AerChemMIP

Points for dicussion I

Overview Discussion points

Discussion 10:00 – 11:00

- Science goals
- Forcing diagnostics
- Do we need to link to DECK experiments?
- Do we have to do all AerChemMIP simulations?
- Can non-CMIP models participate?
- Link to other MIPs

Overview Discussion points II

- Discussion 12:15-12:45

Implementation of past and future emissions

Ozone field implementation

Overview Discussion points III

- Discussion 14:30-15:30

Experiment plan

Diagnostics plan

Way forward
   experiment and diagnostic testing
   webinars
   meetings

Diagnostics overview

- Documents
  - Excel sheet with variables
    - https://wiki.met.no/aerocom/aerchemmip/diagnostics
  - CMIP6 template document, scope

  - CMIP6 xml database
  - http://proj.badc.rl.ac.uk/svn/exarch/CMIP6dreq/tags/01.beta.02/

Diagnostics scope

| Short name of variable group | RFDOC | | HIST | | HISTAGCM | | NTCFResp | | NTCFRespAGCM | | WMFORC | | FDBCK | |
| | AerChemMIP-1 | | AerChemMIP-2 | | AerChemMIP-2b | | AerChemMIP-3 | | AerChemMIP-3b | | AerChemMIP-4 | | AerChemMIP-5 | |
	number of sims.	# of yrs per sim.	number of sims.	# of yrs per sim.	number of sims.	# of yrs per sim.	number of sims.	# of yrs per sim.	number of sims.	# of yrs per sim.	number of sims.	# of yrs per sim.	number of sims.	# of yrs per sim.
AerChemMIP_annual	9	20	9	165/65	6	165/65	6	41	7	41/10	2	165	7	20
AerChemMIP_daily	9	20	9	165/65	6	165/65	6	41	7	41/10	2	165	7	20
AerChemMIP_fixed	9	20	9	165/65	6	165/65	6	41	7	41/10	2	165	7	20
AerChemMIP_hourly	9	20					6	41	7	41/10				
AerChemMIP_monthly	9	20	9	165/65	6	165/65	6	41	7	41/10	2	165	7	20

