ECHAM-HAMMOZ namelist documentation

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ECHAM6.3.0-HAM2.3-MOZ1.0

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1 Preamble

The main purpose is to cover the HAMMOZ specific namelists, as well as the submodel specific namelists. For convenience, the ECHAM `physctl` (physics) and `radctl` (radiation) namelists have also been documented here, because they are also central to making decisions in setting up an HAMMOZ experiment. For a complete description of ECHAM namelist controls, see the echam6_userguide.pdf.

The tables in this document have been (mostly) automatically created by parsing the ECHAM-HAMMOZ code (for the switches documentation) and by diagnosing switches values at run time with two barebone experiments:

- one with setting only `lham = .true.` in the `submodelctl` namelist and leaving all other possible namelist entries empty (except for basic `runctl` namelist entries);
- the second with doing the same but with `lmoz=.true.`.

The idea is to reflect here the default values associated with HAM and MOZ respectively. The actual standard setups (as given by creating experiments with the jobscript toolkit, for HAM with M7, HAM with SALSA or MOZ) are not documented here.

Please keep in mind that not all combinations of switches and settings are reasonable and not every reasonable combination has been tested. If you encounter errors we appreciate your feedback.

2 ECHAM physics and radiation

2.1 physctl

This namelist is used to specify parameters and switches for the ECHAM physics.

Namelist: physctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
lphys	True for parameterisation of diabatic processes.	.true.	.true.
lrad	True for radiation scheme	.true.	.true.
lvdiff	True for vertical diffusion	.true.	.true.
lcond	True for large scale condensation scheme	.true.	.true.
lsurf	True for surface exchanges	.true.	.true.
lconv	True to allow convection	.true.	.true.
lmfpen	True to switch on penetrative convection	.true.	.true.
lgwdrag	True for gravity wave drag scheme	.true.	.true.
lice	True for sea-ice temperature calculation	.true.	.true.
lconvmassfix	True for switching on aerosol mass fixer in conv	.true.	.true.
lcdnc_progn	True for prognostic cloud activation scheme	.false.	.false.
ncd_activ	Select cloud droplet activation scheme: 0: off (lcdnc_progn=false) 1: Lohmann et al. (1999) + Lin and Leaitch (1997) 2: Lohmann et al. (1999) + Abdul-Razzak and Ghan (2000)	2	2

Namelist: physctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nactivpdf	Sub-grid scale pdf of updraft velocities in activation scheme: 0: Mean updraft from TKE scheme without pdf 1: Coupling of updraft pdf with 20 bins to TKE scheme (West et al., 2013) >1: as 1, but use the specified number of bins <0: as positive value, but output per-bin supersaturation diagnostics etc.	0	0
nic_cirrus	Select ice crystal cirrus scheme: 0: off (lcdnc_progn=false) 1: Lohmann JAS 2002 2: Kaercher Lohmann JGR 2002	0	0
nauto	Select autoconversion scheme for clouds: 1: Beheng (1994) - ECHAM5 Standard 2: Khairoutdinov and Kogan (2000)	0	0
lsecprod	True for secondary ice production	.false.	.false.
lorocirrus	True for orographic cirrus clouds	.false.	.false.
ldyn_cdnc_min	Turn on dynamical setting of the min cloud droplet number concentration	.false.	.false.
cdnc_min_fixed	Fixed value for min CDNC in cm^{-3} (used when ldyn_cdnc_min is FALSE) Warning! So far only values of 40 or 10 are accepted.	40	40

2.2 radctl

This namelist is used to specify parameters and switches for the ECHAM radiation.

