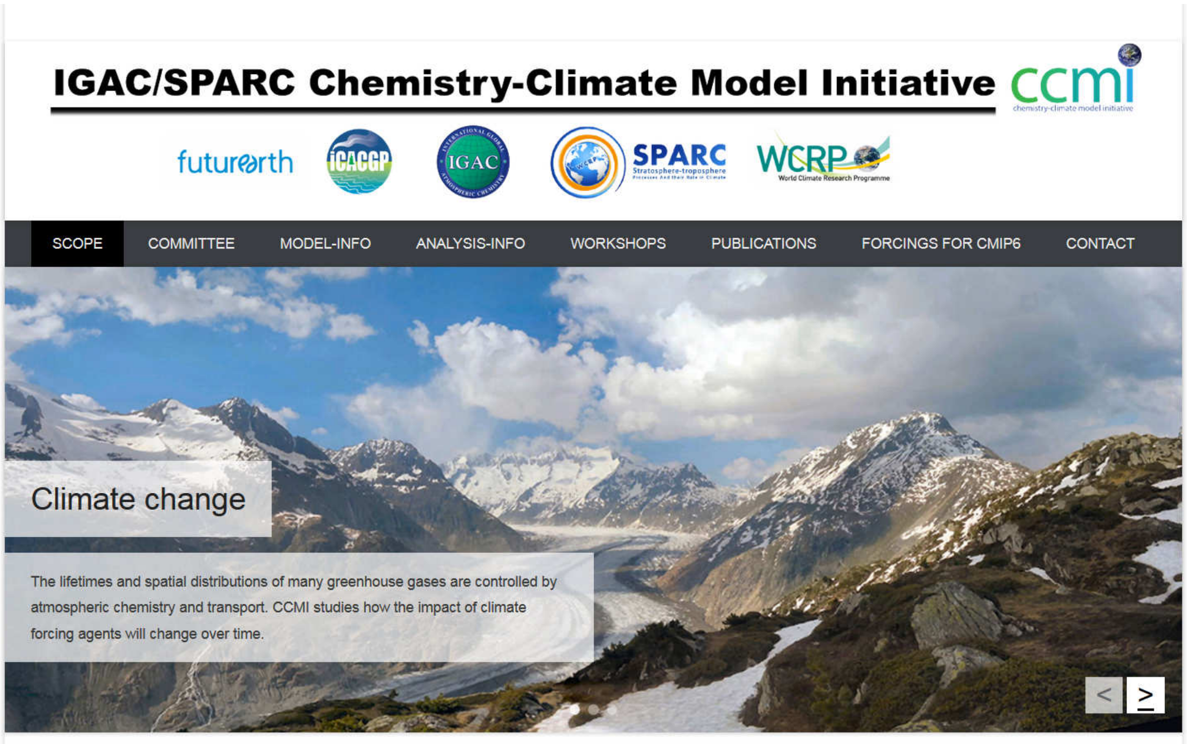
The IGAC/SPARC Chemistry-Climate Model Initiative (CCMI)



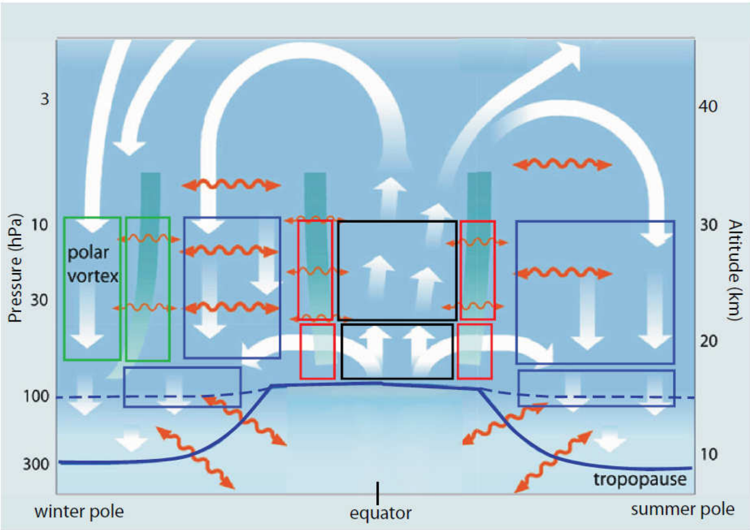
http://blogs.reading.ac.uk/ccmi/

What is CCMI?