This sheet brings together the
the sheet describes a request

Return completed workbook to
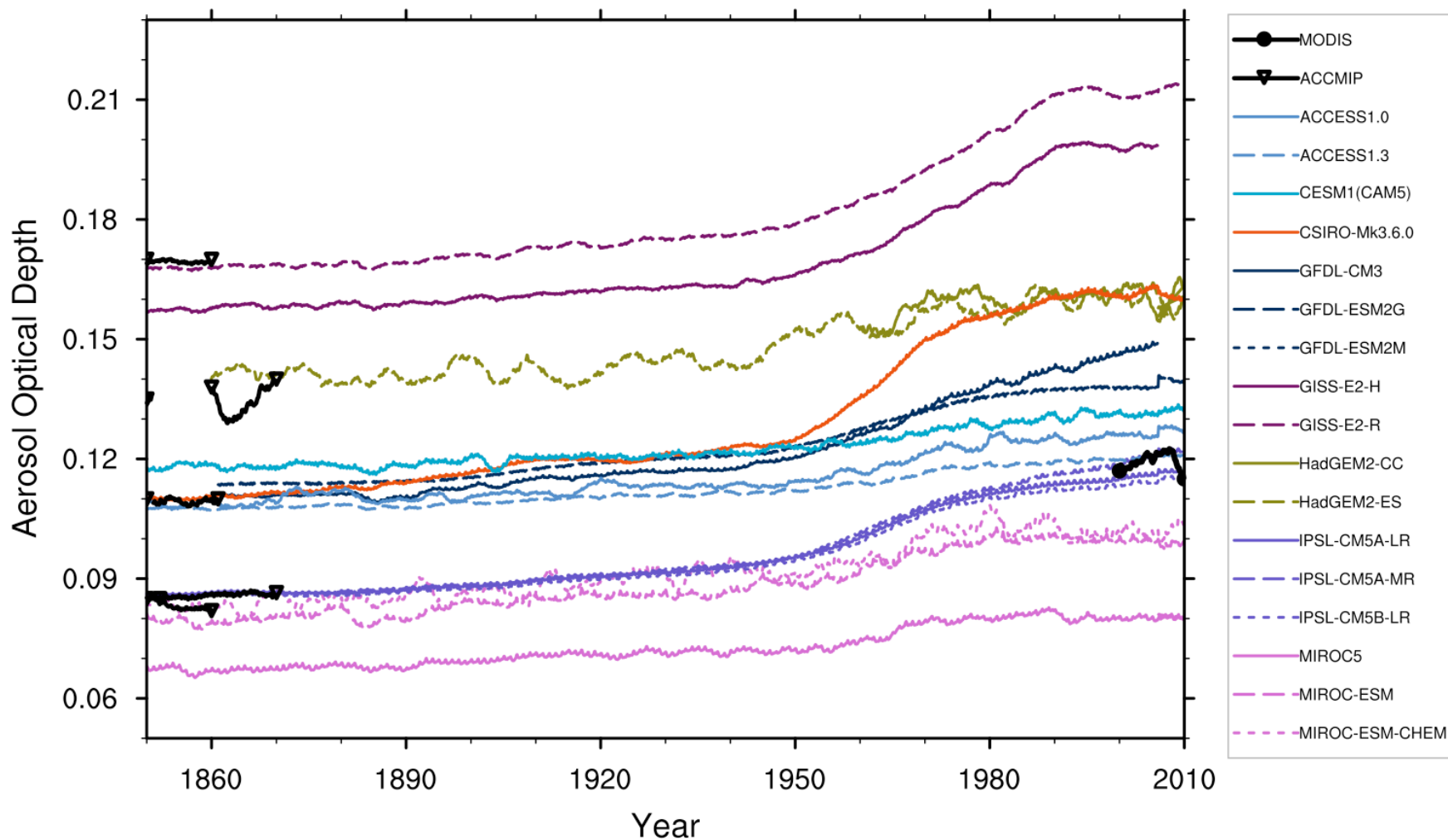
Definition

Experiment Groups

Figure 9.29 | Time series of global oceanic mean aerosol optical depth (AOD) from individual CMIP5 models' historical (1850–2005) and RCP4.5 (2006–2010) simulations, corrected Moderate Resolution Imaging Spectrometer (MODIS) satellite observations by Shi et al. (2011) and Zhang et al. (2008a), and the Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP) simulations for the 1850s by Shindell et al. (2013b).

IPCC 2013

Diagnostics packages AerChemMIP

Package Name Science Topic	Description	AerChemMIP Experiment Class
AerChemMIP core documentation	*Budgets, emissions, depositions, burdens aod$_{sp}$+aaod (all-sky&clear sky) 3d fields, vertical integrated emissions*	*RFDOC, HIST, CLIM, SLCFLU, FDBCK*
Forcing	ERF, triple call radiation Separate ERFari+aci, scattering&absorption	*RFDOC, FDBCK, HIST*
AQ Air Quality	*Surface pm25, pm10, o3, daily mean and max*	*RFDOC,HIST,SCMIP, SLCFLU,FDBCK*
Transport Lifetimes	*Age of Air, tracers, …. tbd w CCMI/AeroCom*	*HIST, SCMIP*
Fields Time Varying Climatology	*3D concentrations aerosol species mass, ozone, oxidants Deposition nitrogen, bc Monthly, 10 y average 1850-2100*	*CLIM*
CMIP	*Standard CMIP output*	

AerChemMIP 3D monthly

Air Pressure	plev
air pressure at interfaces	pilev
Air Temperature	ta
Geopotential Height	zg
Eastward Wind	ua
Northward Wind	va
Upward Air Velocity	wa
Shortwave heating rate	tntsw
Longwave heating rate	tntlw
Ozone volume mixing ratio	o3
Water vapour volume mixing ratio	h2o
N2O volume mixing ratio	n2o
CH4 volume mixing ratio	ch4
CO2 volume mixing ratio	co2
HCl volume mixing ratio	hcl
CO volume mixing ratio	co
NO2 volume mixing ratio	no2
NO volume mixing ratio	no
C2H6 volume mixing ratio	c2h6
C2H2 volume mixing ratio	c2h2
C3H6 volume mixing ratio	c3h6
C3H8 volume mixing ratio	c3h8
CH3COCH3 volume mixing ratio	ch3coch3
Cloud Area Fraction	clt
Convective Cloud Area Fraction	convclt
OH volume mixing ratio	oh
PM10 mass mixing ratio at 50 percent RH	mmrpm10
PM2.5 mass mixing ratio at 50 percent RH	mmrpm2p5
PM1.0 mass mixing ratio at 50 percent RH	mmrpm1
chemical gross production rate of O1D	prodo1d
chemical gross production rate of OH	prodoh

