Guide to the Rossby Centre Regional Climate Model RCA

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Contents

1 Quickstart

1.1 Check out RCA

Check out the (trunk) code using:

```
svn co svn+ssh://$USER@gimle.nsc.liu.se/home/rossby/svn/rca_repository/rca/trunk SRC_DIR
```

where `$USER` refers to your NSC user name and `SRC_DIR` is the directory where RCA will be created.

Variables referred to in this text are:

Name	Explanation
`SRC_DIR`	where the source code of RCA is located
`WORK_DIR`	location of result output (earlier known as `WORK_OUT`)
`ARCH`	the computer RCA is running on
`DOMAIN`	the name of the computational domain

If you feel con dent or just do not need to know any details in the compilation process, you should try this:

1.2 Compile RCA

- Make sure you have the adequate compilers, modules etc. loaded/available. On gimle e.g. `impi`, `ifort`, `icc`.
- Set the `ARCH` variable in your shell e.g. `export ARCH=gimle` on gimle, (or if you don't want to set ARCH as an environment variable you can use `make ARCH=gimle`).
- Make sure that `SRC_DIR/config/config.ARCH` has the expected settings. E.g. speci cation of compiler to use, optimization level, links to MPI-directories. See Section ??.
- Make sure that `SRC_DIR/config/definitions.global` has the expected settings. E.g. `-DDEBUG`, `-DMPI_SRC`. See Section ??.
- type `make` in `SRC_DIR`, if you de ned `ARCH` or else `make ARCH=gimle` on gimle.
- the executable `rca.x` should be located in `SRC_DIR/ARCH/bin`.
- if all did NOT go well (the authors have never experienced, but...) the compiler will tell what is wrong immediately and stop compilation (a compilation error).

1.3 Run RCA

In order to ensure that the automatic arrays in `phys` are allocated `ulimit -s unlimited` must be issued before executing RCA. A good idea is to place this command in your login script (e.g. `~/.bashrc`) or in your runscript if you use a runscript to execute the code (see Section ??).

Three namelist files, `namelists.dat`, `namelists_namppp.dat` and `gcmpaths.[nsc,pdc,userd]`, are needed to run RCA. Depedning on how you launch RCA the namelist files should be placed either in your `WORK_DIR` or where your runscript is located. `namelists.dat` should be copied from an appropiate sub-directory under `SRC_DIR/reference_setups/domains`. `namelists_namppp.dat` should be generated using `SRC_DIR/tools/prepare_namelists_namppp.sh` with an appropiate input file from `SRC_DIR/reference_setups/output_variables`

A runscript for the specific computer/filesystem `gimle` (`tools/runScriptGimle`) is also provided. Copy also this to e.g. your `WORK_DIR`.

To submit a job (on `gimle`) go to the directory where your runscript is located and do `sbatch -p nehalem runScriptGimle`.

If you wish to run the job interactively, DO NOT RUN the runscript.

Instead go into interactive mode (e.g. 8 nodes for 8 hours)

```
interactive -N 8  -t 8:00:00
```

and run RCA by

```
mpprun [--nranks=max(64 (if running totalview))] [--totalview] SRC_DIR/$ARCH/bin/rca.x
```

This is an easy way to run RCA in a varied number of cores and also possibly through Totalview. The results, `fc`-files etc, will end up in `WORK_DIR`. (Please note that one cannot rerun a simulation without removing old `fc`-files. Otherwise the job crashes with an odd(!) explanation that JPLREC is too small.)

2 Configuration of RCA

2.1 config/definitions.global

The RCA code can be configured to be different programs via different 'define'-options, described below. By invoking one or several of these definitions a different executable is generated. Some of the options are not valid simultaneously, but this is not checked for in any way, so it is up to the user to check that different options can co-exist.

The define options are:

-DDEBUG (optional) Print verbose information written to std_out.

-DLITTLE_ENDIAN (machine dependent)

-DMPI_SRC (for parallell systems)

-DUSING_NETCDF (for restart files in NetCDF format)

-DOASIS4 For coupling with the ocean model RCO.

The sources must be recompiled after adding or removing a definition. Recompilation is simply done by `make`, since the file `definitions.global` that contains all definition is a dependency for all source files. If however a change is made to

2.2 config/config.ARCH

If a change is made to a `config.ARCH` file to change e.g. the degree of optimization a `make clean` (which cleans away all object files) is necessary before recompilation.

3 Runscript

The runscript is very simple. It contains `SBATCH`-options for the queueing system and a definition of to the `WORK_DIR`. The runscript assumes that proper namelists are available in the directory where the runscript is launched. The runscript also copies an analysing script to `WORK_DIR` which can be submitted during or after a simulation for postprocessing and analysis of results.

4 gcmpaths.[*]

4.1 rout_path

varible	type[(length)]	explanation	default
routing_path	char(132)		''

4.2 climyears

varible	type[(length)]	explanation
climyears_path	char(*)	Who knows

4.3 gtopo30

varible	type[(length)]	explanation
gtopo30_path	char(*)	path to where gtopo30 database resides

4.4 ecoclimap

varible	type[(length)]	explanation
ecopath	char(*)	path to where Ecoclimap database resides

4.5 ecice

varible	type[(length)]	explanation
ecice_path	char(*)	path to where ECMWF ice global data resides

4.6 global_clim

varible	type[(length)]	explanation
global_clim_path	char(*)	path to where GCM lower global data resides

4.7 bound

varible	type[(length)]	explanation
bound_path	char(*)	path to where lateral boundary data resides

4.8 ocean

varible	type[(length)]	explanation
ocean_path	char(*)	Who knows

4.9 orog

varible	type[(length)]	explanation
orog_path	char(*)	Who knows

4.10 ghg

varible	type[(length)]	explanation
ghg_path	char(*)	Who knows

5 namelists.dat

Here follows a documentation of all variables that are possible in the di erent namelists in `namelists.dat` as read by `RCA`. Some variables are mandatory, others are optional and are marked with *emphasized* text.

5.1 institute

varible	type[(length)]	explanation	default
inst	char	'nsc','pdc' or 'user'	no default

5.2 namconfig

varible	type[(length)]	explanation	default
use_oasis	bool	use oasis	.false.
use_guess	bool	use LPJ-guess	.false.
use_routing	bool	use routing	.false.
use_match	bool	use MATCH	.false. (for future use)

5.3 namrouting

The variables only have meaning if `use_routing=.true.`

varible	type[(length)]	explanation	default
klon_bound	int		-
klat_bound	int		-
ntile	int		1
dimstate	int		1000
acctime	real		86400

5.4 namphys

varible	type[(length)]	explanation	default
latvap	real		2.5003e6
rair	real		2.8704e2
cpair	real		1.0046e3
ccpq	real		0.8593
epsilo	real		0.622
gravit	real	gravity acceleration constant	9.80665
tmelt	real		273.16
latice	real		3.336e5
rhos	real		1.3e3
rhoh2o	real		1.0e3
solar	real		1.367E3
stebol	real		5.67e-8
carman	real		0.40
rearth	real	radius of earth	6.37e6
lbkf	bool	Use BKF convection parametrization vs. KF	.true.
maximum_random	bool		.false.
lcarb	bool	Use soil organic carbon	.true.
lmulch	bool	Use vegetation mulch e ect	.true.

Note: Current experience is that Bechtold Kain-Fritsch should no be used for South Amercian domains.

5.5 namvar

varible	type[(length)]	explanation	default
iacdg2	int	number of 2D elds to be accumulated	13
iacdg	int	number of 3D elds to be accumulated	1
ksvar	int	number of extra scalar variables, e.g. TKE	1

5.6 namprc

varible	type[(length)]	explanation	default
nhorph	int	number of grid points in each physics subarea	500
lserial	bool	run physics in serial mode	.true.

5.7 namprocessor

varible	type[(length)]	explanation	default
nprocx	int	number of MPI-ranks to use in longitudal direction	computed by rca
nprocy	int	number of MPI-ranks to use in latitudal direction	computed by rca

5.8 namgcm

varible	type[(length)]	explanation	default
lecmwf	bool	ECMWF (ERA40 or ERA Interim) data on the boundaries	.false.
lhadley	bool	HadCM data on the boundaries	.false.
lipsl	bool	IPSL data on the boundaries	false.
lecham2	bool	ECHAM2 data on the boundaries	.false.
lecham5	bool	ECHAM5 data on the boundaries	.false.
lccsm	bool	CCSM data on the boundaries	.false.
lifs	bool	IFS data on the boundaries	.false.
lcanesm2	bool	CanESM2 data on the boundaries	.false.

5.9 scenario

varible	type[(length)]	explanation	default
lrcp	bool	use CO2 speci cation from control RCP period	.false.
lrcp45	bool	use CO2 speci cation from RCP 4.5	.false.
lrcp85	bool	use CO2 speci cation from RCP 8.5	.false.
lsres	bool	use CO2 speci cation from control SRES period	.false.
lsresa1b	bool	use CO2 speci cation from SRES A1B	.false.
lsresa2	bool	use CO2 speci cation from SRES A2	.false.
lsresb2	bool	use CO2 speci cation from SRES B2	.false.
lsresb1	bool	use CO2 speci cation from SRES B1	.false.

5.10 namrestart

varible	type[(length)]	explanation	default
doRestart	bool	start from a dumpFile	.false.
ntimesteps	int	number of timesteps to take before dump	-1
stopYear	int	what year simulation ends	1990
stopMonth	int	what month simulation ends	1
stopDay	int	what day simulation ends	1
stopHour	int	what hour simulation ends	0
stopMin	int	what minute simulation ends	0
stopSec	int	what second simulation ends	0
reyear	int	what year to run from	1990
remonth	int	what month to run from	01
reday	int	what day to run from	01
rehour	int	what hour to run from	00
remin	int	what minute to run from	00
resec	int	what second to run from	00
monthly	bool	do monthly dumps/else yearly	.false.

5.11 namdiffh

varible	type[(length)]	explanation	default
nldifu	bool	impl. hor. di usion for u	true
ndifu	int	order of impl. hor. di usion for u	6
cdifuin	real(klev)	horizontal di usion constants for u	1.0
nldifv	bool	impl. hor. di usion for v	true
ndifv	int	order of impl. hor. di usion for v	6
cdifvin	real(klev)	horizontal di usion constants for v	1.0
nldift	bool	impl. hor. di usion for T	true
ndift	int	order of impl. hor. di usion for T	6
cdiftin	real(klev)	horizontal di usion constants for T	1.0
nldifq	bool	impl. hor. di usion for q	true
ndifq	int	order of impl. hor. di usion for q	6
cdifqin	real(klev)	horizontal di usion constants for q	1.0
nldifs	bool	use impl. hor. di usion for cloud water	true
ndifs	int	order of impl. hor. di usion for cloud water	6
cdifsin	real(klev)	horizontal di usion constants for cloud water	1.0
nldifxin	bool(ksvar)	impl. hor. di usion for extra passive scalars	true
ndifxin	real(ksvar)	order of impl. hor. di usion for extra passive scalars	6
cdifxin	real(ksvar,klev)	horizontal di usion constants for extra passive scalars	1.0
nlhdif	bool	use explicit hor. di usion in dynamics	false
ak4	real	di usion coe cient for 2nd order hor. di u computed statistics	1.0e+14
ak4levin	real(nc*klev)	(nc=numberOfComponents in state vector)	(1.0*klev*4)

5.12 namsl

varible	type[(length)]	explanation	default
nlslan	bool	use s-l advection	true (must always be
nslpqi	int	number of iterations for calculation of displacement	1
nslinc	int	type of interpolation at the midpoint (not used)	4
nslind	int	type of interpolation at the departure point	4
nslint	int(100)	list of interpolation types for each iteration	4*100
nlsl3d	bool	use 3-dim. semi-lagrangian advection	.true.
epsg	real	coe cient fot the gravity wave damper	0.2
epsn	real	coe cient fot the gravity wave damper	0.2
nslext	int	order of time-extrapolation from t^n to $t^{n+1/2}$	2
nlitrh	bool	true for iterative Helmholtz-solver	.false.
aerrih	real	abs. error tol. for iterative Helmholtz-solver	1.0e-13
rerrih	real	rel. error tol. for iterative Helmholtz-solver	1.0e-8
nityph	int	iteration type for iterative Helmholtz solve	2
nptyph	int	preconditioning type for iterative Helmholtz-solver	1
dynamic_halo	bool	use dynamic halo in SL	true
khalo	int	if not dynamic halo then speci es halo width	10
safety_factor	real	used in dynamic khalo computation	0.7

5.13 nambc

varible	type[(length)]	explanation	default
npbpts	int	number of passive boundary points	2
nbdpts	int	number of gridpoints in the boundary relaxation zone for the boundary relaxation	8
nltanh	bool	use tanh-shape boundary relaxation function	true

5.14 namrun

varible	type[(length)]	explanation	default
dtime	int	timestep in seconds	
nlsimp	bool	use semi-implicit sheme	true
nlphys	bool	use physical paramerization	true
nlstat	bool	compute and print of statics	true
nltvir	bool	use virtual temperature in dynamics	true
nlhumc	bool	check of critical humidity for input data	true
nltcrf	bool	use correction for hor. di . of T and humidity along pseud press. lev.	true
dtphys	real	timestep for physics in seconds	real(ndtime)
dtvdif	real	imestep for vertical di usion in seconds	real(ndtime)
timesu	real	spinup time in seconds	real(2*ndtime)
nldynvd	bool	use dynamic tendency used in the vertical di usion scheme	false
nwmosvin	int	WMO-CODE FOR EXTRA SCALARS	
sit0	real	reference temperature (Kelvin)	300.0
sip0	real	reference surface presssure (pa)	101320.0
nlusug	bool	???	false
month_file	bool	One fc- le per month instead of one for each output-time interval.	true

5.15 namtun

varible	type[(length)]	explanation	default
acrit	real	threshold for critical humidity	1.00
tseafr	real	freezing temperature for salty sea water	271.15

5.16 nampos

varible	type[(length)]	explanation	default
lphys	bool		true
lomega	bool	compute omegas: omh and omf	true
iminpp	int	1:st i-index of output	1:st inner point
jminpp	int	1:st j-index of output	1:st inner point
npplon	int	last i-index of output	last inner point
npplat	int	last j-index of output	last inner point
linner	bool	if .t. then output inner domain else whole domain	.true.

