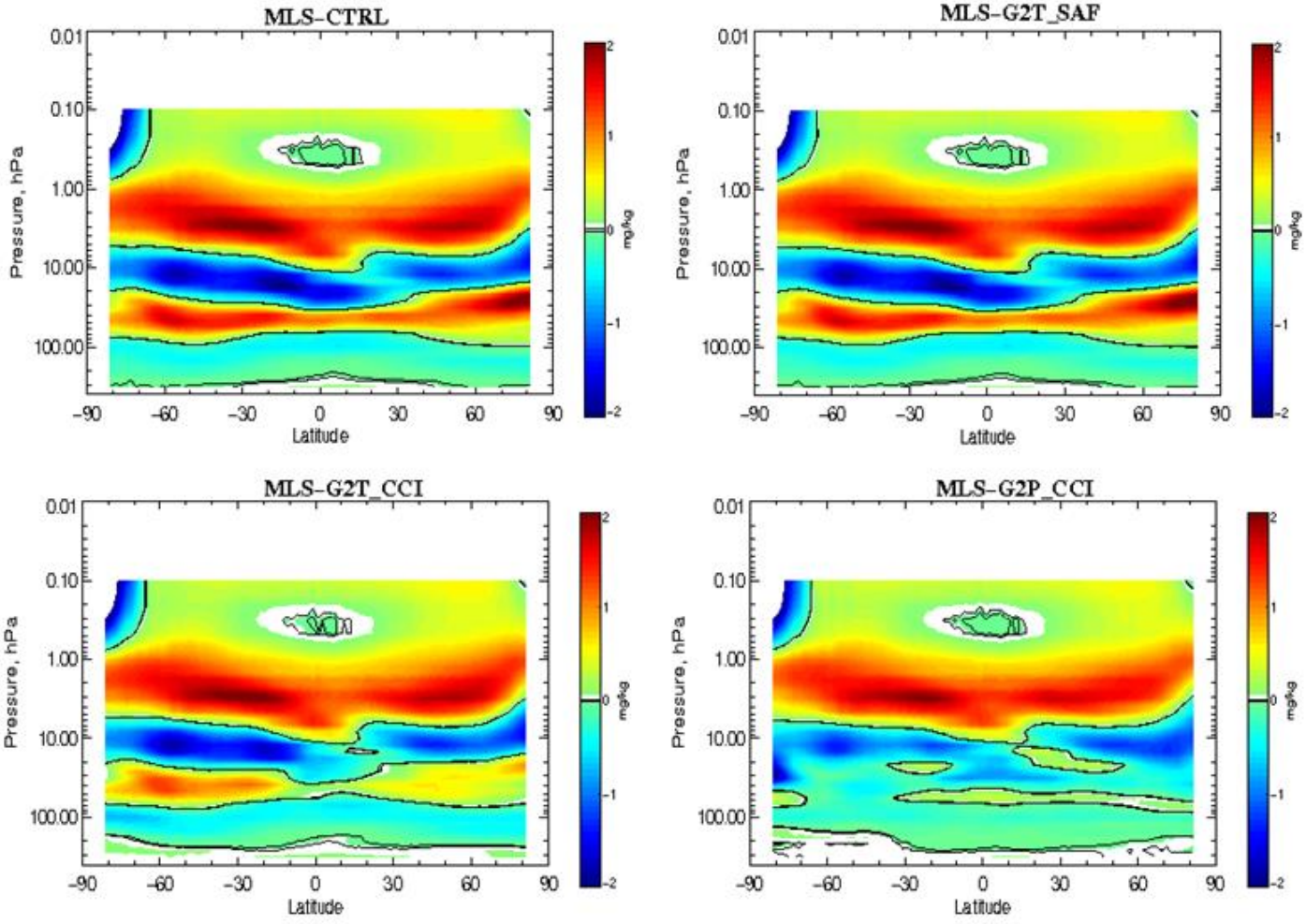
(WMO, 2014)

Round-Robin assimilation exercise (ECMWF)