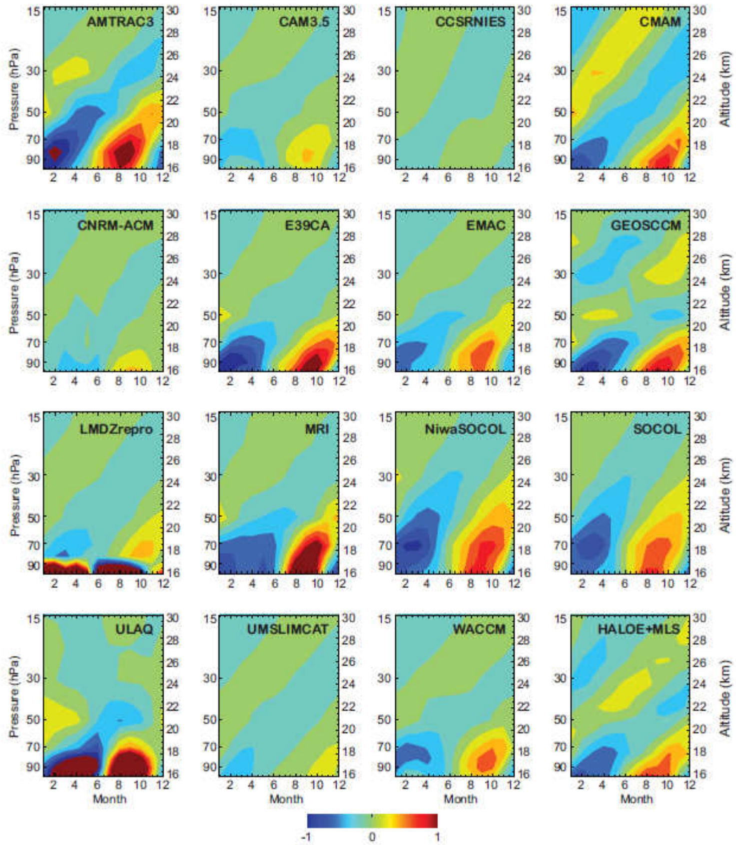
- The joint IGAC/SPARC Chemistry-Climate Model Initiative (CCMI) was established to coordinate IGAC and SPARC chemistry-climate model evaluation and associated modeling activities.
- Activities focus on the coupled troposphere-stratosphere domain and assessment of scientific questions in the context of comprehensive stratosphere-troposphere resolving models with chemistry. For example:
  - The impact of stratospheric ozone changes on tropospheric chemistry via both ozone fluxes (e.g. from the projected strengthening of the Brewer-Dobson circulation) and actinic fluxes.
  - Shortcomings in our understanding and/or modeling of long-term ozone trends and methane lifetime
- The CCMI simulations were defined in 2013 and the first output delivered ~mid 2016. Delivery of output is ongoing.
- The evaluation of CCMI models is organized “bottom up” rather than “top down” like the preceding SPARC CCMVal activity
- However, the focus is still on process-oriented diagnostics that test models’ ability to represent specific aspects of observations that reveal fundamental physical processes.

Example of Process-Oriented Diagnostics

Chapter 5 (Transport), SPARC CCMVal Report

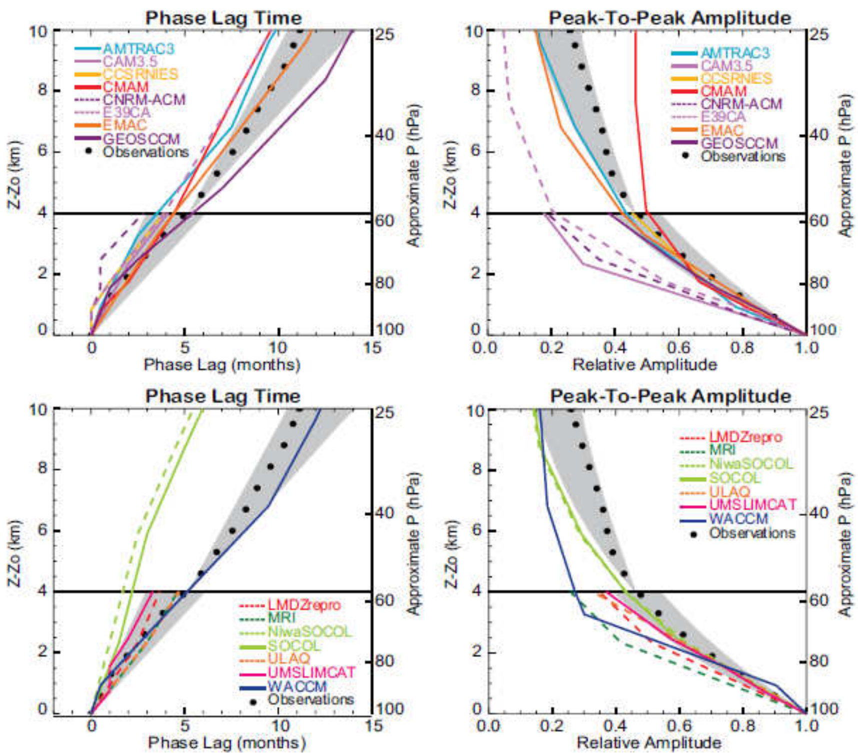


The water vapor "tape recorder"



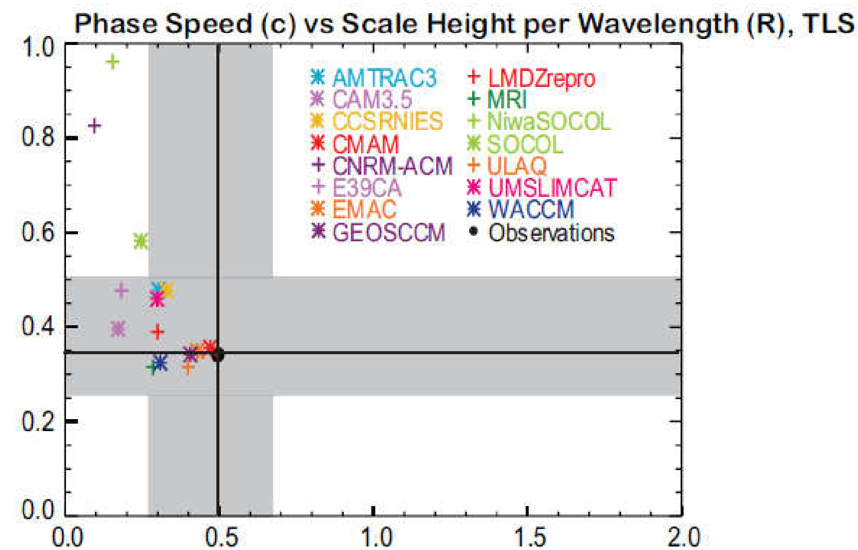
The ascent rate of the water vapor anomalies is a measure of tropical upwelling, the scale height over which they are attenuated is a measure of in-mixing of extratropical air