5.17 domain

varible	type[(length)]	explanation
klon_global	int	number of gridpoint in longitudal direction
klat_global	int	number of gridpoints in latitudal direction
klev_global	int	number of vertical levels
dlon	real	longitudal grid spacing on the model grid (uniform)
dlat	real	latitudal grid spacing on the model grid (uniform)
south	real	latitudal coordinate of the model grid corner
west	real	longitudal coordinate of the model grid corner
polon	real	the longitudal coordinate of the projected south pole
polat	real	the latitudal coordinate of the projected south pole

5.18 namtsf

varible	type[(length)]	explanation	default
iunita	int	unit number of output el	97
imodea	int	TSF (0) or BUFR (1) output format	0
ifreqa	int	Sample frequency for ML elds	1
zlona	real(jpnts)	Longitude of points for ML elds	0.0
zlata	real(jpnts)	Latitude of points for ML elds	0.0
landa	int(jpnts)	Index for nearest/land/sea point	0
iunitb	int	just here to maintain old namelist	
imodeb	int	TSF (0) or BUFR (1) output format	
ifreqb	int	Sample frequency for SL elds	1
zlonb	real(jpnts)	Longitude of points for SL elds	0.0
zlatb	real(jpnts)	Latitude of points for SL elds	0.0
landb	int(jpnts)	Index for nearest/land/sea point	0

6 namelists_nampp.dat

This namelist is preferable created by the provided tool, `SRC_DIR/tools/prepare_namelists_namppp.sh` Input les for `prepare_namelists_namppp.sh` are available under

`SRC_DIR/reference_setups/output_variables`. If you create your own input le please follow the instructions in `prepare_namelists_namppp.sh`.

6.1 nampp

varible	type[(length)]	explanation	default
nppstr	int	number of output les	-1
suff	char[2][10]	su xes to les	'pp','dd','qq','hh','ss','gb',' '
month_file	bool	write monthly output	.true.

6.2 namppp

This namespace MUST be repeated `nppstr` (from nampp) times. Each variable as written to an output le must be de ned as a GRIB code (code, type, level) which in the name list corresponds to (`iwmoslp`, `ltypslp`, `alevslp`). For a speci cation of available variables (`iwmoslp`, `ltypslp`, `alevslp`) please refer to Appendix ??.

varible	type[(length)]	explanation	default
lunppfp	int	unit number to write	
prefixp	char(2)	pre x for lename	'fc'
su xp	char(2)	su x for lename	
timeppp	int	output interval in seconds	
nlevmlp	int	number of multi-levels	
nwmomlp	int	number of components of multi-level variables	
ltypmlp	int	grib-code type for multi-level variable	
alevmlp	int	grib-code level for multi-level variable	
iwmomlp	int	grib-code parameter for multi-level variable	
nslp	int	number of single levels	
ltypslp	int(nslp)	grib-code type for single-level variable	
alevslp	real(nslp)	grib-code level for single-level variable	
iwmoslp	int(nslp)	grib-code parameter for single-level variable	

7 Lateral boundaries from a general circulation model

This manual mainly describes how to use RCA with ERA40 or ERA-INTERIM, the re-analyses from ECMWF. Suppose you want to run a climate scenario with lateral boundaries from some global model. What input is necessary?

The 3-D fields needed are:
temperature
wind (u and v)
specific humidity

Preferably at model levels. If only pressure levels are available, you have to interpolate to model levels.

You also need:
sea surface temperature
ice cover
surface pressure

and constant fields:
land-sea mask
orography (surface geopotential)

For initialising the soil scheme you need some soil variables at different layers:
soil moisture
soil temperature

An alternative to initialising the soil scheme is to run a longer spin-up.

All models are di erent, they use di erent formats, use di erent grids, save different variables. So, retrieving what you need is di erent every time. Therefore we can not give you one recipe for the work.

For example you might have to:

change from NetCDF format to GRIB format
change or set GRIB codes
change from spectral coefficients to regular lat/long grid
change from Gaussian grid to regular grid
change from vorticity and divergence to U and V winds
change from logarithm of surface pressure to surface pressure
change units
swap north/south to south/north
extract a geographical area (to save space)
split a file with data for one month into files with data for one time-step

These things you can do inside RCA or pre-process data before running RCA.
We generally do it in a pre-processor.

If the grid is not global, it should be big enough for the regional grid you will use.

RCA needs ASIMOF-files. ASIMOF format is close to GRIB format but somewhat different. ASIMOF has a header in the beginning of the file. Compilation of RCA also creates a tool that converts from GRIB to ASIMOF. It is called pgb2as.x and is found in `SRC_DIR/ARCH/bin`
The use of it is shown in appendix ??.

Appendix ?? shows some excerpts from a script that does some of the things mentioned above. It uses CDO (https://code.zmaw.de/projects/cdo) and MARS from ECMWF. If you don't have MARS, we are pretty sure you can do the same thing with CDO or any tool that you prefer.

8 Defining a grid, the geographical area

In `namelists.dat` you have to edit the `domain` namelist to define your computational domain.

Here you specify the southwestern corner `south` and `west`. And the grid distance in degrees `dlon, dlat`. If you want to rotate the grid, set latitude and longitude for the south pole `polon, polat`.

```
Example:
&domain
        klon_global=134
        klat_global=155
        klev_global=40.
        south=-25.0
        west=159.5
        dlon=0.50
        dlat=0.50
        polon=110.0
        polat=-55.0
&end
```

If you don't use the iterartive Helmholtz-solver (in namsl) there are restrictions in the choice of `klon_global`. The `klat_global` you may choose freely. This is due to the FFT-transforms to solve the Helmholtz-equation in longitudal direction.

$$klonGlobal = (2^n 3^m 5^k) + 2 \cdot \underbrace{npbpts}_{\text{given in nambc}} + 2, \quad n > 0 \text{ and } m, k \in \mathbf{Z}. \qquad (1)$$

A list of allowed `klon_global` is found in appendix ??.

Currently RCA supports using `klev_global=19,24,31,40,50,60,62,91`.

9 Version control for RCA using SVN

Version control systems are designed to help keep track of documents that are frequently revised by one or many authors. This is typically the case when programming, and when producing a manuscript for a scientific publication. Using a version control system makes your life easier when

- there are more than one person working on the project
- you want to keep old versions of the code for future reference (and reversion) but find it silly to manually create directories like `./code_v_0.1_backup_date`.
- you are writing a manuscript for a scientific publication together with collaborators
- you want to share the code with someone (i.e. your professor). You will want to share the latest working version, and not the messy directory that contains the current version of the code (which may not always work) along with all the junk that accumulates when you code, run, and test.

In fact, a version control system will make it much more likely that you manage to maintain control of the code. Version control makes you a better programmer { and it's not hard at all to use! This is a simple tutorial on how to get started with Subversion (SVN), a modern version control system. Visit the official homepage `http://subversion.tigris.org/`.

9.1 Introduction to SVN

There is a phenomenal book on SVN freely available online, `http://svnbook.red-bean.com/`. You may read it and skip this tutorial completely (but the tutorial is not 300 pages). Either way, you will want to turn to it as a reference for more involved stuff. Also, the first 40 pages give a very nice introduction.

9.2 Check out a working copy

Go to the place in the file system where you write code, such as `~/workspace/`. To check out the newly created repository do

```
user@host:~/workspace/ svn co svn+ssh://$USER@gimle.nsc.liu.se/home/rossby/svn/rca_repositor
```

It should say the it has checked out the latest revision (some number). Now you have a working copy in the directory `project_name`.

9.3 Add files

Go to the working copy. Put some code in this directory, say hello.c and Make- le. Now put these les under version control by

```
svn add hello.c Makefile
A         hello.c
A         Makefile
```

The A above indicates "add", i.e. those les will be added to the repository when the changes are committed.

9.4 Committing changes

The nal step is to commit the changes made (i.e. that two les have been added). The command is

```
user@host:~/workspace/ svn commit -m "Added files hello.c and Makefile"
Adding         hello.c
Adding         Makefile
Transmitting file data ........................
Committed revision X.
```

9.5 Tools for common tasks

Always do svn help when you don't remember a command. Here are the most useful ones:

- `svn status` shows the status of the working copy. If we did this after adding the les above SVN would tell you that these two les are to be added to the repository (the A in the left column). File may otherwise be modi ed (M), deleted (D) or not under version control (?).
- `svn status -u`: Stat against latest revision in the repository
- `svn update` updates against the latest revision in the repository.
- `svn diff "file"` runs di between this le and the one checked out from the repository. This is the convenient way to check what changes you have made to a particular le.
- `svn diff -r HEAD`: runs di against the lates revision on the repository.

9.6 Resurrecting a file from an older revision

Say that the le foo.c has been removed, but now turns out to be interesting again. How to get it back? Well rst we have to know in which revision it existed. We use the copy command in SVN:

```
svn cp -r 100 file://$HOME/svnroot/repository_name/foo.c foo_old.c
```

where the ag -r 100 speci es that we want the version of the le that existed in revision 100. Note that this works equally well for reverting a le that exists in the repository back to a previous revision.

9.7 Some things NOT to do

- Do not move or remove les that are under version control using mv or rm, since this will break the version control of the code. Use svn move and svn rm instead. Note that les that have been removed can be reverted from earlier revisions.
- Do not commit code to the repository that does not work. The repository should contain the latest working copy (in the sense that it runs at least). Fixing bugs, adding features etc, however is part of the development cycle (i.e. the code that is committed doesn't need to be " nal").

9.8 RapidSVN - A GUI for SVN operations

Subversion has many more features than what has been presented here. And in certain circumstances problems occur. Two things to remember when things look complicated are

- Subversion has features that handle most conceivable problems that can occur in a development project (it's mostly a question of nding help).
- The on-line guide has most answers (link above).

Still, it can be comforting and convenient to have a GUI that gives an overview over repositories, working copies, patches and change-sets. Support for SVN is embedded in certain IDEs, but there is a stand-alone tool called RapidSVN `http://rapidsvn.tigris.org/` that gets the complicated jobs done.

10 Oasis

When coupling RCA to other codes we support the use of OASIS. Oasis is downloaded by issuing:

```
svn checkout svn://memphis.cerfacs.fr/home/oasis/PRISMSVN/trunk/oasis4 oasis
```

in the `SRC_DIR`. *To be continued...*

11 LPJ-GUESS

To check out LPJ-GUESS administer:

```
svn co svn://stormbringer.nateko.lu.se/svn/LPJ-GUESS/trunk
```