Namelist: radctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nmonth	index for annual cycle or perpetual month experiments 0 : annual cycle on 1 - 12 : perpetual month January - December (only with PCMDI-Orbit)	0	0
ldiur	true for diurnal cycle on	.true.	.true.
trigrad	frequency of full radiation	trigrad%counter = 2 trigrad%unit = hours trigrad%adjustment = first trigrad%offset = 0	trigrad%counter = 2 trigrad%unit = hours trigrad%adjustment = first trigrad%offset = 0
isolrad	0: rrtm solar constant 1: dependent spectrally resolved solar constant read from file 2: solar constant 3: constant for amip runs 4: constant for rad.-conv. eq. runs with diurnal cycle 5: constant for rad.-conv. eq. runs without diurnal cycle	3	3
ih2o	0: no H2O in radiation computation 1: use prognostic specific humidity cloud water and cloud ice	1	1

Namelist: radctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
ico2	0: no CO2 in radiation computation 1: use prognostic CO2 mass mixing ratio of tracer co2 2: uniform volume mixing ratio co2vmr 4: uniform volume mixing ratio in scenario run (ighg)	2	2
ich4	0: no CH4 in radiation computation 2: uniform volume mixing ratio ch4vmr 3: troposphere: ch4vmr; decay with elevation above 4: uniform volume mixing ratio in scenario run (ighg)	2	3
io3	0: no O3 in radiation computation 1 : use prognostic O3 mass mixing ratio of tracer O3 2: spectral climatology as in ECHAM4 3: gridpoint climatology from NetCDF file 4: gridpoint climatology from IPCC-NetCDF file	3	3
io2	0: no O2 in radiation computation 2: O2 volume mixing ratio o2vmr	2	2
in2o	0: no N2O in radiation computation 2: uniform volume mixing ratio n2ovmr 3: troposphere: n2ovmr; decay with elevation above 4: uniform volume mixing ratio in scenario run (ighg)	2	3

Namelist: **radctl** *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
icfc	0: no CFCs in radiation computation 2: uniform volume mixing ratios cfcvmr(1:2) for : CFC11 CFC12 4: uniform volume mixing ratios in scenario run (ighg)	2	2
ighg	0: no scenario 1: scenario A1B 2: scenario B1 3: scenario A2	0	0
iaero	0: no aerosols in radiation computation 1: prognostic aerosol of a submodel (HAM) 2: climatological Tanre aerosols 3: aerosol climatology compiled by S. Kinne 5: S. Kinne + volcanic aerosols of G. Stenchikov 6: S. Kinne + G. Stenchikov + plus additional (stratospheric) aerosols from submodels 7: S. Kinne + volcanic aerosols from lookup table (T. Crowley)	0	0
fco2	factor for external co2 scenario (ighg=1 and ico2=4)	1.0	1.0
co2vmr	CO2 volume mixing ratio for ico2=2	0.0003539	0.0003539
ch4vmr	CH4 volume mixing ratio for ich4=23	1.6936e-06	1.6936e-06
o2vmr	O2 volume mixing ratio for io2=2	0.20946	0.20946
n2ovmr	N2O volume mixing ratio for in2o=23	3.095e-07	3.095e-07
cfcvmr	CFC volume mixing ratios for icfc=2	2.528000000000000e-010 4.662000000000000e-010	2.528000000000000e-010 4.662000000000000e-010
cecc	eccentricity of the earth's orbit	0.016715	0.016715

Namelist: radctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
cobld	obliquity in degrees	23.441	23.441
clonp	longitude of perihelion measured from vernal equinox	282.7	282.7
yr_perp	year AD for orbit VSOP87-orbit only	-99999	-99999
lradforcing	switch on/off diagnostic of instantaneous aerosol solar (lforcing(1)) and thermal (lforcing(2)) radiation forcing	2*.false.	2*.false.
lw_spec_samp	1: broadband 2: MCSI 3 and up: teams	1	1
sw_spec_samp			
lw_gpts_ts	Number of g-points per time step using MCSI	1	1
sw_gpts_ts			
rad_perm	Integer for perturbing random number seeds	0	0
i_overlap	1: max-ran 2: max 3: ran	1	1
l_do_sep_clear_sky	True for: compute clear-sky fluxes by removing clouds	.true.	.true.