chemical gross production rate of OH	prodoh
chemical production rate of o3 via HO2+NO	prodo3viaho2
chemical production rate of o3 via CH3O2+NO	prodo3viach3o2
chemical production rate of O3 via RO2+NO	prodo3viaro2
chemical loss rate of O3 via O3+OH	losso3viaoh
chemical loss rate of O3 via O3+HO2	losso3viaho2
chemical loss rate of O3 via O3+alkenes	losso3viaalkenes
rate of ch4 oxidation	lossch4
rate of co oxidation	lossco
photolysis rate of O3 to O1d	photo1d
Specific Humidity	hus
Atmosphere Model Cell Geometric Thickness	dh
Vertically integrated mass content of air in layer	airmass
Aerosol water mass mixing ratio	mmraerh2o
POM mass mixing ratio	mmroa
SOA mass mixing ratio	mmrsoa
BC mass mixing ratio	mmrbc
Convective Updraft Mass Flux	mcu
Mass Fraction of Cloud Liquid Water	clw
Mass Fraction of Cloud Ice	cli
Aerosol sulfate mass mixing ratio	mmrso4
SO2 volume mixing ratio	so2
Isoprene volume mixing ratio	isop
Formaldehyde volume mixing ratio	hcho
DMS volume mixing ratio	dms
layer-integrated lightning production of NOx	emilnox
Gas-phase production rate of SO4	chegpso4
Aqueous-phase production rate of SO4	cheaqpso4
Aqueous-phase production rate of SO4 via S(iv)+H2O2	cheaqph2o2so4

AerChemMIP 3D monthly

Aqueous-phase production rate of SO4 via S(iv) +H2O2   cheaqph2o2so4

Aqueous-phase production rate of SO4 via S(iv) +O3   cheaqpo3so4

NO3 aerosol mass mixing ratio   mmrno3

NH4 mass mixing ratio   mmrnh4

HNO3 volume mixing ratio   hno3

PAN volume mixing ratio   pan

Sea Salt mass mixing ratio   mmrss

Dust aerosol mass mixing ratio   mmrdust

O3 production rate   o3prod

O3 destruction rate   o3loss

photolysis rate of NO2   jno2

photolysis frequency of o3 -> o1d + o2   j_o1d

diabatic heating rates   dthdt

AerChemMIP 2D monthly

Surface Air Pressure	ps
Total Cloud Fraction	clt
Convective Cloud Area Fraction	convclt
Tropopause Air Pressure	ptp
Tropopause Air Temperature	tatp
Tropopause Altitude	ztp
Precipitation	pr
Surface Upward Latent Heat Flux	hfls
Surface Upward Sensible Heat Flux	hfss
Total Ozone Column	toz
tropospheric ozone column	tropoz
Sea Surface Temperature	tos
Sea Ice Area Fraction	sic
ambient aerosol optical thickness at 550 nm	od550aer
ambient fine aerosol optical thickness at 550 nm	od550lt1aer
ambient aerosol absorption optical thickness at 550 nm	abs550aer
ambient aerosol optical thickness at 870 nm	od870aer
rate of emission and production of dry aerosol total organic matter	emioa
production rate of dry aerosol secondary organic matter	chepsoa