A Code structure

This code structure represents the path through the code given `lecmwf=.true.` in the namelist `namgcm`.

```
rca
`--hlprog
   |--read_config
   |--readDeconam
   |--init_hkp_memory
   |--read_namrun
   |--read_namsl
   |--read_restart
   |--decompose
   |--allocate_transpose
   |--decompose_hh
   |--getgcm
   |  `--init_gcm
   |     |--arakawastag
   |     |--readboundpath
   |     |--cre_fil*
   |     |--groploc
   |     |  |--as2ddr
   |     |  |  |--reset_ddr
   |     |  |  |--loadfd
   |     |  |  |--setlof
   |     |  |  |--getfd
   |     |  |  `--getbvt
   |     |  `--commddr
   |     `--grclloc
   `--gemini
      |--contun
      |--conphys
      |--tabdef
      |--initRca
      |--read_nampos
      |--gco2
      |--initEcoclimap
      |  |--readecoclimapdata
      |  |--lakemasks
      |  |--readecoclimapdata
      |  `--lakemasks
      |--setInitialEcoclimap
      |--initLateral_bc
```

```
|  |--getlateral_bc
|  |  |--pre_getgrb
|  |  |  |--readboundpath
|  |  |  |--cre_fil*
|  |  |  |--interpol_bd
|  |  |  |  |--grrdloc_hint
|  |  |  |  |  `--gread
|  |  |  |  |     |--asimhm
|  |  |  |  |     `--getfd
|  |  |  |  |        |--asimhr
|  |  |  |  |        `--degrib
|  |  |  |  |           |--gribex
|  |  |  |  |           |--gb1tb2
|  |  |  |  |           `--gbe2h?
|  |  |  |  `--etaeta
|  |  |  `--grclloc
|  |  |--comped
|  |  |--crihum
|  |  `--estimateCloudCondensate
|  |--getlateral_bc
|  `--initBoundary
|--setInitialCondition
|--initSurface_bc
|  |--getSurface_bc
|  |  `--pre_getgrblow
|  |     |--readboundpath
|  |     |--readecicepath
|  |     |--arakawastag
|  |     `--interpol_bdlow
|  `--getSurface_bc
|--setSurface_bc
|--setInitialCondPhys
|--difhini
|     TIME LOOP STARTS HERE
|--hilot
|--hilorh
|--higust
|--hiuv10
|--cloud_cover
|--accumulate1
|--acc_surf
|--acc4mean_surf
|--accumulate_post_process_surface
|--accumulate_post_process
|--turn_wind
|--writeDump
```

```
|--postproc
|  `--putdat
|     `--postpp
|--scratch_post_process_surface
|--scratch_post_process
|--gco2
|--setEcoclimap
|  |--readecoclimapdata
|  `--lakemasks
|--sl2tim
|  |--compfx
|  |--sldyn
|  |--comped
|  |--sldynm
|  |--slexpa
|  |--impadj
|  |--setLateral_bc
|  |  |--getlateral_bc
|  |  `--bndrel
|  |--omcomp
|  `--phcall
|     |--iniphys
|     |  |--inirad
|     |  |--inikf
|     |  |--inicbr
|     |  `--inisurf
|     |--inirad
|     |--partly_solarupdate
|     `--phtask
|        `--phys
|           |--ahybrid
|           |--conv_ecocli
|           |--calctemps
|           |--aradia
|           |  `--radia
|           |     `--ficefun
|           |--slfluxo_land
|           |--surf_land
|           |  `--surf
|           |--lai_guess_opl
|           |--lai_guess_for
|           |--slfluxo_surf_sea_ice
|           |--slfluxo_surf_lake_ice
|           |  |--TurbFluxLakeWater
|           |  |--TurbFluxLakeIceSnow
|           |  |--RadSurfLake
```

```
|                |  `--FLakeInterface3D
|                |     |--flake_radflux_Modif
|                |     `--flake_driver
|                |--slfluxo_average
|                |--pblhgt
|                |--vcbr
|                |  `--vcbr
|                |     |--wind_gust
|                |     |--entrain
|                |     |--mixlen
|                |     |--statcld
|                |     `--mixlen
|                `--akfrak
|                   |--ficefun
|                   |--prcond
|                   |--BKFCALL
|                   |  |--INI_CONVPAR
|                   |  |--DEEP_CONVECTION
|                   |  |  |--CONVECT_TRIGGER_FUNCT
|                   |  |  |  `--CONVECT_SATMIXRATIO
|                   |  |  |--CONVECT_UPDRAFT
|                   |  |  |  |--CONVECT_CONDENS
|                   |  |  |  `--CONVECT_MIXING_FUNCT
|                   |  |  |--CONVECT_TSTEP_PREF
|                   |  |  |--CONVECT_DOWNDRAFT
|                   |  |  |  `--CONVECT_SATMIXRATIO
|                   |  |  |--CONVECT_PRECIP_ADJUST
|                   |  |  |--CONVECT_CLOSURE
|                   |  |  |  |--CONVECT_CLOSURE_THRVLCL
|                   |  |  |  |--CONVECT_SATMIXRATIO
|                   |  |  |  `--CONVECT_CLOSURE_ADJUST
|                   |  |  |--CONVECT_CHEM_TRANSPORT
|                   |  |  |--
|                   |  |  |--
|                   |  |--INI_CONVPAR_SHAL
|                   |  `--SHALLOW_CONVECTION
|                   |     |--CONVECT_TRIGGER_SHAL
|                   |     |--CONVECT_UPDRAFT_SHAL
|                   |     |  |--CONVECT_CONDENS
|                   |     |  `--CONVECT_MIXING_FUNCT
|                   |     |--CONVECT_CLOSURE_SHAL
|                   |     |  |--CONVECT_CLOSURE_THRVLCL
|                   |     |  |--CONVECT_SATMIXRATIO
|                   |     |  `--CONVECT_CLOSURE_ADJUST_SHAL
|                   |     `--CONVECT_CHEM_TRANSPORT
|                   |--AKFCUM
```

```
           |              |  `--KFCUMULUS
           |              |--acldfrc
           |              |  `--cldfrc
           |              |     |--cucoeff
           |              |     `--rhcrak
           |              |--apcond
           |              |  `--pcond
           |              `--axucld
           |                 `--xucld
!!           |--setLateral_bc
           |--diagnos
           |--setSurface_bc
           |--ficefun
           |--intvert2
           `--intvert_moist
                 TIME LOOP STOPS HERE
```

B Prepare boundaries

```
# for CLARIS/South America:
south=-60.
west=-110.
north=30.
east=0.
echo "southern America area"

indir=/nobackup/rossby14/sm_uhans/DATA/ECHAM5/Global/20C_1
dirgrib=/nobackup/rossby14/sm_uhans/DATA/ECHAM5/Regional/GRIB
prefixm=31009_S09_
prefix6=S09_
mkdir -p $dirgrib

tmpdir=/scratch/local/rossby/sm_uhans/4RCA_EH5
mkdir -p $tmpdir
mkdir $tmpdir/splitteddays
mkdir $tmpdir/splittedhours

# one month at a time

yyyy=1958
while (($yyyy <= 2000))
do
for mm in 01 02 03 04 05 06 07 08 09 10 11 12
do

ln -s $indir/$prefixm$yyyy$mm.01 infil


# get vo div from spectral file
#-----------------------------------------------------
cat > mars_in <<@@
read,
    source     ="infil",
    param      =vo/div,
    fieldset   ="fs"
write,
    fieldset   ="fs",
    target     ="vodivsh"
@@

mars  mars_in > /dev/null


# make u v with cdo
#-----------------------------------------------------
cdo dv2uv vodivsh uvfromcdo
```

```
# extract area and interpolate u v
#-----------------------------------------------------
cat > mars_in <<@@
read,
    source     ="uvfromcdo",
    grid       =1.875/1.875,
    area       =$north/$west/$south/$east,
    fieldset   ="fs"
write,
    fieldset   ="fs",
    target     ="uvml1"
@@

mars  mars_in > /dev/null

# change codes
#-----------------------------------------------------
cdo selcode,131 uvml1 uml
cdo selcode,132 uvml1 vml
cdo setcode,33 uml u
cdo setcode,34 vml v
cdo merge u v uvml

# splitting in 6-hour files
#-----------------------------------------------------
cd splitteddays
cdo splitday ../$prefix6$yyyy$mm $prefix6$yyyy$mm
cd ..
cd splittedhours

for dd in 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 2
do

cdo splithour ../splitteddays/$prefix6$yyyy$mm$dd.grb $prefix6$yyyy$mm$dd

for hh in 00 06 12 18
do

mv $prefix6$yyyy$mm$dd$hh.grb $prefix6$yyyy$mm$dd$hh"00+000H00M"

done #hh

done #dd

mv * $dirgrib
cd ..
```

```
rm splitteddays/*
rm $prefix6$yyyy$mm

done #mm

yyyy=‘expr 1 + $yyyy‘
done #yyyy

#------------------------------------------------------
# converting from GRIB to ASIMOF
#------------------------------------------------------

dirgrib=/nobackup/rossby13/sm_uhans/DATA/ECHAM5/GRIB
dirasim=/nobackup/rossby14/sm_uhans/DATA/ECHAM5/ASIMOF/A1B_3
prefix6=S24_

YY=2001
while (( $YY <= 2101 ))
do
for MM in 01 02 03 04 05 06 07 08 09 10 11 12
do
for JD in 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 2
do
for JH in 00 06 12 18
do

ln -s $dirgrib/$prefix6\_$YY$MM$JD$JH\00+000H00M fort.1
ln -s $dirasim/$prefix6\_$YY$MM$JD$JH\00+000H00M fort.2
/home/sm_uhans/hirlam/$SRC_DIR/$ARCH/bin/pgb2as.x > /dev/null
rm fort.1
rm fort.2

done #JH
done #JD
done #MM
YY=‘expr 1 + $YY‘
done #YY
```

C Allowed klon_global

x	y	z	allowed klon_global-6	klon_global
2	1	0	12	18
4	0	0	16	22
1	2	0	18	24
2	0	1	20	26
3	1	0	24	30
1	1	1	30	36
5	0	0	32	38
2	2	0	36	42
3	0	1	40	46
4	1	0	48	54
1	0	2	50	56
1	3	0	54	60
2	1	1	60	66
6	0	0	64	70
3	2	0	72	78
4	0	1	80	86
1	2	1	90	96
5	1	0	96	102
2	0	2	100	106
2	3	0	108	114
3	1	1	120	126
7	0	0	128	134
4	2	0	144	150
1	1	2	150	156
5	0	1	160	166
1	4	0	162	168
2	2	1	180	186
6	1	0	192	198
3	0	2	200	206
3	3	0	216	222
4	1	1	240	246
1	0	3	250	256
8	0	0	256	262
1	3	1	270	276
5	2	0	288	294
2	1	2	300	306
6	0	1	320	326
2	4	0	324	330
3	2	1	360	366
7	1	0	384	390
4	0	2	400	406

4	3	0	432	438
1	2	2	450	456
5	1	1	480	486
1	5	0	486	492
2	0	3	500	506
9	0	0	512	518
2	3	1	540	546
6	2	0	576	582
3	1	2	600	606
7	0	1	640	646
3	4	0	648	654
4	2	1	720	726
1	1	3	750	756
8	1	0	768	774
5	0	2	800	806
1	4	1	810	816
5	3	0	864	870
2	2	2	900	906
6	1	1	960	966
2	5	0	972	978
3	0	3	1000	1006
10	0	0	1024	1030
3	3	1	1080	1086
7	2	0	1152	1158
4	1	2	1200	1206
1	0	4	1250	1256
8	0	1	1280	1286
4	4	0	1296	1302
1	3	2	1350	1356

D GRIB codes

Each variable is speci ed using its uniqe GRIB code (code, type, level) which corresponds to the rst three columns in the list below. In general \code" refers to the character of the varibel (e.g. 11 for temperature, 33 for u-wind component), \type" refers to which type the variable represent (e.g. 105 for land surface, 109 for model level, 100 for pressure level) and \level" refers to which level the vaiable represent (.e.g. 0 for surface, 24 for model level 24, 850 for pressure level 850 hPa). However, a number of exceptions to these general rules exist. For example, \level"=3006 refers to mean value of the variable over the output interval (e.g. 111 105 3006), \level"=4006 refers to accumulated value of the variable over the output interval (e.g. 62 105 4006).

In addition Rossby Centre has violated the GRIB standard by de ning arrays of varaibles de end by their code number but where every unique variable in the array is de end by its level. The code numbers for these arrays are de ned in the following table (all with type=105). The number of levels for each array are de ned by parameters in `src/gemini.F90`. The number of levels for 252, 250, 243 and 244 must correspond to the same number of variables in `call phys` and in `subroutine phys`.

code	**description**	**parameter in gemini.F90**
252	prognostic land and se-ice varibels	`ksvars`
250	for diagnostic instantaneous land and sea-ice variables	`msvars`
242	diagnostic mean values (over ecah speci c output interval) of land and sea-ice variables	`msvars`
245	diagnostic accumulated values (over ecah speci c output interval) of land and sea-ice variables	`msvars`
241	extreme time-step values (over ecah speci c output interval)	`esvars`
243	prognostic FLake variables	`lake_no_prog`
244	diagnostic FLake variables	`lake_no_diag`
245	ECOCLIMAP physiography variables	`meco`