3 General submodel control and switches

3.1 submodelctl

This namelist defines general submodel switches which are needed in the interface layer (`mo_submodel_interface` or other parts of the standard ECHAM code). Also included are switches which define the coupling between various submodels (for example in HAMMOZ, which coupled aerosol and gas-phase chemical processes). Other submodel-specific switches should be defined and maintained in extra namelists which carry the name of the submodel itself (e.g. mozctl or hamctl).

Definition and handling of these controls is in `mo_submodel.f90`.

Namelist: submodelctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
lxt	switch generic test tracer submodule	.false.	.false.
lmethox	switch for upper atmospheric H2O production from methane	.false.	.false.
ltransdiag	switch to turn on atmospheric energy transport diagnostics	.false.	.false.
lco2	switch for CO2 submodel (JSBACH related)	.false.	.false.
lham	switch HAM aerosol module	.true.	.false.
lmoz	switch MOZART	.false.	.true.
lhammoz	switch HAM and MOZ together with the coupling between the two note: lhammoz overrides lham and lmoz	.false.	.false.
lhammonia	switch HAMMONIA	.false.	.false.
llght	switch lightning emissions	.false.	.false.
lbioemi_stdalone	switch biogenic emissions model as a standalone submodel (ie not embedded in HAM or MOZ)	.false.	.false.
losat	satellite simulator	.false.	.false.
loisccp	isccp diagnostics	.false.	.false.
lhmzphoto	hammoz photolysis frequency coupling	.false.	.false.
lhmzoxi	hammoz coupling of oxidant fields	.false.	.false.

Namelist: submodelctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
lhmzhet	hammoz heterogeneous chemistry coupling	.false.	.false.
lchemfeedback	combi-switch for interactive chemistry: for moz: lchemrad and linterh2o = true for hammonia: as above plus lchemheat atmospheric mass and cp	.false.	.false.
lchemrad	chemistry interacts with radiation	.false.	.false.
linterh2o	feedback water content from MOZ to ECHAM and vice versa	.false.	.true.
lchemheat	chemical heating	.false.	.false.
lccnclim	activate CCN climatology as submodel	.false.	.false.
linteram	hammonia air mass from chemistry	.false.	.false.
lintercp	hammonia specific heat from chemistry	.false.	.false.
lemissions	switch emissions	.true.	.true.
lchemistry	switch chemistry calculations	.true.	.true.
ldrydep	switch dry deposition	.true.	.true.
lwetdep	switch wet deposition	.true.	.true.
lsedimentation	switch sedimentation	.true.	.true.
laero_micro	switch aerosol microphysical processes	.true.	.true.
lburden	activate burden (column integral) diagnostics for mass mixing ratio tracers	.false.	.false.
emi_basepath	path to emission files specified in emi_spec.txt	/some/local/path/	/some/local/path/
emi_scenario	RCP (Representative Concentration Pathway) to be modelled	UNDEF	UNDEF
laoa	switch for age-of-air tracer submodel	.false.	.false.

3.2 submdiagctl

This namelist controls diagnostic output for generic submodel variables and streams:

- vphysc: physical ECHAM variables not contained in standard ECHAM output
- wetdep: variables used in the calculation of wet deposition and extra diagnostics
- drydep: variables used in the calculation of dry deposition and deposition rates
- sedi: diagnostics of sedimentation rates
- emi: diagnostics of emission fluxes

Definition and handling of these controls is in `mo_submodel_streams.f90`.
The vphysc-stream collects ECHAM (physical) variables that are used in submodels, but not normally stored outside the parallel environment in physc, and it allows saving these variables to file.