Karlsruher Institut für Technologie

Zonal Mean Temporal Mean (MLS-Analyses): Aug – Oct 2008

Comparisons with MLS ozone profiles



R. Dragani, ECMWF

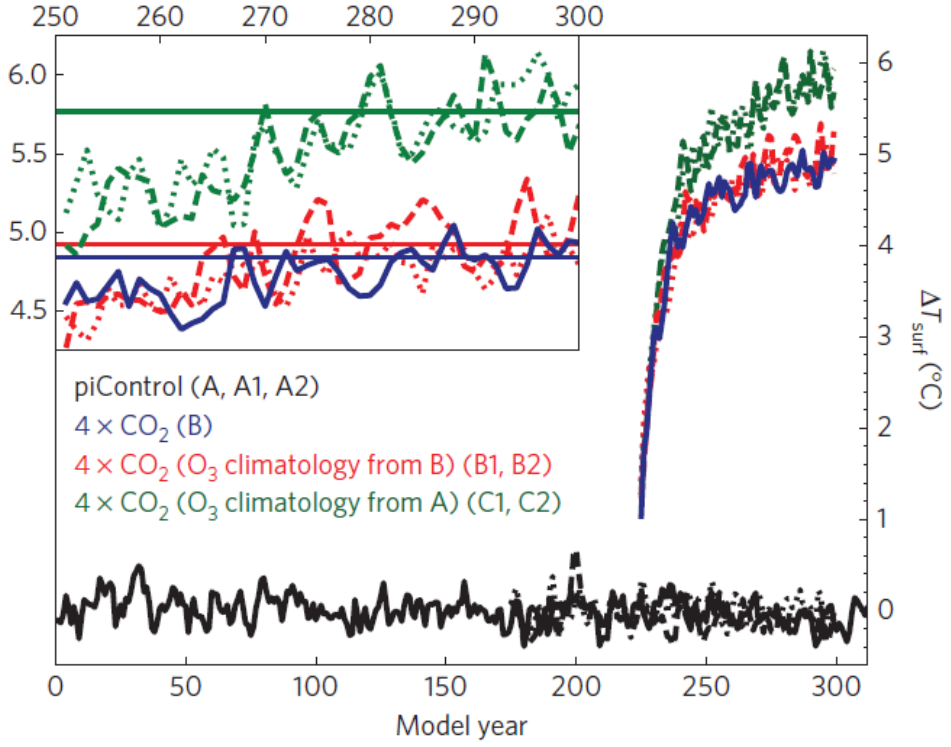
Climate Sensitivity

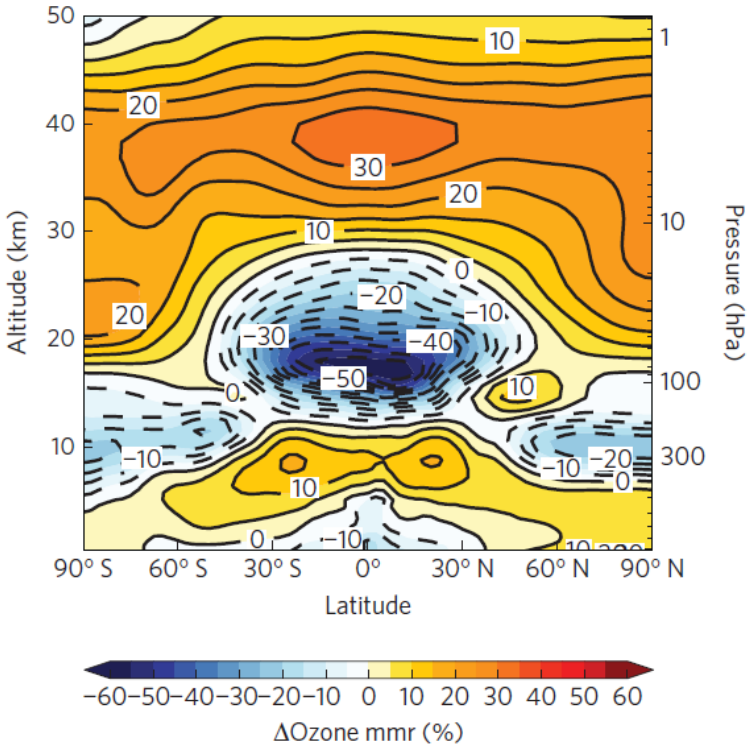
nature climate change
LETTERS
PUBLISHED ONLINE: 1 DECEMBER 2014 | DOI: 10.1038/NCLIMATE2451

A large ozone-circulation feedback and its implications for global warming assessments

Peer J. Nowack[1*], N. Luke Abraham[1,2], Amanda C. Maycock[1,2], Peter Braesicke[1,2†], Jonathan M. Gregory[2,3,4], Manoj M. Joshi[2,3†], Annette Osprey[2,3] and John A. Pyle[1,2]

DLR See also Dietmüller et al., 2014 for ozone changes when CO_2 is doubled.