List of variables:

```
11 109 1 t1 Temperature K
11 109 2 t2 Temperature K
11 109 3 t3 Temperature K
11 109 4 t4 Temperature K
11 109 5 t5 Temperature K
11 109 6 t6 Temperature K
11 109 7 t7 Temperature K
11 109 8 t8 Temperature K
11 109 9 t9 Temperature K
```

```
11 109 10 t10 Temperature K
11 109 11 t11 Temperature K
11 109 12 t12 Temperature K
11 109 13 t13 Temperature K
11 109 14 t14 Temperature K
11 109 15 t15 Temperature K
11 109 16 t16 Temperature K
11 109 17 t17 Temperature K
11 109 18 t18 Temperature K
11 109 19 t19 Temperature K
11 109 20 t20 Temperature K
11 109 21 t21 Temperature K
11 109 22 t22 Temperature K
11 109 23 t23 Temperature K
11 109 24 t24 Temperature K
11 109 25 t25 Temperature K
11 109 26 t26 Temperature K
11 109 27 t27 Temperature K
11 109 28 t28 Temperature K
11 109 29 t29 Temperature K
11 109 30 t30 Temperature K
11 109 31 t31 Temperature K
11 109 32 t32 Temperature K
11 109 33 t33 Temperature K
11 109 34 t34 Temperature K
11 109 35 t35 Temperature K
11 109 36 t36 Temperature K
11 109 37 t37 Temperature K
11 109 38 t38 Temperature K
11 109 39 t39 Temperature K
11 109 40 t40 Temperature K
33 109 1 u1 U-component_of_Wind m_s^{-1}
33 109 2 u2 U-component_of_Wind m_s^{-1}
33 109 3 u3 U-component_of_Wind m_s^{-1}
33 109 4 u4 U-component_of_Wind m_s^{-1}
33 109 5 u5 U-component_of_Wind m_s^{-1}
33 109 6 u6 U-component_of_Wind m_s^{-1}
33 109 7 u7 U-component_of_Wind m_s^{-1}
33 109 8 u8 U-component_of_Wind m_s^{-1}
33 109 9 u9 U-component_of_Wind m_s^{-1}
33 109 10 u10 U-component_of_Wind m_s^{-1}
33 109 11 u11 U-component_of_Wind m_s^{-1}
33 109 12 u12 U-component_of_Wind m_s^{-1}
33 109 13 u13 U-component_of_Wind m_s^{-1}
33 109 14 u14 U-component_of_Wind m_s^{-1}
33 109 15 u15 U-component_of_Wind m_s^{-1}
```

```
33 109 16 u16 U-component_of_Wind m_s^{-1}
33 109 17 u17 U-component_of_Wind m_s^{-1}
33 109 18 u18 U-component_of_Wind m_s^{-1}
33 109 19 u19 U-component_of_Wind m_s^{-1}
33 109 20 u20 U-component_of_Wind m_s^{-1}
33 109 21 u21 U-component_of_Wind m_s^{-1}
33 109 22 u22 U-component_of_Wind m_s^{-1}
33 109 23 u23 U-component_of_Wind m_s^{-1}
33 109 24 u24 U-component_of_Wind m_s^{-1}
33 109 25 u25 U-component_of_Wind m_s^{-1}
33 109 26 u26 U-component_of_Wind m_s^{-1}
33 109 27 u27 U-component_of_Wind m_s^{-1}
33 109 28 u28 U-component_of_Wind m_s^{-1}
33 109 29 u29 U-component_of_Wind m_s^{-1}
33 109 30 u30 U-component_of_Wind m_s^{-1}
33 109 31 u31 U-component_of_Wind m_s^{-1}
33 109 32 u32 U-component_of_Wind m_s^{-1}
33 109 33 u33 U-component_of_Wind m_s^{-1}
33 109 34 u34 U-component_of_Wind m_s^{-1}
33 109 35 u35 U-component_of_Wind m_s^{-1}
33 109 36 u36 U-component_of_Wind m_s^{-1}
33 109 37 u37 U-component_of_Wind m_s^{-1}
33 109 38 u38 U-component_of_Wind m_s^{-1}
33 109 39 u39 U-component_of_Wind m_s^{-1}
33 109 40 u40 U-component_of_Wind m_s^{-1}
34 109 1 v1 V-component_of_Wind m_s^{-1}
34 109 2 v2 V-component_of_Wind m_s^{-1}
34 109 3 v3 V-component_of_Wind m_s^{-1}
34 109 4 v4 V-component_of_Wind m_s^{-1}
34 109 5 v5 V-component_of_Wind m_s^{-1}
34 109 6 v6 V-component_of_Wind m_s^{-1}
34 109 7 v7 V-component_of_Wind m_s^{-1}
34 109 8 v8 V-component_of_Wind m_s^{-1}
34 109 9 v9 V-component_of_Wind m_s^{-1}
34 109 10 v10 V-component_of_Wind m_s^{-1}
34 109 11 v11 V-component_of_Wind m_s^{-1}
34 109 12 v12 V-component_of_Wind m_s^{-1}
34 109 13 v13 V-component_of_Wind m_s^{-1}
34 109 14 v14 V-component_of_Wind m_s^{-1}
34 109 15 v15 V-component_of_Wind m_s^{-1}
34 109 16 v16 V-component_of_Wind m_s^{-1}
34 109 17 v17 V-component_of_Wind m_s^{-1}
34 109 18 v18 V-component_of_Wind m_s^{-1}
34 109 19 v19 V-component_of_Wind m_s^{-1}
34 109 20 v20 V-component_of_Wind m_s^{-1}
34 109 21 v21 V-component_of_Wind m_s^{-1}
```

```
34 109 22 v22 V-component_of_Wind m_s^{-1}
34 109 23 v23 V-component_of_Wind m_s^{-1}
34 109 24 v24 V-component_of_Wind m_s^{-1}
34 109 25 v25 V-component_of_Wind m_s^{-1}
34 109 26 v26 V-component_of_Wind m_s^{-1}
34 109 27 v27 V-component_of_Wind m_s^{-1}
34 109 28 v28 V-component_of_Wind m_s^{-1}
34 109 29 v29 V-component_of_Wind m_s^{-1}
34 109 30 v30 V-component_of_Wind m_s^{-1}
34 109 31 v31 V-component_of_Wind m_s^{-1}
34 109 32 v32 V-component_of_Wind m_s^{-1}
34 109 33 v33 V-component_of_Wind m_s^{-1}
34 109 34 v34 V-component_of_Wind m_s^{-1}
34 109 35 v35 V-component_of_Wind m_s^{-1}
34 109 36 v36 V-component_of_Wind m_s^{-1}
34 109 37 v37 V-component_of_Wind m_s^{-1}
34 109 38 v38 V-component_of_Wind m_s^{-1}
34 109 39 v39 V-component_of_Wind m_s^{-1}
34 109 40 v40 V-component_of_Wind m_s^{-1}
71 109 22 totcov22 Total_Cloud_Cover -
71 109 23 totcov23 Total_Cloud_Cover -
71 109 24 totcov24 Total_Cloud_Cover -
71 109 38 totcov38 Total_Cloud_Cover -
71 109 39 totcov39 Total_Cloud_Cover -
71 109 40 totcov40 Total_Cloud_Cover -
72 109 24 totccov Convective_Cloud_Cover -
76 109 1 cw1 Cloud_Water kg_m^{-2}
76 109 2 cw2 Cloud_Water kg_m^{-2}
76 109 3 cw3 Cloud_Water kg_m^{-2}
76 109 4 cw4 Cloud_Water kg_m^{-2}
76 109 5 cw5 Cloud_Water kg_m^{-2}
76 109 6 cw6 Cloud_Water kg_m^{-2}
76 109 7 cw7 Cloud_Water kg_m^{-2}
76 109 8 cw8 Cloud_Water kg_m^{-2}
76 109 9 cw9 Cloud_Water kg_m^{-2}
76 109 10 cw10 Cloud_Water kg_m^{-2}
76 109 11 cw11 Cloud_Water kg_m^{-2}
76 109 12 cw12 Cloud_Water kg_m^{-2}
76 109 13 cw13 Cloud_Water kg_m^{-2}
76 109 14 cw14 Cloud_Water kg_m^{-2}
76 109 15 cw15 Cloud_Water kg_m^{-2}
76 109 16 cw16 Cloud_Water kg_m^{-2}
76 109 17 cw17 Cloud_Water kg_m^{-2}
76 109 18 cw18 Cloud_Water kg_m^{-2}
76 109 19 cw19 Cloud_Water kg_m^{-2}
76 109 20 cw20 Cloud_Water kg_m^{-2}
```

```
76 109 21 cw21 Cloud_Water kg_m^{-2}
76 109 22 cw22 Cloud_Water kg_m^{-2}
76 109 23 cw23 Cloud_Water kg_m^{-2}
76 109 24 cw24 Cloud_Water kg_m^{-2}
76 109 25 cw25 Cloud_Water kg_m^{-2}
76 109 26 cw26 Cloud_Water kg_m^{-2}
76 109 27 cw27 Cloud_Water kg_m^{-2}
76 109 28 cw28 Cloud_Water kg_m^{-2}
76 109 29 cw29 Cloud_Water kg_m^{-2}
76 109 30 cw30 Cloud_Water kg_m^{-2}
76 109 31 cw31 Cloud_Water kg_m^{-2}
76 109 32 cw32 Cloud_Water kg_m^{-2}
76 109 33 cw33 Cloud_Water kg_m^{-2}
76 109 34 cw34 Cloud_Water kg_m^{-2}
76 109 35 cw35 Cloud_Water kg_m^{-2}
76 109 36 cw36 Cloud_Water kg_m^{-2}
76 109 37 cw37 Cloud_Water kg_m^{-2}
76 109 38 cw38 Cloud_Water kg_m^{-2}
76 109 39 cw39 Cloud_Water kg_m^{-2}
76 109 40 cw40 Cloud_Water kg_m^{-2}
51 109 1 q1 Specific_Humidity kg_kg^{-1}
51 109 2 q2 Specific_Humidity kg_kg^{-1}
51 109 3 q3 Specific_Humidity kg_kg^{-1}
51 109 4 q4 Specific_Humidity kg_kg^{-1}
51 109 5 q5 Specific_Humidity kg_kg^{-1}
51 109 6 q6 Specific_Humidity kg_kg^{-1}
51 109 7 q7 Specific_Humidity kg_kg^{-1}
51 109 8 q8 Specific_Humidity kg_kg^{-1}
51 109 9 q9 Specific_Humidity kg_kg^{-1}
51 109 10 q10 Specific_Humidity kg_kg^{-1}
51 109 11 q11 Specific_Humidity kg_kg^{-1}
51 109 12 q12 Specific_Humidity kg_kg^{-1}
51 109 13 q13 Specific_Humidity kg_kg^{-1}
51 109 14 q14 Specific_Humidity kg_kg^{-1}
51 109 15 q15 Specific_Humidity kg_kg^{-1}
51 109 16 q16 Specific_Humidity kg_kg^{-1}
51 109 17 q17 Specific_Humidity kg_kg^{-1}
51 109 18 q18 Specific_Humidity kg_kg^{-1}
51 109 19 q19 Specific_Humidity kg_kg^{-1}
51 109 20 q20 Specific_Humidity kg_kg^{-1}
51 109 21 q21 Specific_Humidity kg_kg^{-1}
51 109 22 q22 Specific_Humidity kg_kg^{-1}
51 109 23 q23 Specific_Humidity kg_kg^{-1}
51 109 24 q24 Specific_Humidity kg_kg^{-1}
51 109 25 q25 Specific_Humidity kg_kg^{-1}
51 109 26 q26 Specific_Humidity kg_kg^{-1}
```

```
51 109 27 q27 Specific_Humidity kg_kg^{-1}
51 109 28 q28 Specific_Humidity kg_kg^{-1}
51 109 29 q29 Specific_Humidity kg_kg^{-1}
51 109 30 q30 Specific_Humidity kg_kg^{-1}
51 109 31 q31 Specific_Humidity kg_kg^{-1}
51 109 32 q32 Specific_Humidity kg_kg^{-1}
51 109 33 q33 Specific_Humidity kg_kg^{-1}
51 109 34 q34 Specific_Humidity kg_kg^{-1}
51 109 35 q35 Specific_Humidity kg_kg^{-1}
51 109 36 q36 Specific_Humidity kg_kg^{-1}
51 109 37 q37 Specific_Humidity kg_kg^{-1}
51 109 38 q38 Specific_Humidity kg_kg^{-1}
51 109 39 q39 Specific_Humidity kg_kg^{-1}
51 109 40 q40 Specific_Humidity kg_kg^{-1}
200 109 37 tke37 Turb_Kinetic_Energy m^2_s^{-2}
200 109 38 tke38 Turb_Kinetic_Energy m^2_s^{-2}
200 109 39 tke39 Turb_Kinetic_Energy m^2_s^{-2}
200 109 40 tke40 Turb_Kinetic_Energy m^2_s^{-2}
6 100 100 gpot100 Geopotential_Height m^2_s^{-2}
6 100 200 gpot200 Geopotential_Height m^2_s^{-2}
6 100 250 gpot250 Geopotential_Height m^2_s^{-2}
6 100 300 gpot300 Geopotential_Height m^2_s^{-2}
6 100 400 gpot400 Geopotential_Height m^2_s^{-2}
6 100 500 gpot500 Geopotential_Height m^2_s^{-2}
6 100 600 gpot600 Geopotential_Height m^2_s^{-2}
6 100 700 gpot700 Geopotential_Height m^2_s^{-2}
6 100 850 gpot850 Geopotential_Height m^2_s^{-2}
6 100 900 gpot900 Geopotential_Height m^2_s^{-2}
6 100 925 gpot925 Geopotential_Height m^2_s^{-2}
6 100 975 gpot975 Geopotential_Height m^2_s^{-2}
6 100 1000 gpot1000 Geopotential_Height m^2_s^{-2}
11 100 100 t100 Temperature K
11 100 200 t200 Temperature K
11 100 250 t250 Temperature K
11 100 300 t300 Temperature K
11 100 400 t400 Temperature K
11 100 500 t500 Temperature K
11 100 600 t600 Temperature K
11 100 700 t700 Temperature K
11 100 850 t850 Temperature K
11 100 900 t900 Temperature K
11 100 925 t925 Temperature K
11 100 975 t975 Temperature K
11 100 1000 t1000 Temperature K
33 100 100 u100 U-component_of_Wind m_s^{-1}
33 100 200 u200 U-component_of_Wind m_s^{-1}
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33 100 250 u250 U-component_of_Wind m_s^{-1}
33 100 300 u300 U-component_of_Wind m_s^{-1}