Namelist: submdiagctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
vphysc_lpost	true for output of vphysc stream false otherwise	.true.	.true.
vphysc_tinterval	output interval	vphysc_tinterval%counter = 12 vphysc_tinterval%unit = minutes vphysc_tinterval%adjustment = last vphysc_tinterval%offset = 0	vphysc_tinterval%counter = 450 vphysc_tinterval%unit = seconds vphysc_tinterval%adjustment = first vphysc_tinterval%offset = 0
vphyscnam	names of variables you like to have in output special names: 'ALL' and 'DEFAULT'	geom1 geohm1 aphm1 grmassm1	geom1 geohm1 aphm1 grmassm1
wetdep_lpost	true for output of wetdep stream false otherwise	.true.	.true.
wetdep_tinterval	output interval	wetdep_tinterval%counter = 12 wetdep_tinterval%unit = minutes wetdep_tinterval%adjustment = last wetdep_tinterval%offset = 0	wetdep_tinterval%counter = 450 wetdep_tinterval%unit = seconds wetdep_tinterval%adjustment = first wetdep_tinterval%offset = 0

Namelist: submdiagctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
wetdepnam	names of variables (diagnostic quantities) you like to have in output special names: 'ALL' 'DETAIL' and 'DEFAULT'	wdep	wdep
wetdep_gastrac	names of gas-phase tracers to be included in wetdep diagnostic output aerosol tracers will always be output – potentially aggregated (see below)	so2 so4_gas	so2 hno3
wetdep_keytype	aggregation level of output: 1: BYTRACER 2: BYSPECIES 3: BYMODE	2	2
drydep_lpost	true for output of drydep stream false otherwise	.true.	.true.
drydep_tinterval	output interval	drydep_tinterval%counter = 12 drydep_tinterval%unit = minutes drydep_tinterval%adjustment = last drydep_tinterval%offset = 0	drydep_tinterval%counter = 450 drydep_tinterval%unit = seconds drydep_tinterval%adjustment = first drydep_tinterval%offset = 0
drydepnam	names of variables (diagnostic quantities) you like to have in output special names: 'ALL' (= 'DETAIL') and 'DEFAULT'	ddep vddep	ddep vddep
drydep_gastrac	names of gas-phase tracers to be included in drydep diagnostic output aerosol tracers will always be output – potentially aggregated (see below)	so2 so4_gas	so2 hno3 o3 no2

Namelist: submdiagctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
drydep_keytype	aggregation level of output: 1: BYTRACER 2: BYSPECIES 3: BYMODE	2	2
drydep_ldetail	detailed output of dry deposition diagnostics	.false.	.false.
drydep_trac_detail	tracer (only one at a run) for detailed drydep output (drydep_ldetail=.true.)	undef	undef
sedi_lpost	true for output of sedi stream false otherwise	.true.	.true.
sedi_tinterval	output interval	sedi_tinterval%counter = 12 sedi_tinterval%unit = minutes sedi_tinterval%adjustment = last sedi_tinterval%offset = 0	sedi_tinterval%counter = 450 sedi_tinterval%unit = seconds sedi_tinterval%adjustment = first sedi_tinterval%offset = 0
sedinam	names of variables (diagnostic quantities) you like to have in output special names: 'ALL' 'DETAIL' and 'DEFAULT'	sed vsedi	default
sedi_keytype	aggregation level of output: 1: BYTRACER 2: BYSPECIES 3: BYMODE	2	2
emi_lpost	true for output of emi stream false otherwise	.true.	.true.
emi_lpost_sector	true for output of detailed (per sector) emission diagnostics	.false.	.false.
emi_tinterval	output interval	emi_tinterval%counter = 12 emi_tinterval%unit = minutes emi_tinterval%adjustment = last emi_tinterval%offset = 0	emi_tinterval%counter = 450 emi_tinterval%unit = seconds emi_tinterval%adjustment = first emi_tinterval%offset = 0

Namelist: submdiagctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
eminam	names of variables (diagnostic quantities) you like to have in output special names: 'ALL' (= 'DETAIL') and 'DEFAULT'	emi	emi
emi_gastrac	names of gas-phase tracers to be included in emi diagnostic output aerosol tracers will always be output – potentially aggregated (see below)	so2 so4_gas dms	so2 dms no no2
emi_keytype	aggregation level of output: 1: BYTRACER 2: BYSPECIES 3: BYMODE	2	2

4 Settings for HAM aerosol submodel

4.1 hamctl

This namelist is used to specify parameter values for the HAM aerosol model. These switches control behavior that is independent of the exact representation of the aerosols (i.e. modal scheme versus bin scheme or bulk scheme).