Example of Process-Oriented Diagnostics



Upwelling Rate

In-mixing Rate



CCMI Workshops

IGAC/SPARC Chemistry-Climate Model Initiative ccmi chemistry-climate model initiative

futurearth | iCACGP | IGAC | SPARC Stratosphere-troposphere Processes And their Role in Climate | WCRP World Climate Research Programme

SCOPE | COMMITTEE | MODEL-INFO | ANALYSIS-INFO | WORKSHOPS | PUBLICATIONS | FORCINGS FOR CMIP6 | CONTACT

Workshops

Next workshops

IGAC/SPARC CCMI Workshop 2017	Météo-France, Toulouse, France	13-15 June 2017

Past workshops

IGAC/SPARC CCMI Workshop 2015	CNR, Rome, Italy	7-9 October 2015
	Find Final Agenda here	
IGAC/SPARC CCMI Workshop 2014	University, Lancaster, UK	20-22 May 2014
IGAC/SPARC CCMI Workshop 2013	NCAR, Boulder CO, USA	14-16 May 2013
IGAC/SPARC CCMI Workshop 2012	Kongresshalle, Davos, Switzerland	21-24 May 2012

CCMI Models

These models are not all independent of one another

Participating models

1. ACCESS-CCM	*University of Melbourne, CAWCR, AAD, Australia, NIWA, NZ*
2. CCSM4	*NCAR, ESL, USA*
3. CCSRNIES-MIROC3.2	*NIES, Tsukuba, Japan*
4. CESM-Superfast	*LLNL, USA*
5. CICERO-OsloCTM3	*CICERO, Norway*
6. CMAM	*EC (Environment Canada), Canada*
7. CNRM-CCM	*Meteo-France; France*
8. EMAC	*MESSy-Consortium, Germany*
9. GEOS CCM	*NASA/GSFC, USA*
10. GEOS Chem	*LAGEO, Institute of Atmospheric Physics, Beijing, China*
11. GFDL-AM3	*UCAR/NOAA, GFDL, USA*
12. GISS-E2-R	*NASA-GISS, USA*
13. HadGEM3-ES	*Hadley Centre, Met Office, UK*
14. LMDZrepro	*IPSL, France*
15. CHASER-MIROC-ESM	*Nagoya University, JAMSTEC, NIES, Japan*
16. MOCAGE	*GAME/CNRM, Méteo France*
17. MRI-ESM	*MRI, Japan*
18. NIWA-UKCA	*NIWA, NZ*
19. SOCOL3	*PMOD/WRC and IAC ETHZ, Switzerland*
20. ULAQ-CCM	*University of L'Aquila, Italy*
21. UMSLIMCAT	*University of Leeds, UK*
22. UMUKCA-UCAM	*University of Cambridge, UK*
23. CESM1-WACCM	*NCAR, USA*

>> Full model information

contact/information: Michaela Hegglin

Detailed Model Descriptions


Geoscientific Model Development
An interactive open-access journal of the European Geosciences Union

| EGU.eu | EGU Journals | EGU Highlight Articles | Contact | Imprint |

Submit a manuscript | Manuscript tracking

About
Editorial board
Articles
Special issues
Highlight articles
Subscribe to alerts
Peer review
For authors
For editors and referees

User ID
Password
New user? | Lost login?

Follow @EGU_GMD

Journal metrics
IF 3.549
IF 5-year 5.280

Geosci. Model Dev., 10, 639-671, 2017
http://www.geosci-model-dev.net/10/639/2017/
doi:10.5194/gmd-10-639-2017

Volume 10, issue 2

Article | Peer review | Metrics | Related articles

Model description paper

13 Feb 2017

Review of the global models used within phase 1 of the Chemistry–Climate Model Initiative (CCMI)

Olaf Morgenstern[1], Michaela I. Hegglin[2], Eugene Rozanov[18,5], Fiona M. O'Connor[14], N. Luke Abraham[17,20], Hideharu Akiyoshi[8], Alexander T. Archibald[17,20], Slimane Bekki[21], Neal Butchart[14], Martyn P. Chipperfield[16], Makoto Deushi[15], Sandip S. Dhomse[16], Rolando R. Garcia[7], Steven C. Hardiman[14], Larry W. Horowitz[13], Patrick Jöckel[10], Beatrice Josse[9], Douglas Kinnison[7], Meiyun Lin[13,23], Eva Mancini[3], Michael E. Manyin[12,22], Marion Marchand[21], Virginie Marécal[9], Martine Michou[9], Luke D. Oman[12], Giovanni Pitari[3], David A. Plummer[4], Laura E. Revell[5,6], David Saint-Martin[9], Robyn Schofield[11], Andrea Stenke[5], Kane Stone[11,a], Kengo Sudo[19], Taichu Y. Tanaka[15], Simone Tilmes[7], Yousuke Yamashita[8,b], Kohei Yoshida[15], and Guang Zeng[1]