33 100 400 u400 U-component_of_Wind m_s^{-1}
33 100 500 u500 U-component_of_Wind m_s^{-1}
33 100 600 u600 U-component_of_Wind m_s^{-1}
33 100 700 u700 U-component_of_Wind m_s^{-1}
33 100 850 u850 U-component_of_Wind m_s^{-1}
33 100 900 u900 U-component_of_Wind m_s^{-1}
33 100 925 u925 U-component_of_Wind m_s^{-1}
33 100 975 u975 U-component_of_Wind m_s^{-1}
33 100 1000 u1000 U-component_of_Wind m_s^{-1}
34 100 100 v100 V-component_of_Wind m_s^{-1}
34 100 200 v200 V-component_of_Wind m_s^{-1}
34 100 250 v250 V-component_of_Wind m_s^{-1}
34 100 300 v300 V-component_of_Wind m_s^{-1}
34 100 400 v400 V-component_of_Wind m_s^{-1}
34 100 500 v500 V-component_of_Wind m_s^{-1}
34 100 600 v600 V-component_of_Wind m_s^{-1}
34 100 700 v700 V-component_of_Wind m_s^{-1}
34 100 850 v850 V-component_of_Wind m_s^{-1}
34 100 900 v900 V-component_of_Wind m_s^{-1}
34 100 925 v925 V-component_of_Wind m_s^{-1}
34 100 975 v975 V-component_of_Wind m_s^{-1}
34 100 1000 v1000 V-component_of_Wind m_s^{-1}
39 100 100 omega100 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 200 omega200 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 250 omega250 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 300 omega300 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 400 omega400 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 500 omega500 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 600 omega600 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 700 omega700 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 850 omega850 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 900 omega900 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 925 omega925 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 975 omega975 Vertical_Velocity_(omega) Pa_s^{-1}
39 100 1000 omega1000 Vertical_Velocity_(omega) Pa_s^{-1}
52 100 100 rh100 Relative_Humidity -
52 100 200 rh200 Relative_Humidity -
52 100 250 rh250 Relative_Humidity -
52 100 300 rh300 Relative_Humidity -
52 100 400 rh400 Relative_Humidity -
52 100 500 rh500 Relative_Humidity -
52 100 600 rh600 Relative_Humidity -
52 100 700 rh700 Relative_Humidity -
52 100 850 rh850 Relative_Humidity -
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52 100 900 rh900 Relative_Humidity -
52 100 925 rh925 Relative_Humidity -
52 100 975 rh975 Relative_Humidity -
52 100 1000 rh1000 Relative_Humidity -
51 100 100 q100 Specific_Humidity kg_kg^{-1}
51 100 200 q200 Specific_Humidity kg_kg^{-1}
51 100 250 q250 Specific_Humidity kg_kg^{-1}
51 100 300 q300 Specific_Humidity kg_kg^{-1}
51 100 400 q400 Specific_Humidity kg_kg^{-1}
51 100 500 q500 Specific_Humidity kg_kg^{-1}
51 100 600 q600 Specific_Humidity kg_kg^{-1}
51 100 700 q700 Specific_Humidity kg_kg^{-1}
51 100 850 q850 Specific_Humidity kg_kg^{-1}
51 100 900 q900 Specific_Humidity kg_kg^{-1}
51 100 925 q925 Specific_Humidity kg_kg^{-1}
51 100 975 q975 Specific_Humidity kg_kg^{-1}
51 100 1000 q1000 Specific_Humidity kg_kg^{-1}
11 102 0 sst Sea_Surface_Temperature K
11 1 0 sst_1 Sea_Surface_Temperature K
83 102 0 z0 Surface_Roughness m
91 102 0 frice Sea_or_Lake_Ice_Concentration -
92 102 0 iceth Lake_Ice_Thickness m
91 1 0   frice_1 Sea_or_Lake_Ice_Concentration -
92 1 0   iceth_1 Lake_Ice_Thickness m
230 102 0 wave_dir wave_direction grad
232 102 0 wave_per wave_period -
229 102 0 wave_hight wave_hight m
239 102 0 lcounttice lcounttice_(for_internal_RCA_use) -
1 103 0 slp Sea_Level_Pressure Pa
1 105 0 sp Surface_Pressure Pa
2 105 0 iind I-Index -
3 105 0 jind J-Index -
4 105 0 mype Processor_rank -
6 105 0 gpot Geopotential_Height m^2_s^{-2}
9 105 0 orosigm Orogsigm m
11 105 0 ts Surface_Temperature K
11 105 2 t2m 2m_Temperature K
11 105 999 tsoild Deep_soil_temperature_(7.2-87.2_cm) K
11 105 998 tsoilc Bottom_clim._soil_temperature K
15 105 0 tsmax Surface_Maximum_Temperature K
15 105 2 t2max 2m_Maximum_Temperature K
16 105 0 tsmin Surface_Minimum_Temperature K
16 105 2 t2min 2m_Minimum_Temperature K
32 105 10 U10max 10m_maximum_wind_speed m_s^{-1}
33 105 10 u10 u10_wind_component m_s^{-1}
34 105 10 v10 v10_wind_component m_s^{-1}
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52 105 2 rh2 2m_Relative_humidity -
54 105 0 precwtr_0 Precipitable_water kg_m^{-2}
54 105 3006 precwtr Precipitable_water kg_m^{-2}
57 105 4006 evap Evaporation -
58 105 0 cldice_0 Cloud_ice kg_m^{-2}
58 105 3006 cldice Cloud_ice kg_m^{-2}
61 105 0 totprc_0 Total_Precipitation mm_s^{-1}
61 105 4006 totprc Total_Precipitation mm_(output_int)^{-1}
62 105 4006 lsprc Large_Scale_Precipitation mm_(output_int)^{-1}
63 105 4006 convprc Convective_Precipitation mm_(output_int)^{-1}
64 105 0 maxdayprecip Maximum_Hourly_Precipitation_Rate mm_s^{-1}
65 105 0 snowprc Snowfall mm_s^{-1}
65 105 4006 snowprc Snowfall mm_(output_int)^{-1}
66 105 0 sn Snow_depth_(Sn_Water_Eq) m
67 105 0 zi Mixed_Layer_Depth m
71 105 0 cov2d Total_Cloud_Cover -
71 105 3006 totcc_a Total_Cloud_Cover -
73 105 0 lowcc_i Low_Cloud_Cover -
73 105 3006 lowcc_a Low_Cloud_Cover -
74 105 0 medcc_i Medium_Cloud_Cover -
74 105 3006 medcc_a Medium_Cloud_Cover -
75 105 0 highcc_i High_Cloud_Cover -
75 105 3006 highcc_a High_Cloud_Cover -
76 105 0 cw_0 Cloud_Water kg_m^{-2}
76 105 3006 cw Cloud_Water kg_m^{-2}
78 105 4006 snowconvprc Convective_Snow_Precipitation mm_(output_int)^{-1}
79 105 4006 snowlsprc Large_Scale_Snow_Precipitation mm_(output_int)^{-1}
81 105 0 land Land_Sea_Mask -
83 105 0 z0 Surface_Roughness m
86 105 0 sw_86 Top__Soil_Moisture_Content m
86 105 999 swd_86 Deep_Soil_Moist_(noramlized_to_top_layer_depth) m
90 105 4006 runoff Water_run-off mm_(output_int)^{-1}
111 105 3006 swnetsrf Short_Net_Radiation._Surf W_m^{-2}
112 105 3006 lwnetsrf Long_Net_Radiation._Surf. W_m^{-2}
113 105 3006 swnettoa Short-Wave_Net_Radiation._TOA W_m^{-2}
114 105 3006 lwnettoa Long_Net_Radiation._TOA W_m^{-2}
115 105 3006 lwdwnsrf Downw._Long-Wave_Radiation_Surf. W_m^{-2}
115 105 0 lwdwnsrf_0 Downw._Long-Wave_Radiation_Surf. W_m^{-2}
116 105 3006 swdwnsrf Downw._Short-Wave_Radiation_Surf. W_m^{-2}
116 105 0 swdwnsrf_0 Downw._Short-Wave_Radiation_Surf. W_m^{-2}
117 105 3006 swdwntoa Downw._Short-Wave_Radiation_TOA W_m^{-2}
121 105 11 latfp1 Potential_evap_latfp1 -
121 105 13 latfp3 Potential_evap_latfp3 -
121 105 3006 latf Latent_heat_flux W_m^{-2}
122 105 3006 senf Sensible_heat_flux W_m^{-2}
128 105 3006 momf Momentum_flux N_m^{-2}
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129 105 0 frsn Snow_fraction -
151 105 3006 qu2d vertically_integrated_zonal_moisture_flux kg_m^{-1}_s^{-1}
152 105 3006 qv2d vertically_integrated_meridional_moisture_flux kg_m^{-1}_s^{-1}
153 105 3006 vimfc2d vertically_integrated_moisture_flux_convergence
kg_m^{-2}_s^{-1}
240 105 4006 assh Acc._sunshine_hours hrs_(output_int)^{-1}
241 105 4006 evapintc Evaporation_of_intercepted_water (not_useful)
252 105 1 topls open_land_ground_temperature K
252 105 2 tforc forest_canopy_temperature K
252 105 3 tfors ground_temperature_below_trees K
252 105 4 tsnopl snow_temperature_for_open_land_snow K
252 105 5 tsns first_soil_layer_temp._under_open_land_snow K
252 105 6 woplv water_on_open_land_vegetation m
252 105 7 wforc water_on_forest_canopy m
252 105 8 snopl open_land_snow_(Sn_Water_Eq),_land-value m
252 105 9 snfor forest_snow_(Sn_Water_Eq),_land-value m
252 105 10 wsnopl liquid_water_in_open_land_snow,_land-value m
252 105 11 rhosnopl density_of_open_land_snow kg_m^{-3}
252 105 12 snoplmax snowmax_for_open_land_snow m
252 105 13 snformax snowmax_for_forest_snow m
252 105 14 tice ice_surface_temperature K
252 105 15 tforsn snow_temperature_for_forest_snow K
252 105 16 tforsns first_soil_layer_temp._under_forest_snow K
252 105 17 wforsn liquid_water_in_forest_snow,_land-value m
252 105 18 rhosnfor density_of_forest_snow kg_m^{-3}
252 105 19 topls2 second_layer_open_land_soil_temperature K
252 105 20 topls3 third__layer_open_land_soil_temperature K
252 105 21 topls4 fourth_layer_open_land_soil_temperature K
252 105 22 topls5 fifth__layer_open_land_soil_temperature K
252 105 23 tsns2 second_layer_soil_temp_under_open_land_snow K
252 105 24 tsns3 third__layer_soil_temp_under_open_land_snow K
252 105 25 tsns4 fourth_layer_soil_temp_under_open_land_snow K
252 105 26 tsns5 fifth__layer_soil_temp_under_open_land_snow K
252 105 27 tfors2 second_layer_soil_temperature_below_trees K
252 105 28 tfors3 third__layer_soil_temperature_below_trees K
252 105 29 tfors4 fourth_layer_soil_temperature_below_trees K
252 105 30 tfors5 fifth__layer_soil_temperature_below_trees K
252 105 31 tforsns2 second_layer_soil_temp_under_forest_snow K
252 105 32 tforsns3 third__layer_soil_temp_under_forest_snow K
252 105 33 tforsns4 fourth_layer_soil_temp_under_forest_snow K
252 105 34 tforsns5 fifth__layer_soil_temp_under_forest_snow K
252 105 35 snowcan intercepted_snow_on_forest_canopy m
252 105 36 ticed deep_ice_temperature K
252 105 37 ticesn ice_temperature_under_snow K
252 105 38 ticesnd deep_ice_temperature_under_snow K
252 105 39 tsnice snow_temperature_on_ice K
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252 105 40 snice snow_depth_over_ice_(Sn_Water_Eq) m
252 105 41 swsnice liquid_water_in_snow_over_ice m
252 105 42 rhosnice density_of_snow_over_ice kg_m^{-3}
252 105 43 snmaxice snowmax_for_snow_over_ice m
252 105 44 sw1opl first_layer_open_land_soil_water m
252 105 45 sw1for first_layer_forest_soil_water m
252 105 46 sw2opl second_layer_open_land_soil_water_(normalized) m