Ozone-QBO

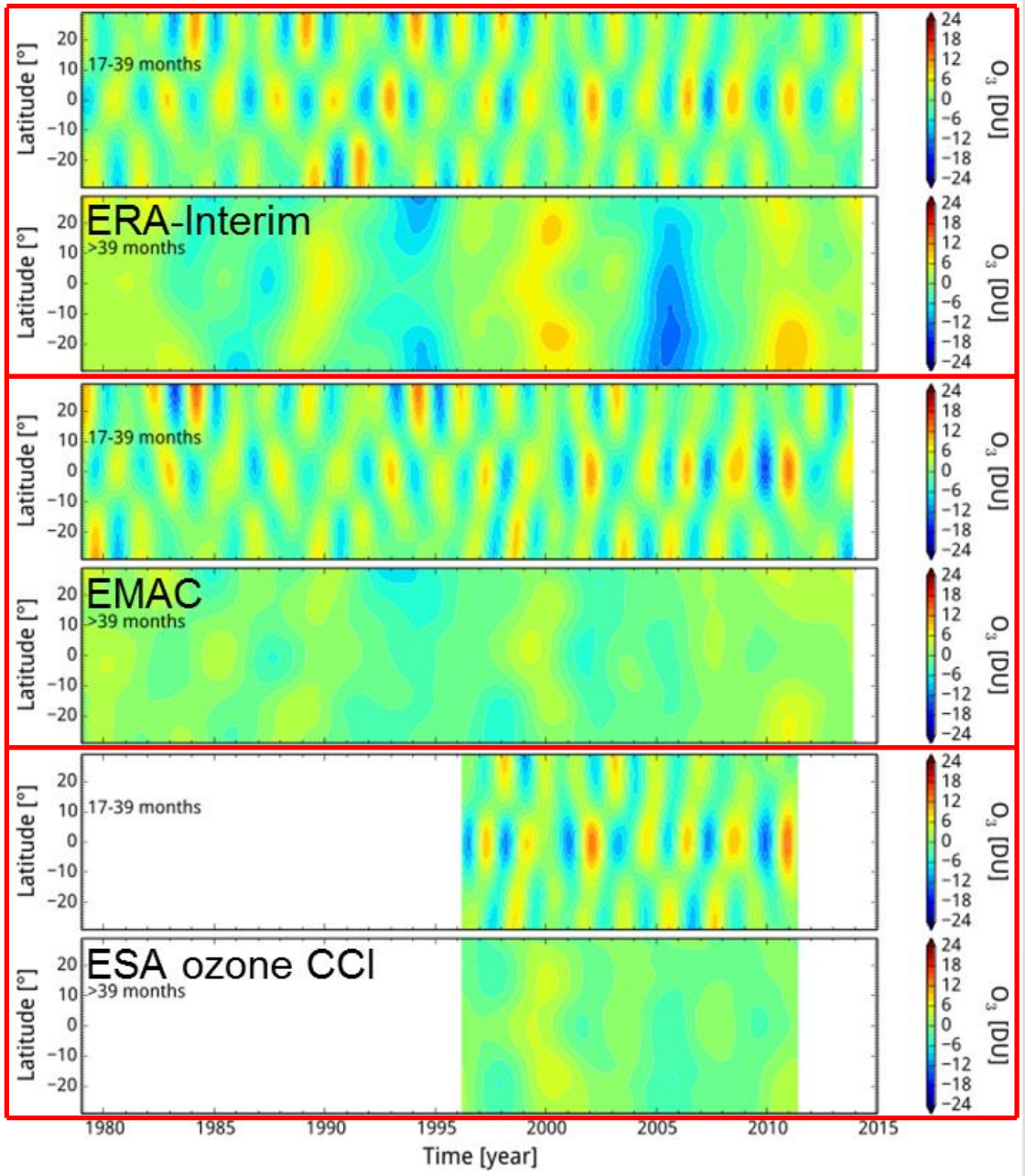
Q: Quasi

B: Biennial

O: Oscillation

Alternating easterly and westerly wind bands in the equatorial lower stratosphere (~27 months periodicity).