[1]National Institute of Water and Atmospheric Research (NIWA), Wellington, New Zealand
[2]Department of Meteorology, University of Reading, Reading, UK
[3]Department of Physical and Chemical Sciences, Universitá dell'Aquila, L'Aquila, Italy
[4]Environment and Climate Change Canada, Montréal, Canada
[5]Institute for Atmospheric and Climate Science, ETH Zürich (ETHZ), Zürich, Switzerland
[6]Bodeker Scientific, Christchurch, New Zealand
[7]National Center for Atmospheric Research (NCAR), Boulder, Colorado, USA
[8]National Institute of Environmental Studies (NIES), Tsukuba, Japan
[9]CNRM UMR 3589, Météo-France/CNRS, Toulouse, France
[10]Institut für Physik der Atmosphäre, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen, Germany
[11]School of Earth Sciences, University of Melbourne, Melbourne, Victoria, Australia
[12]National Aeronautics and Space Administration Goddard Space Flight Center (NASA GSFC), Greenbelt, Maryland, USA
[13]National Atmospheric and Ocean Administration Geophysical Fluid Dynamics Laboratory (NOAA GFDL), Princeton, New Jersey, USA
[14]Met Office Hadley Centre (MOHC), Exeter, UK
[15]Meteorological Research Institute (MRI), Tsukuba, Japan
[16]School of Earth and Environment, University of Leeds, Leeds, UK
[17]Department of Chemistry, University of Cambridge, Cambridge, UK
[18]Physikalisch-Meteorologisches Observatorium Davos – World Radiation Center (PMOD/WRC), Davos, Switzerland
[19]Graduate School of Environmental Studies, Nagoya University, Nagoya, Japan
[20]National Centre for Atmospheric Science (NCAS), UK
[21]LATMOS, Institut Pierre Simon Laplace (IPSL), Paris, France
[22]Science Systems and Applications, Inc., Lanham, Maryland, USA
[23]Princeton University Program in Atmospheric and Oceanic Sciences, Princeton, New Jersey, USA
[a]now at: Massachusetts Institute of Technology (MIT), Boston, Massachusetts, USA

Copernicus Publications
The Innovative Open Access Publisher

Search articles
Search
Author

Special issue
Chemistry–Climate Modelling Initiative (CCMI) (ACP/...

Download
Supplement (258 KB)

Short summary
We present a review of the make-up of 20 models participating in the Chemistry–Climate Model...
Read more

Citation
BibTeX
EndNote

Share

Morgenstern et al., GMD, 2017

CCMI Reference Simulations

Name of Reference Simulation	Period	Greenhouse Gases	ODSs	SSTs/SICs	Background & Volcanic Aerosol	Solar Variability	VSLS	QBO	Ozone and Aerosol Precursors
REF-C1	**Transient simulation 1960-2010** Appropriate spin up prior to 1960	**OBS** GHG used for CMIP5 simulations, updated until 2010.	**OBS** (WMO, 2011)	**OBS** HadISST1	**OBS** Surface Area Density data (SAD)	**OBS** Spectrally resolved irradiance data, Proton ionization, Ap	**YES**	**OBS or internally generated**	**OBS** Based on Lamarque *et al.* (2010), but annual emissions
REF-C1SD (nudged for CCMs, or CTMs)	**Transient simulation 1980-2010**	**OBS** Same as **REF-C1**	**OBS** Same as **REF-C1**	**OBS** Consistent with met. reanalysis	**OBS** Same as **REF-C1**	**OBS** Same as **REF-C1**	Same as **REF-C1**	Same as **REF-C1**	**OBS** Same as **REF-C1**
REF-C2	**Transient simulation 1960-2100** 10-year spin up prior to 1960	**OBS to 2005 then RCP 6.0 (Masui *et al.*, 2011)**	**OBS + A1 scenario from WMO (2011)**	**Modeled SSTs**	**OBS** Background SAD	**YES** Spectrally resolved irradiance data, Proton ionization, Ap	**YES**	**YES**	**Same as REF-C1 until 2000 + RCP 6.0 scenario in the future**

All CCMs are running REF-C1 and REF-C2

There are some CTMs, which have run only REF-C1SD

CCMI Sensitivity Simulations

Name of Sensitivity Simulation	Period	GHGs	ODSs	SSTs/SICs	Background & Volcanic Aerosol	Solar Variability	VSLS	QBO	Ozone and Aerosol Precursors
SEN-C1-Emis	1960-2010	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Different from REF-C1
SEN-C1SD-Emis	1980 2010	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Different from REF-C1SD
SEN-C1-fEmis	1960-2010	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Fixed at 1960 levels
SEN-C1SD-fEmis	1980-2010	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Same as in REF-C1SD	Fixed at 1980 levels
SEN-C1-SSI	1960-2010	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Same as in REF-C1	Different SSI data set (SATIRE) Protons and Ap same as in REF-C1	Same as in REF-C1	OBS or internally generated	Same as in REF-C1

Also fixed GHGs, fixed ODSs, etc….