252 105 47 sw2for second_layer_forest_soil_water_(normalized) m
252 105 48 sw3opl third_layer_open_land_soil_water_(normalized) m
252 105 49 sw3for third_layer_forest_soil_water_(normalized) m
250 105 1 t2m_i grid_averaged_T2m K
250 105 2 t2ml_i land_averaged_T2m K
250 105 3 t2mopsn_i open_land_and_snow_averaged_T2m K
250 105 4 t2mfor_i forest_(bare_soil_and_snow)_T2m K
250 105 5 t2ms_i lake_and/or_sea_water_T2m K
250 105 6 t2mi_i lake_and/or_sea_ice_and_snow_averaged_T2m K
250 105 7 q2m_i grid_averaged_q2m kg_kg^{-1}
250 105 8 q2ml_i land_averaged_q2m kg_kg^{-1}
250 105 9 q2mopsn_i open_land_and_snow_averaged_q2m kg_kg^{-1}
250 105 10 q2mfor_i forest_(bare_soil_and_snow)_q2m kg_kg^{-1}
250 105 11 q2ms_i lake_and/or_sea_water_q2m kg_kg^{-1}
250 105 12 q2mi_i lake_and/or_sea_ice_and_snow_averaged_q2m kg_kg^{-1}
250 105 13 u10_i grid_averaged_u10 m_s^{-1}
250 105 14 u10l_i land_averaged_u10 m_s^{-1}
250 105 15 u10opsn_i open_land_and_snow_averaged_u10 m_s^{-1}
250 105 16 u10for_i forest_(bare_soil_and_snow)_u10 m_s^{-1}
250 105 17 u10ms_i lake_and/or_sea_water_u10 m_s^{-1}
250 105 18 u10mi_i lake_and/or_sea_ice_and_snow_averaged_u10 m_s^{-1}
250 105 19 v10_i grid_averaged_v10 m_s^{-1}
250 105 20 v10l_i land_averaged_v10 m_s^{-1}
250 105 21 v10opsn_i open_land_and_snow_averaged_v10 m_s^{-1}
250 105 22 v10for_i forest_(bare_soil_and_snow)_v10 m_s^{-1}
250 105 23 v10ms_i lake_and/or_sea_water_v10 m_s^{-1}
250 105 24 v10mi_i lake_and/or_sea_ice_and_snow_averaged_v10 m_s^{-1}
250 105 25 senf_i grid_averaged_sensible_heat_flux_(H) W_m^{-2}
250 105 26 senfl_i land_averaged_H W_m^{-2}
250 105 27 senfopsn_i open_land_and_snow_averaged_H W_m^{-2}
250 105 28 senffor_i forest_(bare_soil_and_snow)_H W_m^{-2}
250 105 29 senfs_i lake_and/or_sea_water_H W_m^{-2}
250 105 30 senfi_i lake_and/or_sea_ice_and_snow_averaged_H W_m^{-2}
250 105 31 latf_i grid_averaged_latent_heat_flux_(LE) W_m^{-2}
250 105 32 latfl_i land_averaged_LE W_m^{-2}
250 105 33 latfopsn_i open_land_and_snow_averaged_LE W_m^{-2}
250 105 34 latffor_i forest_(bare_soil_and_snow)_LE W_m^{-2}
250 105 35 latfs_i lake_and/or_sea_water_LE W_m^{-2}
250 105 36 latfi_i lake_and/or_sea_ice_and_snow_averaged_LE W_m^{-2}
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250 105 37 momfu_i grid_averaged_u_momentum_flux_(uw) N_m^{-2}
250 105 38 momful_i land_averaged_uw N_m^{-2}
250 105 39 momfuopsn_i open_land_and_snow_averaged_uw N_m^{-2}
250 105 40 momfufor_i forest_(bare_soil_and_snow)_uw N_m^{-2}
250 105 41 momfus_i lake_and/or_sea_water_uw N_m^{-2}
250 105 42 momfui_i lake_and/or_sea_ice_and_snow_averaged_uw N_m^{-2}
250 105 43 momfv_i grid_averaged_v_momentum_flux_(vw) N_m^{-2}
250 105 44 momfvl_i land_averaged_vw N_m^{-2}
250 105 45 momfvopsn_i open_land_and_snow_averaged_vw N_m^{-2}
250 105 46 momfvfor_i forest_(bare_soil_and_snow)_vw N_m^{-2}
250 105 47 momfvs_i lake_and/or_sea_water_vw N_m^{-2}
250 105 48 momfvi_i lake_and/or_sea_ice_and_snow_averaged_vw N_m^{-2}
250 105 49 momf_i grid_averaged_momentum_flux_(rho*ustar**2) N_m^{-2}
250 105 50 ustar_i grid_averaged_ustar m_s^{-1}
250 105 51 frcw_i fraction_forest_of_fraction_land_(0-1) -
250 105 52 vegopl_i vegetation_cover_for_open_land_(0-1) -
250 105 53 frsn_i fraction_snow_on_open_land_(0-1) -
250 105 54 frsnfor_i fraction_snow_in_forest_(0-1) -
250 105 55 frsnice_i fraction_snow_on_sea_ice_(0-1) -
250 105 56 laiopn_int_i LAI_for_open_land_vegetation -
250 105 57 lai_conif_i LAI_for_coniferous_forest -
250 105 58 lai_decid_i LAI_for_deciduous_forest -
250 105 59 albedo_i grid_averaged_albedo -
250 105 60 albsnowl_i albedo_of_open_land_snow -
250 105 61 albsnice_i albedo_of_sea_ice_snow -
250 105 62 albicenl_i albedo_of_sea/lake_ice -
250 105 63 tseff_i grid_averaged_surface_temperature K
250 105 64 tskin_i grid_averaged_radiation_surface_temp K
250 105 65 tca_i forest_canopy_air_temperature K
250 105 66 evap_i grid_averaged_latf_with_unit mm_timestep^{-1}
250 105 67 latfp1_i potential_evapotranspiration mm_timestep^{-1}
250 105 68 sn_i grid_averaged_snow_water_eq. m
250 105 69 tsopsn1_i open_land/snow_averaged_1_soil_temp K
250 105 70 tsopsn2_i open_land/snow_averaged_2_soil_temp K
250 105 71 tsopsn3_i open_land/snow_averaged_3_soil_temp K
250 105 72 tsopsn4_i open_land/snow_averaged_4_soil_temp K
250 105 73 tsopsn5_i open_land/snow_averaged_5_soil_temp K
250 105 74 tsfor1_i forest_bare_soil/snow_averaged_1_soil_temp K
250 105 75 tsfor2_i forest_bare_soil/snow_averaged_2_soil_temp K
250 105 76 tsfor3_i forest_bare_soil/snow_averaged_3_soil_temp K
250 105 77 tsfor4_i forest_bare_soil/snow_averaged_4_soil_temp K
250 105 78 tsfor5_i forest_bare_soil/snow_averaged_5_soil_temp K
250 105 79 swa_i soil_water_availability -
250 105 80 lwlai_i land-averaged_LAI -
250 105 81 storage_w_i water_storage_terms_(for_water-bal_purpose)
m
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250 105 82 flux_w_i water_flux_terms_(for_water-bal_purpose) m
250 105 83 rh2_i grid_averaged_relative_humidity_2m_(rh2m) -
250 105 84 rh2ml_i land_averaged_rh2m -
250 105 85 rh2mopsn_i open_land_and_snow_averaged_rh2m -
250 105 86 rh2mfor_i forest_(bare_soil_and_snow)_rh2m -
250 105 87 rh2ms_i lake_and/or_sea_water_rh2m -
250 105 88 rh2mi_i lake_and/or_sea_ice_and_snow_averaged_rh2m -
250 105 89 frsngrid_i grid_averaged_snow_cover -
250 105 90 wevopl_i evaporation_from_low_vegetation kg_m^{-2}
250 105 91 cloudbot_i lowest_cloud_level m
250 105 92 gustest_i estimated_gust_wind m_s^{-1}
250 105 93 gustlow_i lower_bound_of_gust_wind m_s^{-1}
250 105 94 gustup_i upper_bound_of_gust_wind m_s^{-1}
250 105 95 tsland1_i land_averaged_1_soil_temp K
250 105 96 tsland2_i land_averaged_2_soil_temp K
250 105 97 tsland3_i land_averaged_3_soil_temp K
250 105 98 tsland4_i land_averaged_4_soil_temp K
250 105 99 tsland5_i land_averaged_5_soil_temp K
250 105 100 tice1_i averaged_tice_and_ticesn_temp K
250 105 101 tice2_i averaged_ticed_and_ticesnd_temp K
250 105 102 mv10_i total_10m_wind_speed_(grid) m_s^{-1}
250 105 103 frdecid_i fraction_decidious_forest -
250 105 104 frfor_i fraction_forest -
250 105 105 fr_rain_hrs_i hours_with_freezing_rain_on_open_land hours
250 105 106 emsnowl_i emissivity_of_snow_on_open_land -
250 105 107 t2mopsnsi_i open_land,_snow,_water_and_ice_averaged_T2m
K
250 105 108 q2mopsnsi_i open_land,_snow,_water_and_ice_averaged_q2m
kg_kg^{-1}
250 105 109 rh2mopsnsi_i open_land,_snow,_water_and_ice_averaged_rh2m
-
250 105 110 u10opsnsi_i open_land,_snow,_water_and_ice_averaged_u10
m_s^{-1}
250 105 111 v10opsnsi_i open_land,_snow,_water_and_ice_averaged_v10
m_s^{-1}
250 105 112 mv10opsnsi_i open_land,_snow,_water_and_ice_averaged_U10
m_s^{-1}
250 105 113 soilwmm_i total_soil_water_content mm
250 105 114 soilfrwmm_i total_soil_frozen_water_content mm
250 105 115 dzsnow_i real_grid_snow_depth m
250 105 116 dzsnowopl_i real_open_land_snow_depth m
250 105 117 dzsnowfor_i real_forest_snow_depth m
250 105 118 dzsnowice_i real_ice_snow_depth m
250 105 119 snowmeltland_i snow_melt_rate_land mm_timestep^{-1}
250 105 120 gustestuc_i uncorrected_estimated_gust_wind m_s^{-1}
242 105 1 t2m_a grid_averaged_T2m K
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242 105 2 t2ml_a land_averaged_T2m K
242 105 3 t2mopsn_a open_land_and_snow_averaged_T2m K
242 105 4 t2mfor_a forest_(bare_soil_and_snow)_T2m K
242 105 5 t2ms_a lake_and/or_sea_water_T2m K
242 105 6 t2mi_a lake_and/or_sea_ice_and_snow_averaged_T2m K
242 105 7 q2m_a grid_averaged_q2m kg_kg^{-1}
242 105 8 q2ml_a land_averaged_q2m kg_kg^{-1}
242 105 9 q2mopsn_a open_land_and_snow_averaged_q2m kg_kg^{-1}
242 105 10 q2mfor_a forest_(bare_soil_and_snow)_q2m kg_kg^{-1}
242 105 11 q2ms_a lake_and/or_sea_water_q2m kg_kg^{-1}
242 105 12 q2mi_a lake_and/or_sea_ice_and_snow_averaged_q2m kg_kg^{-1}
242 105 13 u10_a grid_averaged_u10 m_s^{-1}
242 105 14 u10l_a land_averaged_u10 m_s^{-1}
242 105 15 u10opsn_a open_land_and_snow_averaged_u10 m_s^{-1}
242 105 16 u10for_a forest_(bare_soil_and_snow)_u10 m_s^{-1}
242 105 17 u10ms_a lake_and/or_sea_water_u10 m_s^{-1}
242 105 18 u10mi_a lake_and/or_sea_ice_and_snow_averaged_u10 m_s^{-1}
242 105 19 v10_a grid_averaged_v10 m_s^{-1}
242 105 20 v10l_a land_averaged_v10 m_s^{-1}
242 105 21 v10opsn_a open_land_and_snow_averaged_v10 m_s^{-1}
242 105 22 v10for_a forest_(bare_soil_and_snow)_v10 m_s^{-1}
242 105 23 v10ms_a lake_and/or_sea_water_v10 m_s^{-1}
242 105 24 v10mi_a lake_and/or_sea_ice_and_snow_averaged_v10 m_s^{-1}
242 105 25 senf_a grid_averaged_sensible_heat_flux_(H) W_m^{-2}
242 105 26 senfl_a land_averaged_H W_m^{-2}
242 105 27 senfopsn_a open_land_and_snow_averaged_H W_m^{-2}
242 105 28 senffor_a forest_(bare_soil_and_snow)_H W_m^{-2}
242 105 29 senfs_a lake_and/or_sea_water_H W_m^{-2}
242 105 30 senfi_a lake_and/or_sea_ice_and_snow_averaged_H W_m^{-2}
242 105 31 latf_a grid_averaged_latent_heat_flux_(LE) W_m^{-2}
242 105 32 latfl_a land_averaged_LE W_m^{-2}
242 105 33 latfopsn_a open_land_and_snow_averaged_LE W_m^{-2}
242 105 34 latffor_a forest_(bare_soil_and_snow)_LE W_m^{-2}
242 105 35 latfs_a lake_and/or_sea_water_LE W_m^{-2}
242 105 36 latfi_a lake_and/or_sea_ice_and_snow_averaged_LE W_m^{-2}
242 105 37 momfu_a grid_averaged_u_momentum_flux_(uw) N_m^{-2}
242 105 38 momful_a land_averaged_uw N_m^{-2}
242 105 39 momfuopsn_a open_land_and_snow_averaged_uw N_m^{-2}
242 105 40 momfufor_a forest_(barer_soil_and_snow)_uw N_m^{-2}
242 105 41 momfus_a lake_and/or_sea_water_uw N_m^{-2}
242 105 42 momfui_a lake_and/or_sea_ice_and_snow_averaged_uw N_m^{-2}