Namelist: hamctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nham_subm	Choice of aerosol microphysics scheme 1: Bulk scheme (not yet implemented) 2: Modal scheme (M7) 3: Sectional scheme (SALSA)	2	2
nseasalt	Choice of the Sea Salt emission scheme 1: Monahan (1986) 2: Schulz et al. (2002) 3: not used (Martensson) 4: Monahan (1986) bin scheme 5: Guelle (2001) 6: Gong (2003) 7: Long et al. (2011) 8: Gong et al. (2003) + T-dep.	2	2
npist	Choice of the air-sea exchange scheme for DMS (piston velocity) 1: Liss Merlivat (1986) 2: Wanninkhof (1992) 3: Nightingale (2000)	3	3
ndrydep	Choice of dry deposition scheme (if ldrydep == .true.) 1: prescribed vd 2: interactive	2	2

Namelist: hamctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nwetdep	Choice of wet deposition scheme (if lwetdep == .true.) 0: wetdep (scavenging) off 1: standard class-wise prescribed scavenging parameters 2: standard in-cloud scav. + aerosol size-dep below-cloud scav. 3: size-dep in-cloud and below-cloud scav WARNING: size-dep IC not yet implemented	1	1
ndust	Different version based on BGC dust scheme 2: Cheng et al. (2008) 3: Stier et al. (2005) 4: Stier et al. (2005) + East Asia soil properties 5: Stier et al. (2005) + MSG-based Saharan dust sources (Schepanski et al. GRL 2007; RSE 2012) + East Asia soil properties	5	5
naerorad	Choice for radiatively active aerosols 0: HAM aerosol radiation deactivated (requires iaero/=1) 1: HAM aerosol radiation prognostic 2: HAM aerosol radiation diagnostic only	2	1
laerocom_diag	Extended aerosol diagnostics	.false.	.false.

Namelist: **hamctl** *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nrad	Radiation calculation (array to specify each class) 0: No radiation calculation 1: SW radiation calculation 2: LW radiation calculation 3: SW+LW radiation calculation	0 19*3	20*0
nradmix	Mixing scheme for refractive indices (array to specify class) 1: volume weighted mixing 2: Maxwell-Garnet mixing 3: Bruggeman mixing	20*1	20*0
nraddiag	Extended radiation diagnostics 0: off 1: 2D diagnostics 2: 2D+3D diagnostics	1	1
lhetfreeze	Switch to set heterogeneous freezing below 235K (cirrus scheme)	.false.	.false.
nsoa	Choice for Secondary Organic Aerosols 0: no SOA scheme 1: SOA scheme from O'Donnell et all, ACP 2011 2: SOA scheme with VBS approach from Farina et al, JGR 2010 (curr. SALSA only)	0	0
nsoalumping	SOA lumping scheme to apply	0	0
nlai_drydep_ef_type	Choice of lai external field type in the drydep scheme 2 (EF_FILE): from external input file 3 (EF_MODULE): online from jsbach	3	3
lscond	Switch for condensation of H2SO4	.true.	.true.
lscoag	Switch for coagulation	.true.	.true.