CCMI Output Variables

Hundreds of outputs available at a range of temporal and spatial resolutions

	A	B	C	D
4	air_pressure	Air Pressure	plev	Pa
5		air pressure at interfaces	pilev	Pa
6	air_temperature	Air Temperature	ta	K
7	geopotential_height	Geopotential Height	zg	m
8	eastward_wind	Eastward Wind	ua	m s^{-1}
9	northward_wind	Northward Wind	va	m s^{-1}
10	upward_air_velocity	Upward Air Velocity	wa	m s^{-1}
11	tendency_of_air_temperature_due_to_shortwave_heating	Shortwave heating rate	tntsw	K s^{-1}
12	tendency_of_air_temperature_due_to_longwave_heating	Longwave heating rate	tntlw	K s^{-1}
13	mole_fraction_of_ozone_in_air	Ozone volume mixing ratio	o3	mole mole^{-1}
14	mole_fraction_of_water_vapor_in_air	Water vapour volume mixing ratio	h2o	mole mole^{-1}
15	age_of_stratospheric_air	Mean age of stratospheric air	mean_age	year
16	mole_fraction_of_nitrous_oxide_in_air	N2O volume mixing ratio	n2o	mole mole^{-1}
17	mole_fraction_of_methane_in_air	CH4 volume mixing ratio	ch4	mole mole^{-1}
18	mole_fraction_of_carbon_dioxide_in_air	CO2 volume mixing ratio	co2	mole mole^{-1}
19	mole_fraction_of_hydrogen_chloride_in_air	HCl volume mixing ratio	hcl	mole mole^{-1}
20	mole_fraction_of_carbon_monoxide_in_air	CO volume mixing ratio	co	mole mole^{-1}
21	mole_fraction_of_nitrogen_dioxide_in_air	NO2 volume mixing ratio	no2	mole mole^{-1}
22	mole_fraction_of_nitrogen_monoxide_in_air	NO volume mixing ratio	no	mole mole^{-1}
23	mole_fraction_of_ethane_in_air	C2H6 volume mixing ratio	c2h6	mole mole^{-1}
24	mole_fraction_of_ethyne_in_air	C2H2 volume mixing ratio	c2h2	mole mole^{-1}
25	mole_fraction_of_hydrogen cyanide_in_air	HCN volume mixing ratio	hcn	mole mole^{-1}
26	cloud_area_fraction_in_atmosphere_layer	Cloud Area Fraction	clt	1
27	convective_cloud_area_fraction	Convective Cloud Area Fraction	convclt	1
28	mole_fraction_of_hydroxyl_radical_in_air	OH volume mixing ratio	oh	mole mole^{-1}
29	mass_fraction_of_pm10_dry_aerosol_in_air	PM10 mass mixing ratio at 50 percent RH	mmrpm10	kg kg-1
30	mass_fraction_of_pm2p5_dry_aerosol_in_air	PM2.5 mass mixing ratio at 50 percent RH	mmrpm2p5	kg kg-1
31	mass_fraction_of_pm1_dry_aerosol_in_air	PM1.0 mass mixing ratio at 50 percent RH	mmrpm1	kg kg-1
32	tendency_of_mole_concentration_of_O1D_due_to_chemical_gross_production	chemical gross production rate of O1D	prodo1d	mole m-3 s-1
33	tendency_of_mole_concentration_of_hydroxyl_radical_due_to_chemical_gross_production	chemical gross production rate of OH	prodoh	mole m-3 s-1
34	tendency_of_mole_concentration_of_ozone_due_to_chemical_production_by_HO2_plus_NO	chemical production rate of o3 via HO2+NO	prodo3viaho2	mole m-3 s-1
35	tendency_of_mole_concentration_of_ozone_due_to_chemical_production_by_CH3O2_plus_NO	chemical production rate of o3 via CH3O2+NO	prodo3viach3o2	mole m-3 s-1
36	tendency_of_mole_concentration_of_ozone_due_to_chemical_production_by_RO2_plus_NO	chemical production rate of O3 via RO2+NO	prodo3viaro2	mole m-3 s-1
37	tendency_of_mole_concentration_of_ozone_due_to_chemical_destruction_by_OH	chemical loss rate of O3 via O3+OH	losso3viaoh	mole m-3 s-1
38	tendency_of_mole_concentration_of_ozone_due_to_chemical_destruction_by_HO2	chemical loss rate of O3 via O3+HO2	losso3viaho2	mole m-3 s-1

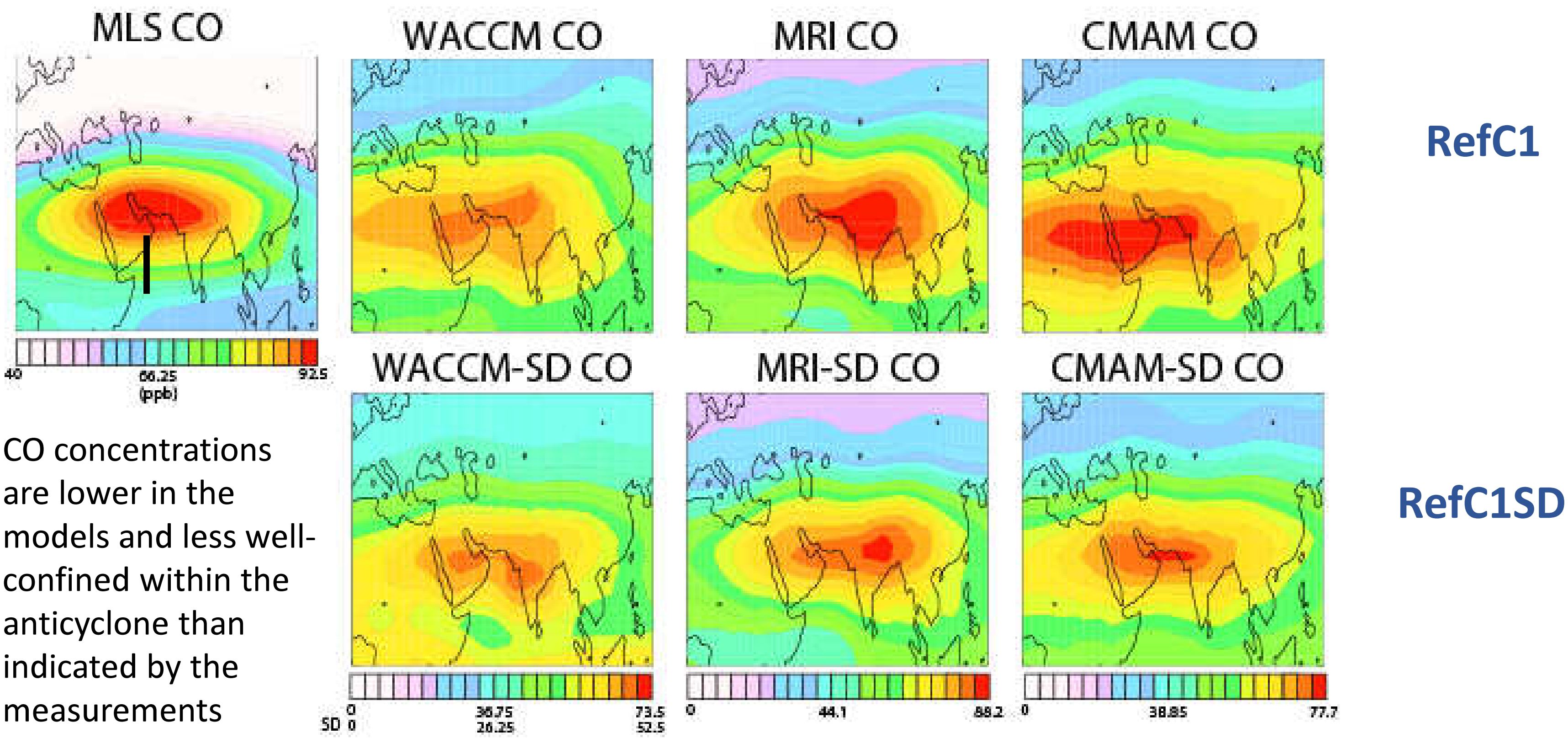
notes | Coordinates | Time-ind 2d | Monthly-mean 2d | **Monthly-mean 3d** | Monthl ...