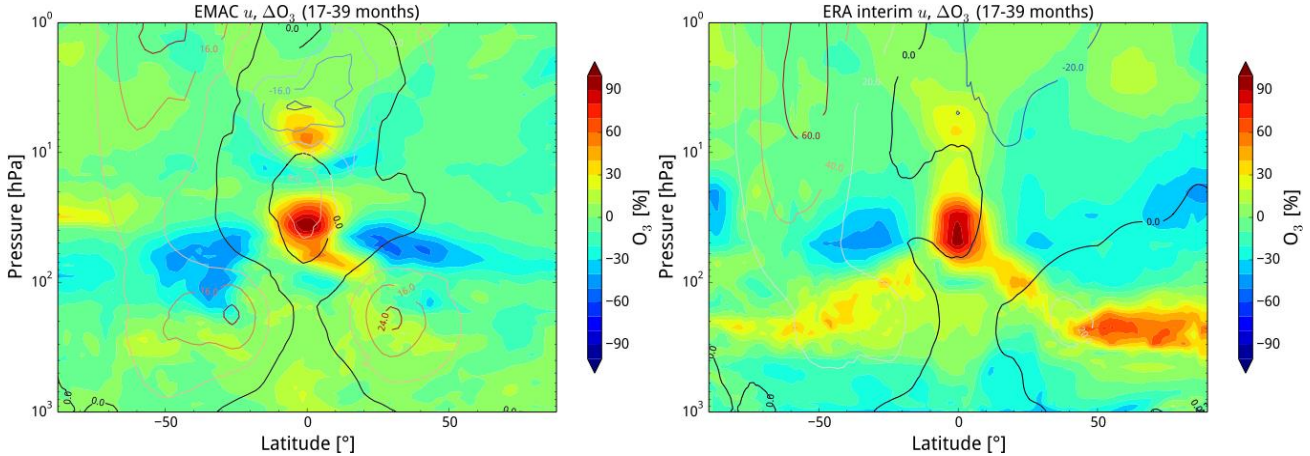
- Comparison between observations and models (using a bandpass filter)
- What is changing? How are regions outside the tropical belt affected?



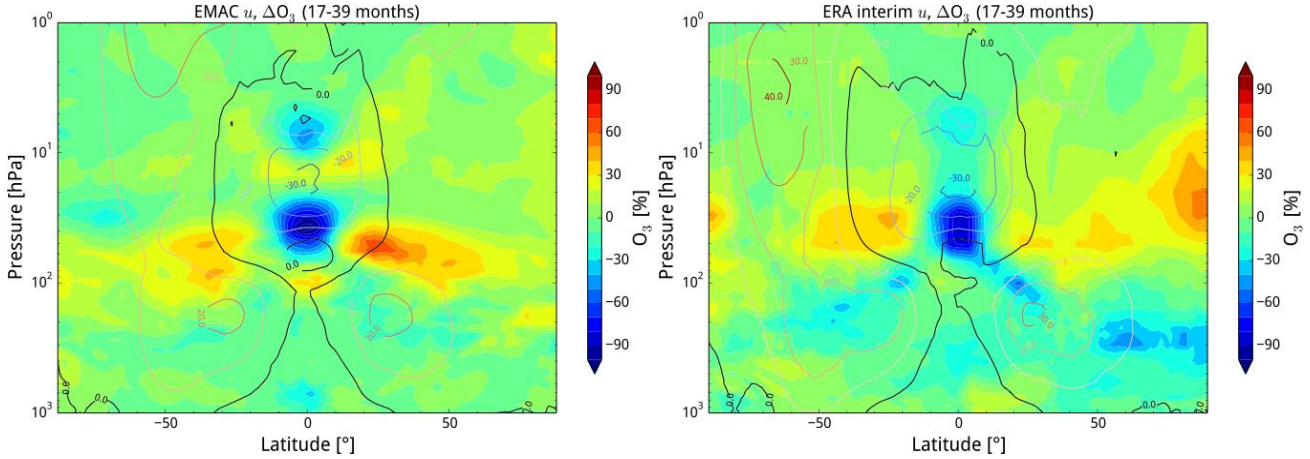
Ozone-QBO

- Characterising changes (column versus profile - TTWG)

QBO Max



QBO Min



- Emerging SPARC QBO Initiative

ENSO Fingerprinting

AGU PUBLICATIONS

Geophysical Research Letters

RESEARCH LETTER
10.1002/2014GL060212

Key Points:
- Global assessment of ozone trends using 18 years of European satellite data
- Natural variability masks ozone recovery in middle latitudes
- Additional 5–10 years of observations are required to detect expected onset