AerChemMIP 2D monthly

emission rate of black carbon aerosol mass	emibc
anthropogenic emission rate of black carbon aerosol mass	emiabc
dry deposition rate of dry aerosol total organic matter	dryoa
dry deposition rate of black carbon aerosol mass	drybc
wet deposition rate of dry aerosol total organic matter	wetoa
wet deposition rate of black carbon aerosol mass	wetbc
total emission rate of so2	emiso2
total direct emission rate of so4	emiso4
total emission rate of dms	emidms
dry deposition rate of so2	dryso2
dry deposition rate of so4	dryso4
dry deposition rate of dms	drydms
wet deposition rate of so4	wetso4
wet deposition rate of so2	wetso2
wet deposition rate of dms	wetdms
total emission rate of nh3	eminh3
anthropogenic emission rate of nh3	emianh3
dry deposition rate of nh3	drynh3
dry deposition rate of nh4	drynh4
wet deposition rate of nh4	wetnh4
total emission rate of seasalt	emiss

AerChemMIP 2D monthly

dry deposition rate of seasalt	dryss
wet deposition rate of seasalt	wetss
total emission rate of dust	emidust
dry deposition rate of dust	drydust
wet deposition rate of dust	wetdust
cloud-top effective droplet radius	reffclwtop
ice cloud-top effective crystal radius	reffclitop
dry deposition rate of o3	dryo3
wet deposition rate of nh3	wetnh3
total emission rate of co	emico
total emission rate of nmvoc	emivoc
total emission rate of biogenic nmvoc	emibvoc
total emission rate of biogenic isoprene	emiisop
total emission rate of anthropogenic co	emiaco
ambient aerosol optical thickness at 440 nm	od440aer
asymmetry parameter	asyaer
angstrom exponent 440/870nm	ang440870aer
angstrom exponent 440/670nm	ang440670aer
angstrom exponent 500/870nm	ang500870aer
angstrom exponent 555/659nm	ang555659aer
angstrom exponent 555/865nm	ang555865aer

AerChemMIP 2D monthly

sulfate aod@550nm	od550so4
black carbon aod@550nm	od550bc
pom aod@550nm	od550oa
soa aod@550nm	od550soa
bb aod@550nm	od550bb
nitrate aod@550nm	od550no3
sea salt aod@550nm	od550ss
dust aod@550nm	od550dust
aerosol water aod@550nm	od550aerh2o
gf @ 90 % rh	gf90aer
cloud droplet number concentration	cdnc
liquid water cloud area fraction	lcc
ice cloud area fraction	icc
liquid water path	lwp
ice water path	iwp
planetary albedo	albs
surface albedo	albsrfc
cloud optical depth	cod
cloud condensation nuclei concentration at liquid cloud top	ccn
air temperature at cloud top	ttop
lower tropospheric stability	lts
toa outgoing shortwave radiation	rsut
toa outgoing clear-sky shortwave radiation	rsutcs
toa outgoing longwave radiation	rlut
toa outgoing clear-sky longwave radiation	rlutcs
surface downwelling shortwave radiation	rsds

AerChemMIP 2D monthly

surface downwelling longwave radiation	rlds
surface upwelling longwave radiation	rlus
all sky sw-rf ch4 at toa	swtoaasch4
all sky lw-rf ch4 at toa	lwtoaasch4
all sky sw-rf n2o at toa	swtoaasn2o
all sky lw-rf n2o at toa	lwtoaasn2o
all sky sw-rf halocarbons at toa	swtoaashc
all sky lw-rf halocarbons at toa	lwtoaashc
all sky sw-rf o3 at toa	swtoaaso3
all sky lw-rf o3 at toa	lwtoaaso3
all sky sw-rf o3 at tropopause	swtropaso3
all sky lw-rf o3 at tropopause	lwtropaso3
all sky sw-rf so4 at toa	swtoaasso4
all sky sw-rf bcff at toa anthropogenic	swtoaasbcff
clear sky sw-rf bcff at toa	swtoacsbcff
all sky sw-rf oaff at toa anthropogenic	swtoaasoaff
clear sky sw-rf oaff at toa anthropogenic	swtoacsoaff
all sky sw-rf bb at toa	swtoaasbb
clear sky sw-rf bb at toa	swtoacsbb
all sky sw-rf soa at toa	swtoaassoa
all sky sw-rf no3 at toa	swtoaasno3
all sky sw-rf ss at toa	swtoaasss
all sky sw-rf dust at toa	swtoaasdust
all sky lw-rf dust at toa	lwtoaasdust
clear sky sw-rf dust at toa	swtoacsdust
all sky sw-rf aerosols at toa	swtoaasaer
clear sky sw-rf aerosols at toa	swtoacsaer