Research Opportunities Abound!

Only 2 analyses focused on the ASM have been proposed

			level				
13.	**Kunze, Markus**, Peter Braesicke *Still doing the analysis and will be starting ASAP*	Assessment of the influences of the Asian monsoon anti-cyclone on stratospheric water vapor in CCMs.	The CCMI simulations will be analyzed to assess the ability of CCMs to simulate the Asian monsoon anticyclone (AMA), and its related transport characteristics. The CCM results are compared to the ERA-Interim re-analyses and the MIPAS satellite water vapor and ozone data for the recent past. The potential changes of the monsoon circulation in a changing climate and their consequences for the AMA and stratospheric water vapor concentrations will be identified.	REF-C1, REF-C2	ta, ua, va, wa, zg, H2O, O3, tntsw, tntlw, clt, convclt, pr	T3M, T2Ms	ERA-INTERIM, MIPAS
14.	**Langematz, Ulrike**, Björn-Martin Sinnhuber, Blanca Ayarzagüena *Replied, but cannot indicate yet when planning to start. Need to organize more with partners*	Stratospheric Arctic winters under climate change and the decline of ODS	CCMI simulations will be analyzed to study the response of stratospheric Arctic winters to GHG increases and declining ODS. The following questions will be addressed: Will the future Arctic polar vortex intensify or become more disturbed by stratospheric warmings? What will be the dynamical and the radiative contributions to Arctic temperature change? Is there a potential for the development of individual cold winters with extreme Arctic ozone losses?	REF-C2, SEN-C2-fGHG SEN-C2-fODS SEN-C2-RCP8.5 SEN-C2-fODS2000	ta, ua, va, wa, ta10, ta100, zg10, TOZ O3, vt100, tntsw, tntlw, psca_nh50, area188K_nh50, area195K_nh50	T3M T2D T2D T2D T3M TIM T3M T0I T0I T0I	ERA-INTERIM, MIPAS
15.	**Langematz, Ulrike**, Peter Braesicke, Greg Bodeker *Replied, but cannot indicate yet when planning to start. Need to organize more with partners*	Development of ozone in the pre1980 era	We analyze the development of ozone in the pre1980 era in the CCMI-REF-C1 simulations. The focus will be on the consistency of the pre1980 behavior of ozone in the CCMI CCMs. Understanding the differences in the evolution of ozone between 1960 and 1980 is necessary for understanding inter-CCM differences in the return of ozone to 1960 or 1980 levels. This is a follow-up study of a CCMVal-2 project.	REF-C1		CCMVal-2 data request	
16.	**Li, Qian**, Daren Lu Lageo *Planning to do the analysis. Starting in a few months – waiting to finish some simulations*	Simulation of distribution and variability of biomass burning tracers CO, HCN, CH3CN in the troposphere and lower stratosphere	By using a 3-D global CTM, we will focus on the study of atmospheric distribution and temporal-spatial variation of biomass burning tracers CO, HCN and CH3CN in the troposphere and lower stratosphere. Comparison of simulation results with available space-borne and in-situ observations will be analyzed.	REF-C1SD; SEN-C1-Emis; SEN-C1-fEmis	HCN, CO (biomass burning tracers)	Original output is daily means in binary format, but the output will be transformed to monthly means in netCDFformat.	ACE-FTS; Aura-MLS; MOPITT; SMILES etc..
17.	**Lin, Meiyun**, and collaborators *Still interested in pursuing the project and hopes to hire a*	Multi-model and observational assessment of tropospheric ozone variability and trends over	We will examine the extent to which CCMI models represent observed interannual variability and long-term trends of lower tropospheric to surface ozone at northern mid-latitudes. Specifically, we will examine the response of ozone to large-scale heat waves,	REF-C1; REF-C1SD; REF-FIXEMIS	Hourly surface ozone; daily 3-D outputs for CO, O3, CO_25, CO_50 and O3S	DESIRED: daily O3S and O3 outputs	-Satellite measurements of mid-tropospheric O3 and CO -Ozonesonde and aircraft

There Is A Lot That Needs To Be Understood



CO concentrations are lower in the models and less well-confined within the anticyclone than indicated by the measurements