Correspondence to:
M. Coldewey-Egbers,
Melanie.Coldewey-Egbers@dlr.de

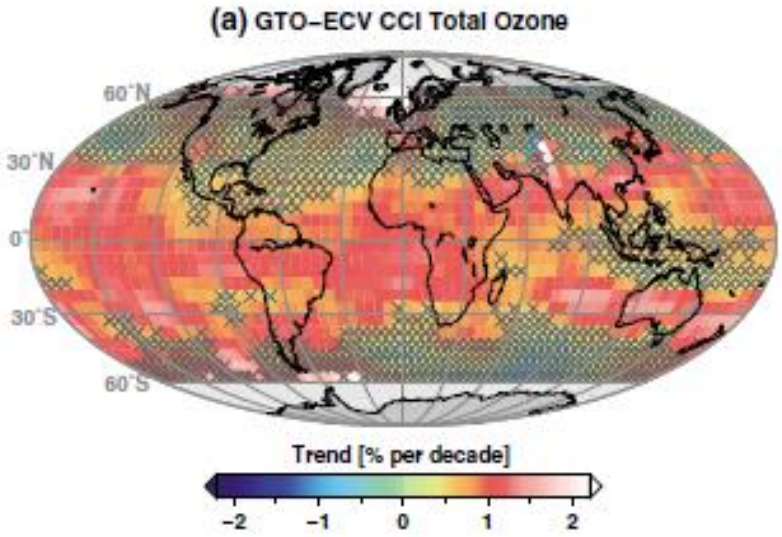
Citation:
Coldewey-Egbers, M., D. G. Loyola R., P. Braesicke, M. Dameris, M. van Roozendael, C. Lerot, and W. Zimmer (2014), A new health check of the ozone layer at global and regional scales, *Geophys. Res. Lett.*, *41*, 4363–4372, doi:10.1002/2014GL060212.

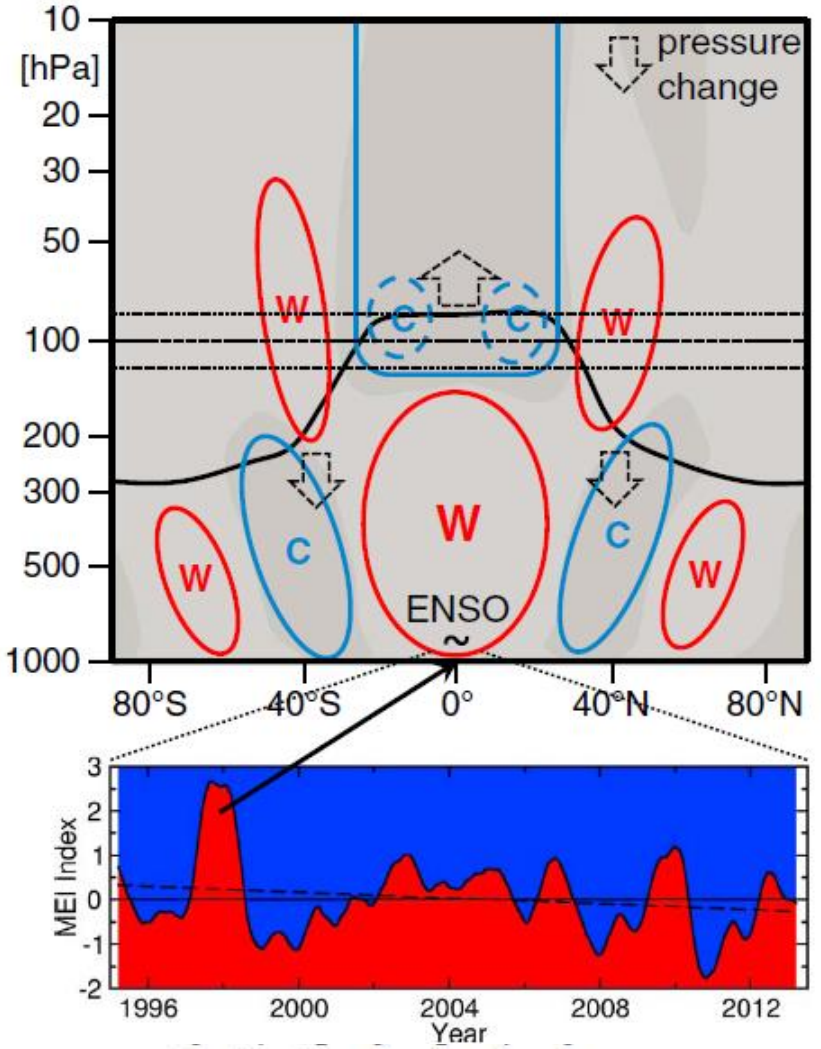
A new health check of the ozone layer at global and regional scales

Melanie Coldewey-Egbers[1], Diego G. Loyola R.[1], Peter Braesicke[2], Martin Dameris[3], Michel van Roozendael[4], Christophe Lerot[4], and Walter Zimmer[1]