242 105 43 momfv_a grid_averaged_v_momentum_flux_(vw) N_m^{-2}
242 105 44 momfvl_a land_averaged_vw N_m^{-2}
242 105 45 momfvopsn_a open_land_and_snow_averaged_vw N_m^{-2}
242 105 46 momfvfor_a forest_(bare_soil_and_snow)_vw N_m^{-2}
242 105 47 momfvs_a lake_and/or_sea_water_vw N_m^{-2}
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242 105 48 momfvi_a lake_and/or_sea_ice_and_snow_averaged_vw N_m^{-2}
242 105 49 momf_a grid_averaged_momentum_flux_(rho*ustar**2) N_m^{-2}
242 105 50 ustar_a grid_averaged_ustar m_s^{-1}
242 105 51 frcw_a fraction_forest_of_fraction_land_(0-1) -
242 105 52 vegopl_a vegetation_cover_for_open_land_(0-1) -
242 105 53 frsn_a fraction_snow_on_open_land_(0-1) -
242 105 54 frsnfor_a fraction_snow_in_forest_(0-1) -
242 105 55 frsnice_a fraction_snow_on_sea_ice_(0-1) -
242 105 56 laiopn_int_a LAI_for_open_land_vegetation -
242 105 57 lai_conif_a LAI_for_coniferous_forest -
242 105 58 lai_decid_a LAI_for_deciduous_forest -
242 105 59 albedo_a grid_averaged_albedo -
242 105 60 albsnowl_a albedo_of_open_land_snow -
242 105 61 albsnice_a albedo_of_sea_ice_snow -
242 105 62 albicenl_a albedo_of_sea/lake_ice -
242 105 63 tseff_a grid_averaged_surface_temperature K
242 105 64 tskin_a grid_averaged_radiation_surface_temp K
242 105 65 tca_a forest_canopy_air_temperature K
242 105 66 evap_a grid_averaged_latf_with_unit mm_timestep^{-1}
242 105 67 latfp1_a potential_evapotranspiration mm_timestep^{-1}
242 105 68 sn_a grid_averaged_snow_water_eq. m
242 105 69 tsopsn1_a open_land/snow_averaged_1_soil_temp K
242 105 70 tsopsn2_a open_land/snow_averaged_2_soil_temp K
242 105 71 tsopsn3_a open_land/snow_averaged_3_soil_temp K
242 105 72 tsopsn4_a open_land/snow_averaged_4_soil_temp K
242 105 73 tsopsn5_a open_land/snow_averaged_5_soil_temp K
242 105 74 tsfor1_a forest_bare_soil/snow_averaged_1_soil_temp K
242 105 75 tsfor2_a forest_bare_soil/snow_averaged_2_soil_temp K
242 105 76 tsfor3_a forest_bare-soil/snow_averaged_3_soil_temp K
242 105 77 tsfor4_a forest_bare_soil/snow_averaged_4_soil_temp K
242 105 78 tsfor5_a forest_bare_soil/snow_averaged_5_soil_temp K
242 105 79 swa_a soil_water_availability -
242 105 80 lwlai_a land-averaged_LAI -
242 105 81 storage_w_a water_storage_terms_(for_water-bal_purpose)
m
242 105 82 flux_w_a water_flux_terms_(for_water-bal_purpose) m
242 105 83 rh2_a grid_averaged_relative_humidity_2m_(rh2m) -
242 105 84 rh2ml_a land_averaged_rh2m -
242 105 85 rh2mopsn_a open_land_and_snow_averaged_rh2m -
242 105 86 rh2mfor_a forest_(bare_soil_and_snow)_rh2m -
242 105 87 rh2ms_a lake_and/or_sea_water_rh2m -
242 105 88 rh2mi_a lake_and/or_sea_ice_and_snow_averaged_rh2m -
242 105 89 frsngrid_a grid_averaged_snow_cover -
242 105 90 wevopl_a evaporation_from_low_vegetation kg_m^{-2}
242 105 91 cloudbot_a lowest_cloud_level m
242 105 92 gustest_a estimated_gust_wind m_s^{-1}
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242 105 93 gustlow_a lower_bound_of_gust_wind m_s^{-1}
242 105 94 gustup_a upper_bound_of_gust_wind m_s^{-1}
242 105 95 tsland1_a land_averaged_1_soil_temp K
242 105 96 tsland2_a land_averaged_2_soil_temp K
242 105 97 tsland3_a land_averaged_3_soil_temp K
242 105 98 tsland4_a land_averaged_4_soil_temp K
242 105 99 tsland5_a land_averaged_5_soil_temp K
242 105 100 tice1_a averaged_tice_and_ticesn_temp K
242 105 101 tice2_a averaged_ticed_and_ticesnd_temp K
242 105 102 mv10_a total_10m_wind_speed_(grid) m_s^{-1}
242 105 103 frdecid_a fraction_decidious_forest -
242 105 104 frfor_a fraction_forest -
242 105 105 fr_rain_hrs_a hours_with_freezing_rain_on_open_land hours
242 105 106 emsnowl_a emissivity_of_snow_on_open_land -
242 105 107 t2mopsnsi_a open_land,_snow,_water_and_ice_averaged_T2m
K
242 105 108 q2mopsnsi_a open_land,_snow,_water_and_ice_averaged_q2m
kg_kg^{-1}
242 105 109 rh2mopsnsi_a open_land,_snow,_water_and_ice_averaged_rh2m
-
242 105 110 u10opsnsi_a open_land,_snow,_water_and_ice_averaged_u10
m_s^{-1}
242 105 111 v10opsnsi_a open_land,_snow,_water_and_ice_averaged_v10
m_s^{-1}
242 105 112 mv10opsnsi_a open_land,_snow,_water_and_ice_averaged_U10
m_s^{-1}
242 105 113 soilwmm_a total_soil_water_content mm
242 105 114 soilfrwmm_a total_soil_frozen_water_content mm
242 105 115 dzsnow_a real_grid_snow_depth m
242 105 116 dzsnowopl_a real_open_land_snow_depth m
242 105 117 dzsnowfor_a real_forest_snow_depth m
242 105 118 dzsnowice_a real_ice_snow_depth m
242 105 119 snowmeltland_a snow_melt_rate_land mm_timestep^{-1}
242 105 120 gustestuc_a uncorrected_estimated_gust_wind m_s^{-1}
245 105 1 t2m_c grid_averaged_T2m K
245 105 2 t2ml_c land_averaged_T2m K
245 105 3 t2mopsn_c open_land_and_snow_averaged_T2m K
245 105 4 t2mfor_c forest_(bare_soil_and_snow)_T2m K
245 105 5 t2ms_c lake_and/or_sea_water_T2m K
245 105 6 t2mi_c lake_and/or_sea_ice_and_snow_averaged_T2m K
245 105 7 q2m_c grid_averaged_q2m kg_kg^{-1}
245 105 8 q2ml_c land_averaged_q2m kg_kg^{-1}
245 105 9 q2mopsn_c open_land_and_snow_averaged_q2m kg_kg^{-1}
245 105 10 q2mfor_c forest_(bare_soil_and_snow)_q2m kg_kg^{-1}
245 105 11 q2ms_c lake_and/or_sea_water_q2m kg_kg^{-1}
245 105 12 q2mi_c lake_and/or_sea_ice_and_snow_averaged_q2m kg_kg^{-1}
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245 105 13 u10_c grid_averaged_u10 m_s^{-1}
245 105 14 u10l_c land_averaged_u10 m_s^{-1}
245 105 15 u10opsn_c open_land_and_snow_averaged_u10 m_s^{-1}
245 105 16 u10for_c forest_(bare_soil_and_snow)_u10 m_s^{-1}
245 105 17 u10ms_c lake_and/or_sea_water_u10 m_s^{-1}
245 105 18 u10mi_c lake_and/or_sea_ice_and_snow_averaged_u10 m_s^{-1}
245 105 19 v10_c grid_averaged_v10 m_s^{-1}
245 105 20 v10l_c land_averaged_v10 m_s^{-1}
245 105 21 v10opsn_c open_land_and_snow_averaged_v10 m_s^{-1}
245 105 22 v10for_c forest_(bare_soil_and_snow)_v10 m_s^{-1}
245 105 23 v10ms_c lake_and/or_sea_water_v10 m_s^{-1}
245 105 24 v10mi_c lake_and/or_sea_ice_and_snow_averaged_v10 m_s^{-1}
245 105 25 senf_c grid_averaged_sensible_heat_flux_(H) W_m^{-2}
245 105 26 senfl_c land_averaged_H W_m^{-2}
245 105 27 senfopsn_c open_land_and_snow_averaged_H W_m^{-2}
245 105 28 senffor_c forest_(bare_soil_and_snow)_H W_m^{-2}
245 105 29 senfs_c lake_and/or_sea_water_H W_m^{-2}
245 105 30 senfi_c lake_and/or_sea_ice_and_snow_averaged_H W_m^{-2}
245 105 31 latf_c grid_averaged_latent_heat_flux_(LE) W_m^{-2}
245 105 32 latfl_c land_averaged_LE W_m^{-2}
245 105 33 latfopsn_c open_land_and_snow_averaged_LE W_m^{-2}
245 105 34 latffor_c forest_(bare_soil_and_snow)_LE W_m^{-2}
245 105 35 latfs_c lake_and/or_sea_water_LE W_m^{-2}
245 105 36 latfi_c lake_and/or_sea_ice_and_snow_averaged_LE W_m^{-2}
245 105 37 momfu_c grid_averaged_u_momentum_flux_(uw) N_m^{-2}
245 105 38 momful_c land_averaged_uw N_m^{-2}
245 105 39 momfuopsn_c open_land_and_snow_averaged_uw N_m^{-2}
245 105 40 momfufor_c forest_(barer_soil_and_snow)_uw N_m^{-2}
245 105 41 momfus_c lake_and/or_sea_water_uw N_m^{-2}
245 105 42 momfui_c lake_and/or_sea_ice_and_snow_averaged_uw N_m^{-2}
245 105 43 momfv_c grid_averaged_v_momentum_flux_(vw) N_m^{-2}
245 105 44 momfvl_c land_averaged_vw N_m^{-2}
245 105 45 momfvopsn_c open_land_and_snow_averaged_vw N_m^{-2}
245 105 46 momfvfor_c forest_(bare_soil_and_snow)_vw N_m^{-2}
245 105 47 momfvs_c lake_and/or_sea_water_vw N_m^{-2}
245 105 48 momfvi_c lake_and/or_sea_ice_and_snow_averaged_vw N_m^{-2}
245 105 49 momf_c grid_averaged_momentum_flux_(rho*ustar**2) N_m^{-2}
245 105 50 ustar_c grid_averaged_ustar m_s^{-1}
245 105 51 frcw_c fraction_forest_of_fraction_land_(0-1) -
245 105 52 vegopl_c vegetation_cover_for_open_land_(0-1) -
245 105 53 frsn_c fraction_snow_on_open_land_(0-1) -
245 105 54 frsnfor_c fraction_snow_in_forest_(0-1) -
245 105 55 frsnice_c fraction_snow_on_sea_ice_(0-1) -
245 105 56 laiopn_int_c LAI_for_open_land_vegetation -
245 105 57 lai_conif_c LAI_for_coniferous_forest -
245 105 58 lai_decid_c LAI_for_deciduous_forest -
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245 105 59 albedo_c grid_averaged_albedo -
245 105 60 albsnowl_c albedo_of_open_land_snow -
245 105 61 albsnice_c albedo_of_sea_ice_snow -
245 105 62 albicenl_c albedo_of_sea/lake_ice -
245 105 63 tseff_c grid_averaged_surface_temperature K
245 105 64 tskin_c grid_averaged_radiation_surface_temp K
245 105 65 tca_c forest_canopy_air_temperature K
245 105 66 evap_c grid_averaged_latf_with_unit mm_(output_int)^{-1}
245 105 67 latfp1_c potential_evapotranspiration mm_(output_int)^{-1}
245 105 68 sn_c grid_averaged_snow_water_eq. m
245 105 69 tsopsn1_c open_land/snow_averaged_1_soil_temp K
245 105 70 tsopsn2_c open_land/snow_averaged_2_soil_temp K
245 105 71 tsopsn3_c open_land/snow_averaged_3_soil_temp K
245 105 72 tsopsn4_c open_land/snow_averaged_4_soil_temp K
245 105 73 tsopsn5_c open_land/snow_averaged_5_soil_temp K
245 105 74 tsfor1_c forest_bare_soil/snow_averaged_1_soil_temp K
245 105 75 tsfor2_c forest_bare_soil/snow_averaged_2_soil_temp K
245 105 76 tsfor3_c forest_bare-soil/snow_averaged_3_soil_temp K
245 105 77 tsfor4_c forest_bare_soil/snow_averaged_4_soil_temp K
245 105 78 tsfor5_c forest_bare_soil/snow_averaged_5_soil_temp K
245 105 79 swa_c soil_water_availability -
245 105 80 lwlai_c land-averaged_LAI -
245 105 81 storage_w_c water_storage_terms_(for_water-bal_purpose)
m
245 105 82 flux_w_c water_flux_terms_(for_water-bal_purpose) m
245 105 83 rh2_c grid_averaged_relative_humidity_2m_(rh2m) -
245 105 84 rh2ml_c land_averaged_rh2m -
245 105 85 rh2mopsn_c open_land_and_snow_averaged_rh2m -