Chemical gradient across the edge of the anticyclone measures effectiveness of the transport barrier

Model Output Is Available at the Centre for Environmental Data Analysis (Formerly British Antarctic Data Center)

IGAC/SPARC Chemistry-Climate Model Initiative ccmi

futurearth iCACGP IGAC SPARC WCRP

SCOPE | COMMITTEE | MODEL-INFO | ANALYSIS-INFO | WORKSHOPS | PUBLICATIONS | FORCINGS FOR CMIP6 | CONTACT

BADC Data Access

This page provides the CCMI data analysts with instructions of how to access CCMI data. Most data are stored at the BADC and can directly be accessed through their website, some are linked to the BADC through a local ESGF node. In order to get access follow the instructions below:

1) Register with the BADC:

- Apply for deposit access by hitting the 'apply for access' button on the BADC webpage.
- You will obtain your own user name and login.

2) Once you have an account you can apply for access to CCMI-1 data by visiting the CCMI-1 dataset web pages:

- Go to CCMI-1 dataset web page
- Choose one of the listed datasets, e.g. 'ETH-PMOD', and apply for access to the data by hitting the 'Apply for access' button.
- This will take you to a web form which will be submitted to the CCMI-1 principal investigator for approval.
- Once your application got approved, you will have access to all available CCMI data sets, so you do not need to apply for each single model data set.
- Note, currently not all available model data are listed in the catalogue, although more model output is available. Once you download data, use the archive directory tree to find the full list of available model output. (See All datasets)
- Also, model data available through the ESGF are currently not listed here, but links to the data will become available soon.

3) Please make sure you follow the CCMI data policy, which you find here.

Data access other than BADC

Model name	Access location
CAM4-chem	NCAR ESG
WACCM	NCAR ESG

You **MUST** Follow the CCMI Data Policy

A) Model Output Policy Guidelines:

1) Above all, CCMI collaborators and other users are expected to respect the interests of the CCM PIs and their research groups in the interpretation, presentation, and publication of the model output. The best way to achieve this is for a routine line of communication to be opened with the model PIs for collaborators to discuss model output and their research. This guideline implicitly recognizes the complexity of the models and interpretive efforts, and the possibility of ongoing scientific work by the model PIs that has yet to be published or otherwise made available to others.

2) Publication of model results and their interpretation in the scientific literature is encouraged. **The CCMI phase 1 (CCMI-1) data policy is currently in PHASE 1:**

Those wishing to use the output from CCMI model runs during phase 1 of the project are requested to become formal CCMI collaborators following the guidelines under B) of this policy document.

• **PHASE 1:** *Restricted use policy for all model data.* The phase 1 policy allows use of model output by 'CCMI Collaborators' (see above) but includes the obligation to offer co-authorship for model PIs during this time. CCMI collaborators will need to have provided the title, an abstract and a list of data that will be used in their study for the CCMI website (see point A above). CCMI and BADC should be explicitly acknowledged in papers and the models need to be properly referenced (see below wording).

• **PHASE 2:** after 1.5 years from when the last model simulations are submitted to the data archive, the *model data will be made publicly available* for use by any researcher or other users. However, it is strongly recommended that users send evaluations, draft presentations, or papers to model PIs and CCMI coordinators

Becoming a Collaborator is Easy!

****

Contact Information of principal investigator:

Name:
Position:
Institution:
Address:
Email:

Date and Location:

Signature:

	CCMI Collaborators	Title	Abstract	CCMI-1 Simulations that are required for the analysis	Diagnostics (if already available)	Output (if more than monthly means, please prioritize into DESIRED and MINIMUM)	Observations
1.							

****

2) **Return a signed and scanned copy of this CCMI Model Output Policy document to m.i.hegglin@reading.ac.uk.** Upon returning the document, new CCMI Collaborators will formally receive access to the password-protected Archive.

3) Follow http://www.met.reading.ac.uk/ccmi/?page_id=251 for instructions on how to get access to the CCMI Archive at BADC.

Check Out the CCMI Special Issues in GMD and ACP

Geoscientific Model Development

An interactive open-access journal of the European Geosciences Union

| EGU.eu | EGU Journals | EGU Highlight Articles | Contact | Imprint |

Special issue

Chemistry–Climate Modelling Initiative (CCMI) (ACP/AMT/ESSD/GMD inter-journal SI)
Editor(s): GMD topical editors

Special issue jointly organized between Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, Earth System Science Data, and Geoscientific Model Development

Download citations of all papers: Bibtex EndNote Reference Manager

31 May 2017
The representation of solar cycle signals in stratospheric ozone. Part II: Analysis of global models
Amanda C. Maycock, Katja Matthes, Susann Tegtmeier, Hauke Schmidt, Rémi Thiéblemont, Lon Hood, Slimane Bekki, Makoto Deushi, Patrick Jöckel, Oliver Kirner, Markus Kunze, Marion Marchand, Daniel R. Marsh, Martine Michou, Laura E. Revell, Eugene Rozanov, Andrea Stenke, Yousuke Yamashita, and Kohei Yoshida
Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-477, 2017
Manuscript under review for ACP (discussion: open, 2 comments)
Summary

20 Mar 2017
The Met Office HadGEM3-ES chemistry–climate model: evaluation of stratospheric dynamics and its impact on ozone
Steven C. Hardiman, Neal Butchart, Fiona M. O'Connor, and Steven T. Rumbold
Geosci. Model Dev., 10, 1209-1232, https://doi.org/10.5194/gmd-10-1209-2017, 2017
Summary