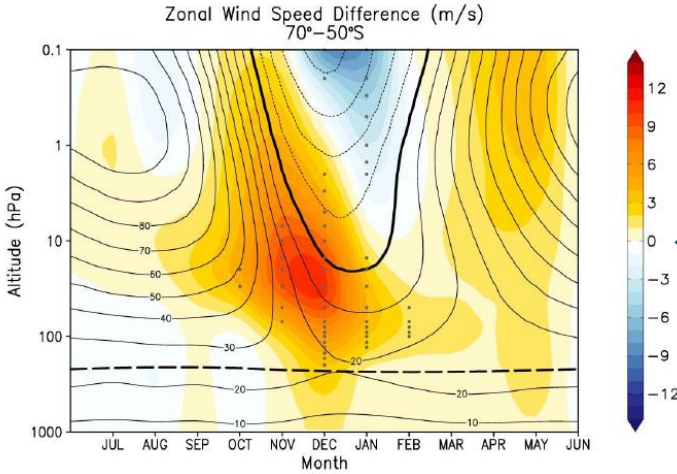
[1]Remote Sensing Technology Institute, German Aerospace Center, Weßling, Germany, [2]Karlsruhe Institute of Technology, Institute for Meteorology and Climate Research, Karlsruhe, Germany, [3]Institute for Physics of the Atmosphere, German Aerospace Center, Weßling, Germany, [4]Belgian Institute for Space Aeronomie BIRA-IASB, Brussels, Belgium

Abstract In this study, we provide a new perspective on the current state of the ozone layer using a comprehensive long-term total ozone data record which has been recently released within the framework of the European Space Agency's Climate Change Initiative. Based on a multivariate regression analysis, we disentangle various aspects of ozone change and variability on global and regional scales, thus enabling the monitoring of the effectiveness of the Montreal Protocol. Given dominant natural variability the expected midlatitude onset of ozone recovery is still not significant and would need additional 5 years of observations to be unequivocally detectable. A regional increase in the tropics is a likely manifestation of a long-term change in El Niño–Southern Oscillation intensity over the last two decades induced by strong El Niño in 1997/1998 and strong La Niña in 2010/2011.