Namelist: hamctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
lgcr	Switch for galactic cosmic ray ionization	.true.	.true.
nsolact	Solar activity parameter [-1;1]; if outside of this range (as per default) then the model will determine the solar activity based on the model calendar date; otherwise it will use the user set solar activity parameter throughout the run. -1 is solar minimum 1 solar maximum.	-99.99	-99.99
lmass_diag	Switch for mass balance check in m7_interface	.false.	.false.
nccndiag	(C)CN diagnostics at fixed supersaturations 0: OFF 1: 2D CCN diagnostics 2: 3D CCN diagnostics 3: 2D CCN + CN diagnostics 4: 3D CCN + CN diagnostics 5: 2D CCN + CN diagnostics + burdens 6: 3D CCN + CN diagnostics + burdens	0	0
burden_keytype	Aggregation level of output: 0: no output 1: BYTRACER 2: BYSPECIES 3: BYMODE	2	0
bc_oh	Tracer boundary condition for OH		
bc_o3	Tracer boundary condition for O3		
bc_h2o2	Tracer boundary condition for H2O2		
bc_no2	Tracer boundary condition for NO2		
bc_no3	Tracer boundary condition for NO3		

4.2 ham_m7ctl

This namelist controls settings that are specific to the modal aerosol scheme M7.

Namelist: ham_m7ctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nwater	Aerosol water uptake scheme 0: Jacobson et al. JGR 1996 1: Kappa-Koehler theory based approach (Petters and Kreidenweis ACP 2007)	1	1
nsnucl	Choice of the sulfate aerosol nucleation scheme: 0: off 1: Vehkamaeki et al. JGR 2002 2: Kazil and Lovejoy ACP 2007	2	2
nonucl	Choice of the organic aerosol nucleation scheme: 0: off 1: Activation nucleation Kulmala et al. ACP 2006 2: Kinetic nucleation Laakso et al. ACP 2004	1	1
lnucl_stat	True for sampling the cloud-free volume as function of T RH [H2SO4(g)] H2SO4 condensation sink and ionization rate (memory intensive)	.false.	.false.

4.3 ham_salsactl

This namelist controls settings that are specific to the sectional aerosol scheme SALSA.

Namelist: ham_salsactl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nsnucl	Choice of the sulfate aerosol nucleation scheme 1: Binary 2: activation type nucleation 3: Kinetic 4: Ternary 5: nucleation with ORGANICs 6: activation type of nucleation with H2SO4+ORG 7: heteromolecular nucleation with H2SO4*ORG 8: homomolecular nucleation of H2SO4 + heteromolecular nucleation with H2SO4*ORG 9: homomolecular nucleation of H2SO4 and ORG + heteromolecular nucleation with H2SO4*ORG	2	2
locgas	Organic carbon emisison in gas phase	.false.	.false.
lsol2b	Repartition soluble material from b-regions to a-regions	.false.	.false.
nj3	Choice of the particle formation scheme 1: Kerminen and Kulmala 2: Lehtinen et al. (2007) 3: Anttila et al. (2010)	1	1
act_coeff	Activation coefficient [unit?]	1e-07	1e-07

5 Settings for MOZ chemistry submodel

5.1 mozctl

This namelist is used to specify parameter values for the MOZ gas-phase chemistry model.

Namelist: mozctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
lchemsolv	activate chemistry solver	.false.	.true.
lphotolysis	activate photolysis calculation	.false.	.true.
lfastj	use fastJ photolysis code instead of WACCM	.false.	.false.
lfastjaero	use fastJ photolysis code without aerosols	.false.	.false.
lfastjcloud	use fastJ photolysis code without clouds	.false.	.false.
lstrathet	heterogeneous chemistry in stratosphere on/off	.true.	.true.
lbc_species	list of species for tropospheric lower boundary condition	undef	default
ubc_species	list of species for stratospheric/mesospheric upper boundary condition	undef	undef
out_species	list of species which shall be output in _tracer file	undef	c2h6 c3h8 c5h8 ch2o
budget_species	list of species for which budget diag. shall be run	undef	undef
burden_species	list of species for which burden diagnostics is done	undef	o3 no no2 co
photovars	list of variables in photo stream (or "all")	undef	default
uvalbedo_file	file name for UV albedo data (green and white)	undef	moz_uvalbedo.%t0.nc