01 Mar 2017
US surface ozone trends and extremes from 1980 to 2014: quantifying the roles of rising Asian emissions, domestic controls, wildfires, and climate
Meiyun Lin, Larry W. Horowitz, Richard Payton, Arlene M. Fiore, and Gail Tonnesen
Atmos. Chem. Phys., 17, 2943-2970, https://doi.org/10.5194/acp-17-2943-2017, 2017
Summary

13 Feb 2017
Review of the global models used within phase 1 of the Chemistry–Climate Model Initiative (CCMI)
Olaf Morgenstern, Michaela I. Hegglin, Eugene Rozanov, Fiona M. O'Connor, N. Luke Abraham, Hideharu Akiyoshi, Alexander T. Archibald, Slimane Bekki, Neal Butchart, Martyn P. Chipperfield, Makoto Deushi, Sandip S. Dhomse, Rolando R. Garcia, Steven C. Hardiman, Larry W. Horowitz, Patrick Jöckel, Beatrice Josse, Douglas Kinnison, Meiyun Lin, Eva Mancini, Michael E. Manyin, Marion Marchand, Virginie Marécal, Martine Michou, Luke D. Oman, Giovanni Pitari, David A. Plummer, Laura E. Revell, David Saint-Martin, Robyn Schofield, Andrea Stenke, Kane Stone, Kengo Sudo, Taichu Y. Tanaka, Simone Tilmes, Yousuke Yamashita, Kohei Yoshida, and Guang Zeng
Geosci. Model Dev., 10, 639-671, https://doi.org/10.5194/gmd-10-639-2017, 2017
Summary

03 Feb 2017
Impact of biogenic very short-lived bromine on the Antarctic ozone hole during the 21st century
Rafael P. Fernandez, Douglas E. Kinnison, Jean-Francois Lamarque, Simone Tilmes, and Alfonso Saiz-Lopez
Atmos. Chem. Phys., 17, 1673-1688, https://doi.org/10.5194/acp-17-1673-2017, 2017
Summary

Atmospheric Chemistry and Physics

An interactive open-access journal of the European Geosciences Union

| EGU.eu | EGU Journals | EGU Highlight Articles | Contact | Imprint |

Special issue

Spe

Chemistry–Climate Modelling Initiative (CCMI) (ACP/AMT/ESSD/GMD inter-journal SI)
Editor(s): B. N. Duncan, A. Gettelman, P. Hess, G. Myhre, and P. Young

Special issue jointly organized between Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, Earth System Science Data, and Geoscientific Model Development

Download citations of all papers: Bibtex EndNote Reference Manager

31 May 2017
The representation of solar cycle signals in stratospheric ozone. Part II: Analysis of global models
Amanda C. Maycock, Katja Matthes, Susann Tegtmeier, Hauke Schmidt, Rémi Thiéblemont, Lon Hood, Slimane Bekki, Makoto Deushi, Patrick Jöckel, Oliver Kirner, Markus Kunze, Marion Marchand, Daniel R. Marsh, Martine Michou, Laura E. Revell, Eugene Rozanov, Andrea Stenke, Yousuke Yamashita, and Kohei Yoshida
Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-477, 2017
Manuscript under review for ACP (discussion: open, 2 comments)
Summary

20 Mar 2017
The Met Office HadGEM3-ES chemistry–climate model: evaluation of stratospheric dynamics and its impact on ozone
Steven C. Hardiman, Neal Butchart, Fiona M. O'Connor, and Steven T. Rumbold
Geosci. Model Dev., 10, 1209-1232, https://doi.org/10.5194/gmd-10-1209-2017, 2017
Summary

01 Mar 2017
US surface ozone trends and extremes from 1980 to 2014: quantifying the roles of rising Asian emissions, domestic controls, wildfires, and climate
Meiyun Lin, Larry W. Horowitz, Richard Payton, Arlene M. Fiore, and Gail Tonnesen
Atmos. Chem. Phys., 17, 2943-2970, https://doi.org/10.5194/acp-17-2943-2017, 2017
Summary

13 Feb 2017
Review of the global models used within phase 1 of the Chemistry–Climate Model Initiative (CCMI)
Olaf Morgenstern, Michaela I. Hegglin, Eugene Rozanov, Fiona M. O'Connor, N. Luke Abraham, Hideharu Akiyoshi, Alexander T. Archibald, Slimane Bekki, Neal Butchart, Martyn P. Chipperfield, Makoto Deushi, Sandip S. Dhomse, Rolando R. Garcia, Steven C. Hardiman, Larry W. Horowitz, Patrick Jöckel, Beatrice Josse, Douglas Kinnison, Meiyun Lin, Eva Mancini, Michael E. Manyin, Marion Marchand, Virginie Marécal, Martine Michou, Luke D. Oman, Giovanni Pitari, David A. Plummer, Laura E. Revell, David Saint-Martin, Robyn Schofield, Andrea Stenke, Kane Stone, Kengo Sudo, Taichu Y. Tanaka, Simone Tilmes, Yousuke Yamashita, Kohei Yoshida, and Guang Zeng
Geosci. Model Dev., 10, 639-671, https://doi.org/10.5194/gmd-10-639-2017, 2017
Summary

03 Feb 2017
Impact of biogenic very short-lived bromine on the Antarctic ozone hole during the 21st century
Rafael P. Fernandez, Douglas E. Kinnison, Jean-Francois Lamarque, Simone Tilmes, and Alfonso Saiz-Lopez
Atmos. Chem. Phys., 17, 1673-1688, https://doi.org/10.5194/acp-17-1673-2017, 2017
Summary

08 Nov 2016
Testing chemistry-climate models' regulation of tropical lower-stratospheric water vapor