AerChemMIP 2D monthly

all sky lw-rf aerosols at toa	lwtoaasaer
clear sky lw-rf aerosols at toa	lwtoacsaer
total emission rate of nox	eminox
anthropogenic emission rate of nox	emianox
dry deposition rate of noy	drynoy
wet deposition of noy incl aerosol nitrate	wetnoy
lightning flash rate	flashrate
net chemistry tendency of o3 in the troposphere	tpo3chm
net chemistry tendency of o3 in the lower most stratosphere	lso3chm
total emission of pom	emipom
total production of soa	emisoa
total emission of anthropogenic pom	emiapom
total emission of anthropogenic soa	emiasoa
total emission rate of isoprene	emiisop
leaf area index	lai
canopy height	cnpz
snow cover fraction	snowfrc

northward_heat_flux_in_air_due_to_eddy_advection   vt100

Monthly-mean zonal mean 2-d atmosphere or land surface data (latitude, pressure, time:mo
Provide output interpolated to fixed pressure levels at:
1000 850 700 500 400 300 250 200 170 150 130 115 100 90 80 70 50 30 20
15 10 7 5 3 2 1.5 1 0.5 0.3 0.2 0.1

Air Temperature	ta
Eastward Wind	ua
Northward Wind	va
Geopotential Height	zg
Ozone volume mixing ratio	o3
N2O volume mixing ratio	n2o
HNO3 volume mixing ratio	hno3
CH4 volume mixing ratio	ch4
H2O volume mixing ratio	h2o
Mean Age of Stratospheric Air	mean_age
Total inorganic chlorine volume mixing ratio	cly
Total inorganic bromine volume mixing ratio	bry
Total reactive nitrogen volume mixing ratio	noy
HCl volume mixing ratio	hcl
OH volume mixing ratio	oh
HO2 volume mixing ratio	ho2

AerChemMIP Daily 2d

Daily 2-d atmosphere data (longitude, latitude, time:day) instantaneous preferred over daily-mean (daily-mean = mean over 24 hours)

daily maximum O3 volume mixing ratio in lowest model layer	o3smax
	tas
Surface Air Pressure	ps
Eastward Wind at 10 hPa	ua10
Geopotential Height at 10 hPa	zg10
Geopotential Height at 100 hPa	zg100
Geopotential Height at 1000 hPa	zg1000
Geopotential Height at 500 hPa	zg500
Total Column Ozone	toz
Surface Downwelling Shortwave Radiation	rsds
Surface Downwelling Clear-Sky Shortwave Radiation	rsdscs
	nufl
Daily Minimum Near-Surface Air Temperature	tasmin
Daily Maximum Near-Surface Air Temperature	tasmax
tropopause pressure	tpp
precipitation	pr
maximum PBL height	maxpblz
minimum PBL height	minpblz
cloud optical depth	cod

AerChemMIP Hourly 2d

Surface pressure	ps
Surface Temperature	sfta
O3 volume mixing ratio in lowest model layer	sfo3
PM2.5 mass mixing ratio in lowest model layer	sfpm25
mole_fraction_of_nitrogen_dioxide_in_air	NO2 volume mixing ratio in lowest mode

Annual-mean 0-d atmosphere or land surface data on a
certain pressure level (time:year)

atmosphere_nitrous_oxide_mole_burden	burden_n2o
tendency_of_nitrous_oxide_mole_burden	tburden_n2o
atmosphere_methane_mole_burden	burden_ch4
tendency_of_atmosphere_methane_mole_burden	tburden_ch4
tendency_of_troposphere_methane_mole_burden	tburden_ltr_ch4
atmosphere_carbon_monoxide_mole_burden	burden_co
tendency_of_atmosphere_carbon_monoxide_mole_burden	tburden_co
tendency_of_troposphere_carbon_monoxide_mole_burden	tburden_ltr_co