Namelist: mozctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
bc_ch4	(lower) boundary condition for methane	bc_ch4%ef_type = 0 bc_ch4%ef_template = undef bc_ch4%ef_varname = undef bc_ch4%ef_geometry = 0 bc_ch4%ef_timedef = 1 bc_ch4%ef_timeoffset = 0.0 bc_ch4%ef_timeindex = 0 bc_ch4%ef_interpolate = 0 bc_ch4%ef_factor = 1.0 bc_ch4%ef_units = undef bc_ch4%ef_value = 0.0 bc_ch4%bc_domain = 0 bc_ch4%bc_minlev = -1 bc_ch4%bc_maxlev = 10000 bc_ch4%bc_mode = 1 bc_ch4%bc_relaxtime = 0.0	bc_ch4%ef_type = 0 bc_ch4%ef_template = undef bc_ch4%ef_varname = undef bc_ch4%ef_geometry = 0 bc_ch4%ef_timedef = 1 bc_ch4%ef_timeoffset = 0.0 bc_ch4%ef_timeindex = 0 bc_ch4%ef_interpolate = 0 bc_ch4%ef_factor = 1.0 bc_ch4%ef_units = undef bc_ch4%ef_value = 0.0 bc_ch4%bc_domain = 0 bc_ch4%bc_minlev = -1 bc_ch4%bc_maxlev = 10000 bc_ch4%bc_mode = 1 bc_ch4%bc_relaxtime = 0.0

Namelist: mozctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
bc_lbc	(lower) boundary conditions for tracers (strato. run/HAMMONIA)	bc_lbc%ef_type = 0 bc_lbc%ef_template = undef bc_lbc%ef_varname = undef bc_lbc%ef_geometry = 0 bc_lbc%ef_timedef = 1 bc_lbc%ef_timeoffset = 0.0 bc_lbc%ef_timeindex = 0 bc_lbc%ef_interpolate = 0 bc_lbc%ef_factor = 1.0 bc_lbc%ef_units = undef bc_lbc%ef_value = 0.0 bc_lbc%bc_domain = 0 bc_lbc%bc_minlev = -1 bc_lbc%bc_maxlev = 10000 bc_lbc%bc_mode = 1 bc_lbc%bc_relaxtime = 0.0	bc_lbc%ef_type = 2 bc_lbc%ef_template = moz_lbc.%t0.nc bc_lbc%ef_varname = * bc_lbc%ef_geometry = 0 bc_lbc%ef_timedef = 1 bc_lbc%ef_timeoffset = 0.0 bc_lbc%ef_timeindex = 0 bc_lbc%ef_interpolate = 0 bc_lbc%ef_factor = 1.0 bc_lbc%ef_units = mole mole-1 bc_lbc%ef_value = 0.0 bc_lbc%bc_domain = 1 bc_lbc%bc_minlev = -1 bc_lbc%bc_maxlev = 10000 bc_lbc%bc_mode = 1 bc_lbc%bc_relaxtime = 0.0

Namelist: mozctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
bc_ubc	(upper) boundary condition for tracers (tropospheric run)	bc_ubc%ef_type = 0 bc_ubc%ef_template = undef bc_ubc%ef_varname = undef bc_ubc%ef_geometry = 0 bc_ubc%ef_timedef = 1 bc_ubc%ef_timeoffset = 0.0 bc_ubc%ef_timeindex = 0 bc_ubc%ef_interpolate = 0 bc_ubc%ef_factor = 1.0 bc_ubc%ef_units = undef bc_ubc%ef_value = 0.0 bc_ubc%bc_domain = 0 bc_ubc%bc_minlev = -1 bc_ubc%bc_maxlev = 10000 bc_ubc%bc_mode = 1 bc_ubc%bc_relaxtime = 0.0	bc_ubc%ef_type = 0 bc_ubc%ef_template = moz_ubc.%t0%l0.nc bc_ubc%ef_varname = * bc_ubc%ef_geometry = 3 bc_ubc%ef_timedef = 2 bc_ubc%ef_timeoffset = 0.0 bc_ubc%ef_timeindex = 0 bc_ubc%ef_interpolate = 0 bc_ubc%ef_factor = 1.0 bc_ubc%ef_units = vmr bc_ubc%ef_value = 0.0 bc_ubc%bc_domain = 3 bc_ubc%bc_minlev = 2 bc_ubc%bc_maxlev = 10 bc_ubc%bc_mode = 3 bc_ubc%bc_relaxtime = 864000.0
ltrophet	Tropospheric heterogeneous chemistry (if ltrophet == .true.)	.true.	.true.