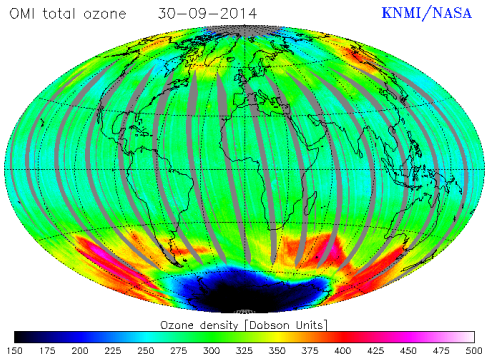


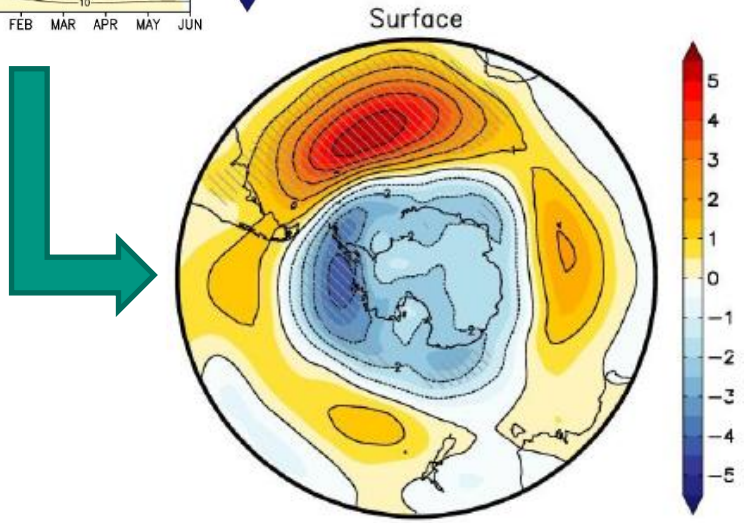


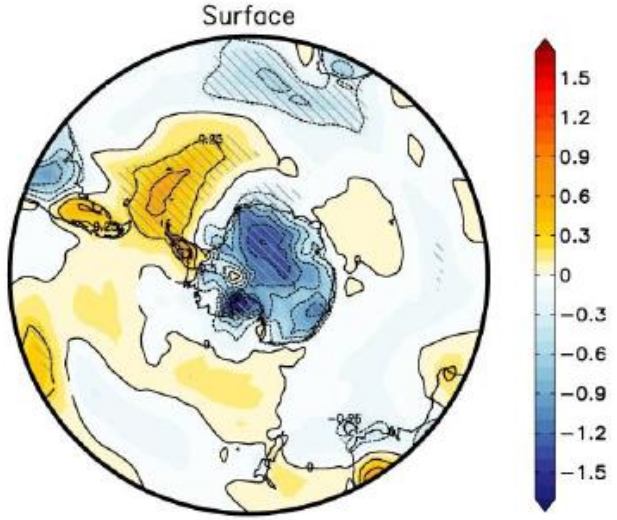
Polar Processes and Climate Change



Ozone Hole



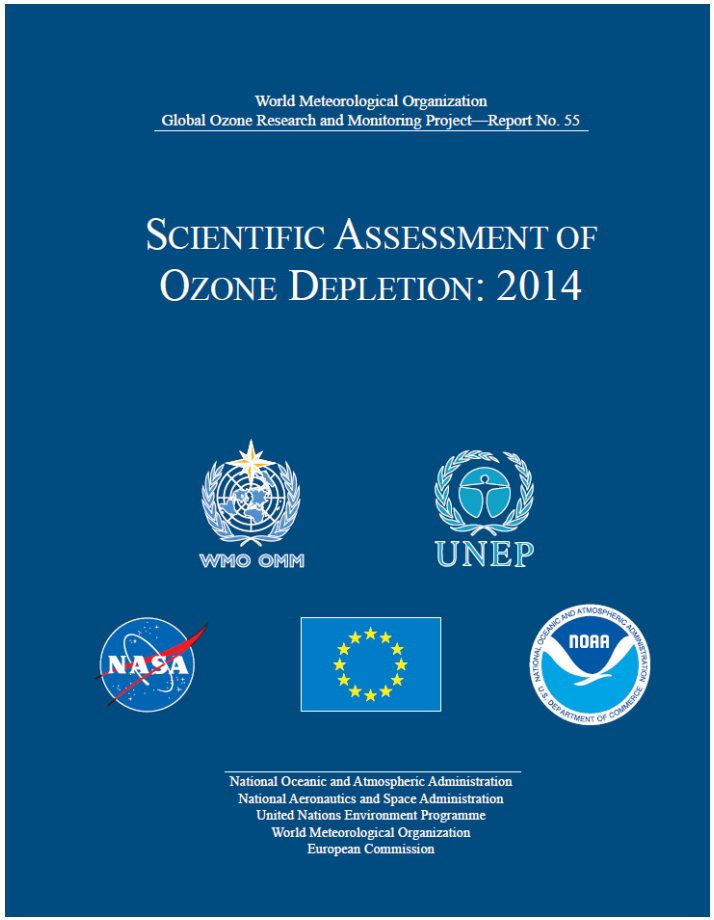




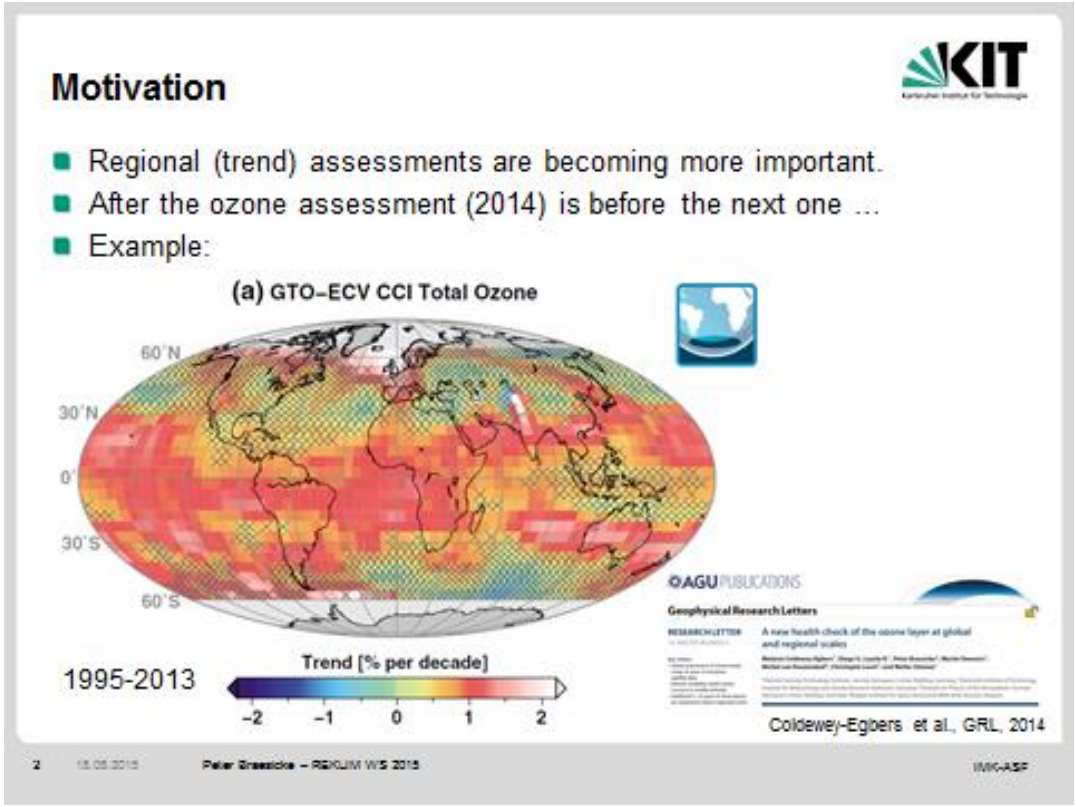
Keeble, J., Braesicke, P., Abraham, N. L., Roscoe, H. K., and Pyle, J. A.: The impact of polar stratospheric ozone loss on Southern Hemisphere stratospheric circulation and climate, Atmos. Chem. Phys., 14, 13705-13717, doi:10.5194/acp-14-13705-2014, 2014.

IGAC TOAR (Tropospheric Ozone)

UNEP/WMO Ozone Assessment



For the next assessment:



SPARC QBOi, CCMI

After the current assessment is before the next one …

Thank you for your attention!

QUESTIONS?

A GREAT WIND IS BLOWING, AND THAT GIVES YOU EITHER IMAGINATION OR A HEADACHE.

CATHERINE II OF RUSSIA (1729-1796)

L2 Data Product	Processing entity	Time period																			
			96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
TC_GOME	BIRA																					
TC_SCIAMACHY	BIRA																					
TC_GOME2A	BIRA																					
TC_GOME2B	BIRA																					
TC_OMI	BIRA																					
TC_OMPS#	BIRA																					
NP_GOME	RAL																					
NP_SCIAMACHY	RAL																					
NP_GOME2A	RAL																					
NP_GOME2B	RAL																					
NP_OMI#	RAL																					
NP_IASI	ULB																					
LP_SCIAMACHY	UBR/FMI																					
LP_OMPS#	UBR/FMI																					
LP_MIPAS	KIT/FMI																					
LP_GOMOS	ESA/FMI																					
LP_OSIRIS	UoS/FMI																					
LP_SMR	CHALM/FMI																					
LP_ACE	UofT/FMI																					
LP_SAGEII	FMI	84-																				
LP_HALOE	FMI	91-																				
UTLS_SCIA	UBR/FMI																					
UTLS_MIPAS	KIT/FMI																					
UTLS_GOMOS	FMI																					
UTLS_OSIRIS	UoS/FMI																					
UTLS_ACE	UofT/FMI																					
MLT_MIPAS_DN_DCA*	KIT																					
MLT_GOMOS_DN_DCA*	ESA/KIT																					
MLT_ACE_DN_DCA*	UofT/KIT																					
MLT_SMR_DN_DCA*	CHALM/KIT																					
MLT_MIPAS_SM#	KIT/IAA																					

L3/4 Data Product	Processing entity	Time period																			
			96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
TC_MRG	DLR																					
NP_MRG	KNMI																					
NP_ASSIM	KNMI																					
TTOC_GOME	DLR																					
TTOC_GOME2A∞	DLR																					
TTOC_GOME2B∞	DLR																					
LNTOC_ENVISAT	UBR																					
LNTOC_OMPS	UBR																					
LNTOC_OMPSG2#	UBR																					
LP_SCIA_MZM	UBR/FMI																					
LP_OMPS_MZM#	UBR/FMI																					
LP_MIPAS_MZM	KIT/FMI																					
LP_GOMOS_MZM	ESA/FMI																					
LP_OSIRIS_MZM	UoS/FMI																					
LP_SMR_MZM	CHALM/FMI																					
LP_ACE_MZM	UofT/FMI																					
LP_SAGEII_MZM	FMI	84-																				
LP_HALOE_MZM	FMI	91-																				
LP_MRG_MZM	FMI																					
LP_MRG_BWM	FMI																					
LP_MRG_FRM	FMI																					
UTLS_SCIA_L3$	UBR/FMI																					
UTLS_MIPAS_L3$	KIT/FMI																					
UTLS_GOMOS_L3$	FMI																					
UTLS_OSIRIS_L3$	UoS/FMI																					
UTLS_ACE_L3$	UofT/FMI																					
UTLS_MRG_L3$	FMI																					
MLT_MIPAS_MZM_DN	KIT/IAA																					
MLT_MIPAS_MZM_DN_DCA*	KIT/IAA																					
MLT_MRG_MZM_DN	KIT/IAA																					
MLT_MRG_MZM_DCA*	KIT/IAA																					