6 Emission-related namelists

6.1 ham_dustctl

This namelist is used to specify parameter values for the dust emission scheme.

Namelist: ham_dustctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
ndurough	Global surface roughness length parameter 0: A monthly mean satellite derived (Prigent et al.JGR 2005) surface roughness length map is used >0: The globally constant surface roughness length ndurough (cm) us used	0.001	0.001
nduscale_reg	Regional threshold wind friction velocity parameter This is an array of shape/dim (8) The indices correspond to the following regions: 1: All the other locations than the following regions 2: North america 3: South America 4: North Africa 5:South Africa 6: Middle East 7: Asia 8: Australia	1.05,1.45,1.45,1.05,1.05,1.05,1.45,1.05	1.05,1.45,1.45,1.05,1.05,1.05,1.45,1.05
r_dust_lai	Parameter for the threshold lai value	1e-1	1e-1
r_dust_umin	Minimum U* for dust mobilization	21.0	21.0
r_dust_z0s	Surface roughness length for smooth surfaces	0.001	0.001
r_dust_scz0	Scale factor of surface roughness length	1.0	1.0
r_dust_z0min	Minimum surface roughness length	1e-05	1e-05

Namelist: ham_dustctl *(continued)*			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
k_dust_smst	Effect of soil moisture on threshold wind velocity of dust emission 0: on (WARNING opposite to standard meaning) 1: off (WARNING opposite to standard meaning)	1	1
k_dust_easo	New soil type for East Asia region 0: on (WARNING: opposite to standard meaning) 1: off (WARNING: opposite to standard meaning) 2: on bug-removed-version 0	2	2
r_dust_sf13	Parameter of the duscale value over Takelimakan desert	1.0	1.0
r_dust_sf14	Parameter of the duscale value over Loess	1.0	1.0
r_dust_sf15	Parameter of the duscale value over Gobi desert	1.0	1.0
r_dust_sf16	Parameter of the duscale value over other mixture soils	1.0	1.0
r_dust_sf17	Parameter of the duscale value over desert and sand land	1.0	1.0
r_dust_af13	Parameter for the alfa value over Takelimakan desert (unitless)	1.9e-06	1.9e-06
r_dust_af14	Parameter for the alfa value over Loess (unitless)	0.00019	0.00019
r_dust_af15	Parameter for the alfa value over Gobi desert (unitless)	3.9e-05	3.9e-05
r_dust_af16	Parameter for the alfa value over other mixture soils (unitless)	3.1e-05	3.1e-05
r_dust_af17	Parameter for the alfa value over desert and sand land (unitless)	2.8e-06	2.8e-06

6.2 biogenic_emissionsctl

This namelist is used to specify parameter values for the Model of Emissions of Gases and Aerosols from Nature (Guenther et al., 2006).

Namelist: biogenic_emissionsctl			
Switch name	Description	Defaults when only lham=.true.	Defaults when only lmoz=.true.
nlai_biogenic_ef_typ	Choice of lai external field type in the biogenic emission module (MEGAN) 2 (EF_FILE): from external input file 3 (EF_MODULE): online from jsbach	3	3
nef_pft	Choice of PFT fractions from MEGAN-CLM4 or JSBACH 2 (EF_FILE): PFT fractions from MEGAN-CLM4 3 (EF_MODULE): fractions from JSBACH	2	2
emifact_files_species	Choice of emission factors read from specific file or calculated with PFT fractions	undef	undef
ldebug_bioemi	Switch on detailed output for bioemi diagnostics	.false.	.false.