245 105 86 rh2mfor_c forest_(bare_soil_and_snow)_rh2m -
245 105 87 rh2ms_c lake_and/or_sea_water_rh2m -
245 105 88 rh2mi_c lake_and/or_sea_ice_and_snow_averaged_rh2m -
245 105 89 frsngrid_c grid_averaged_snow_cover -
245 105 90 wevopl_c evaporation_from_low_vegetation kg_m^{-2}
245 105 91 cloudbot_c lowest_cloud_level m
245 105 92 gustest_c estimated_gust_wind m_s^{-1}
245 105 93 gustlow_c lower_bound_of_gust_wind m_s^{-1}
245 105 94 gustup_c upper_bound_of_gust_wind m_s^{-1}
245 105 95 tsland1_c land_averaged_1_soil_temp K
245 105 96 tsland2_c land_averaged_2_soil_temp K
245 105 97 tsland3_c land_averaged_3_soil_temp K
245 105 98 tsland4_c land_averaged_4_soil_temp K
245 105 99 tsland5_c land_averaged_5_soil_temp K
245 105 100 tice1_c averaged_tice_and_ticesn_temp K
245 105 101 tice2_c averaged_ticed_and_ticesnd_temp K
245 105 102 mv10_c total_10m_wind_speed_(grid) m_s^{-1}
245 105 103 frdecid_c fraction_decidious_forest -
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245 105 104 frfor_c fraction_forest -
245 105 105 fr_rain_hrs_c hours_with_freezing_rain_on_open_land hours
245 105 106 emsnowl_c emissivity_of_snow_on_open_land -
245 105 107 t2mopsnsi_c open_land,_snow,_water_and_ice_averaged_T2m
K
245 105 108 q2mopsnsi_c open_land,_snow,_water_and_ice_averaged_q2m
kg_kg^{-1}
245 105 109 rh2mopsnsi_c open_land,_snow,_water_and_ice_averaged_rh2m
-
245 105 110 u10opsnsi_c open_land,_snow,_water_and_ice_averaged_u10
m_s^{-1}
245 105 111 v10opsnsi_c open_land,_snow,_water_and_ice_averaged_v10
m_s^{-1}
245 105 112 mv10opsnsi_c open_land,_snow,_water_and_ice_averaged_U10
m_s^{-1}
245 105 113 soilwmm_c total_soil_water_content mm
245 105 114 soilfrwmm_c total_soil_frozen_water_content mm
245 105 115 dzsnow_c real_grid_snow_depth m
245 105 116 dzsnowopl_c real_open_land_snow_depth m
245 105 117 dzsnowfor_c real_forest_snow_depth m
245 105 118 dzsnowice_c real_ice_snow_depth m
245 105 119 snowmeltland_c snow_melt_rate_land mm_(output_int)^{-1}
245 105 120 gustestuc_c uncorrected_estimated_gust_wind m_s^{-1}
241 105 1 t2opsnmax max_of_open_land_and_snow_averaged_T2m K
241 105 2 t2opsnmin min_of_open_land_and_snow_averaged_T2m K
241 105 3 t2msmax max_of_lake_and/or_sea_water_T2m K
241 105 4 t2msmin min_of_lake_and/or_sea_water_T2m K
241 105 5 t2mimax max_of_lake_and/or_sea_ice_and_snow_aver._T2m K
241 105 6 t2mimin min_of_lake_and/or_sea_ice_and_snow_aver._T2m K
241 105 7 toplsmax max_of_open_land_ground_temperature K
241 105 8 toplsmin min_of_open_land_ground_temperature K
241 105 9 tforcmax max_of_forest_canopy_temperature K
241 105 10 tforcmin min_of_forest_canopy_temperature K
241 105 11 tforsmax max_of_ground_temperature_below_trees K
241 105 12 tforsmin min_of_ground_temperature_below_trees K
241 105 13 U10mopsnmax max_of_open_land_and_snow_averaged_wind_speed
m_s^{-1}
241 105 14 U10msmax max_of_lake_and/or_sea_water_wind_speed m_s^{-1}
241 105 15 U10mimax max_of_lake_and/or_sea_ice_and_snow_aver._wind
m_s^{-1}
241 105 16 tsnoplmax max_of_snow_temperature_for_open_land_snow K
241 105 17 tsnoplmin min_of_snow_temperature_for_open_land_snow K
241 105 18 utot10ms mean_over_output_int._of_tot._wind_over_all_water
m_s^{-1}
241 105 19 rh2max max_of_relative_humidity_2m -
241 105 20 rh2min min_of_relative_humidity_2m -
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241 105 21 gustest max_of_estimated_gust_wind m_s^{-1}
241 105 22 gustlow max_of_lower_bound_of_gust_wind m_s^{-1}
241 105 23 gustup max_of_upper_bound_of_gust_wind m_s^{-1}
241 105 24 t2opsnsimax max_of_open_land,_snow,_water_and_ice_averaged_T2m
K
241 105 25 t2opsnsimin min_of_open_land,_snow,_water_and_ice_averaged_T2m
K
241 105 26 U10mopsnsimax max_of_open_land,_snow,_water_and_ice_averaged_U10
m_s^{-1}
241 105 27 gustestuc max_of_uncorrected_estimated_gust_wind m_s^{-1}
243 105 1 tLakeSfc lake_surf_temp_incl._ice_and_snow K
243 105 2 tLakeSnow temperature_of_snow_over_the_lake_ice K
243 105 3 tLakeIce temperature_of_lake_ice K
243 105 4 tLakeMean mean_water_lake_temperature K
243 105 5 tLakeML mixed_layer_lake_temperature K
243 105 6 tLakeBot lake_bottom_temperature K
243 105 7 CTLake chape-factor -
243 105 8 SnDepthLake snow_depth_over_lake_ice m
243 105 9 IceDepthLake lake_ice_depth m
243 105 10 MLDepth mixed_layer_depth m
243 105 11 T_B1Lake temp_of_the_extremum_on_bottom_sediments K
243 105 12 H_B1Lake depth_of_the_bottom_sediments_temp_extremum m
243 105 13 tLakeSfc_m lake_surf_temp_incl._ice_and_snow K
243 105 14 tLakeSnow_m temperature_of_snow_over_the_lake_ice K
243 105 15 tLakeIce_m temperature_of_lake_ice K
243 105 16 tLakeMean_m mean_water_lake_temperature K
243 105 17 tLakeML_m mixed_layer_lake_temperature K
243 105 18 tLakeBot_m lake_bottom_temperature K
243 105 19 CTLake_m chape-factor -
243 105 20 SnDepthLake_m snow_depth_over_lake_ice m
243 105 21 IceDepthLake_m lake_ice_depth m
243 105 22 MLDepth_m mixed_layer_depth m
243 105 23 T_B1Lake_m temp_of_the_extremum_on_bottom_sediments K
243 105 24 H_B1Lake_m depth_of_the_bottom_sediments_temp_extremum m
243 105 25 tLakeSfc_s lake_surf_temp_incl._ice_and_snow K
243 105 26 tLakeSnow_s temperature_of_snow_over_the_lake_ice K
243 105 27 tLakeIce_s temperature_of_lake_ice K
243 105 28 tLakeMean_s mean_water_lake_temperature K
243 105 29 tLakeML_s mixed_layer_lake_temperature K
243 105 30 tLakeBot_s lake_bottom_temperature K
243 105 31 CTLake_s chape-factor -
243 105 32 SnDepthLake_s snow_depth_over_lake_ice m
243 105 33 IceDepthLake_s lake_ice_depth m
243 105 34 MLDepth_s mixed_layer_depth m
243 105 35 T_B1Lake_s temp_of_the_extremum_on_bottom_sediments K
243 105 36 H_B1Lake_s depth_of_the_bottom_sediments_temp_extremum m
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244 105 1 z0Lake lake_surface_roughness m
244 105 2 t2mLake T2m_over_lake_(with/without_ice) K
244 105 3 q2mLake q2m_over_lake_(with/without_ice) kg_kg^{-1}
244 105 4 u10Lake u10_over_lake_(with/without_ice) m_s^{-1}
244 105 5 v10Lake v10_over_lake_(with/without_ice) m_s^{-1}
244 105 6 momfuLake u_momentum_flux_over_lake_(with/without_ice) N_m^{-2}
244 105 7 momfvLake v_momentum_flux_over_lake_(with/without_ice) N_m^{-2}
244 105 8 senfLake sensible_heat_flux_(with/without_ice) W_m^{-2}
244 105 9 latfLake latent_heat_flux_(with/without_ice) W_m^{-2}
244 105 10 sswrLake surf_net_SW_radiation_(with/without_ice) W_m^{-2}
244 105 11 slwrLake surf_net_LW_radiation_(with/without_ice) W_m^{-2}
244 105 12 ustarLake friction_velocity_for_lake_(with/without_ice)
m_s^{-1}
244 105 13 rh2mLake rh2m_over_lake_(with/without_ice) -
244 105 14 frLake frac_Lake -
244 105 15 depthLake depth_Lake m
244 105 16 z0Lake_m lake_surface_roughness m
244 105 17 t2mLake_m T2m_over_lake_(with/without_ice) K
244 105 18 q2mLake_m q2m_over_lake_(with/without_ice) kg_kg^{-1}
244 105 19 u10Lake_m u10_over_lake_(with/without_ice) m_s^{-1}
244 105 20 v10Lake_m v10_over_lake_(with/without_ice) m_s^{-1}
244 105 21 momfuLake_m u_momentum_flux_over_lake_(with/without_ice)
N_m^{-2}
244 105 22 momfvLake_m v_momentum_flux_over_lake_(with/without_ice)
N_m^{-2}
244 105 23 senfLake_m sensible_heat_flux_(with/without_ice) W_m^{-2}
244 105 24 latfLake_m latent_heat_flux_(with/without_ice) W_m^{-2}
244 105 25 sswrLake_m surf_net_SW_radiation_(with/without_ice) W_m^{-2}
244 105 26 slwrLake_m surf_net_LW_radiation_(with/without_ice) W_m^{-2}
244 105 27 ustarLake_m friction_velocity_for_lake_(with/without_ice)
m_s^{-1}
244 105 28 rh2mLake_m rh2m_over_lake_(with/without_ice) -
244 105 29 frLake_m frac_Lake -
244 105 30 depthLake_m depth_Lake m
244 105 31 z0Lake_s lake_surface_roughness m
244 105 32 t2mLake_s T2m_over_lake_(with/without_ice) K
244 105 33 q2mLake_s q2m_over_lake_(with/without_ice) kg_kg^{-1}
244 105 34 u10Lake_s u10_over_lake_(with/without_ice) m_s^{-1}
244 105 35 v10Lake_s v10_over_lake_(with/without_ice) m_s^{-1}
244 105 36 momfuLake_s u_momentum_flux_over_lake_(with/without_ice)
N_m^{-2}
244 105 37 momfvLake_s v_momentum_flux_over_lake_(with/without_ice)
N_m^{-2}
244 105 38 senfLake_s sensible_heat_flux_(with/without_ice) W_m^{-2}
244 105 39 latfLake_s latent_heat_flux_(with/without_ice) W_m^{-2}
244 105 40 sswrLake_s surf_net_SW_radiation_(with/without_ice) W_m^{-2}
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244 105 41 slwrLake_s surf_net_LW_radiation_(with/without_ice) W_m^{-2}
244 105 42 ustarLake_s friction_velocity_for_lake_(with/without_ice)
m_s^{-1}
244 105 43 rh2mLake_s rh2m_over_lake_(with/without_ice) -
244 105 44 frLake_s frac_Lake -
244 105 45 depthLake_s depth_Lake m
247 105 1 snowdays snow_days_per_month days_month^{-1}
247 105 2 frsnow snow_cover_fraction -
246 105 1 lai_t1 LAI_open_land -
246 105 2 lai_t2 LAI_conif_forest -
246 105 3 lai_t3 LAI_broad-leaf_forest -
246 105 4 z0_t1 roughness_length_open_land m
246 105 5 z0_t2 roughness_length_conif_forest m
246 105 6 z0_t3 roughness_length_broad-leaf_forest m
246 105 7 emis_t1 emissivity_open_land -
246 105 8 alb_t1 albedo_open_land -
246 105 9 veg_t1 vegetation_cover_open_land -
246 105 10 frland fraction_land -
246 105 11 alb_soil albedo_of_bare_soil -
246 105 12 clay percentage_of_clay -
246 105 13 sand percentage_of_sand -
246 105 14 frac_t1 fraction_open_land -
246 105 15 frac_t2 fraction_conif_forest -
246 105 16 frac_t3 fraction_broad-leaf_forest -
246 105 17 alb_t2 albedo_conif_forest -
246 105 18 alb_t3 albedo_broad-leaf_forest -
246 105 19 emis_t2 emissivity_conif_forest -
246 105 20 emis_t3 emissivity_broad-leaf_forest -
246 105 21 veg_t2 vegetation_cover_conif_forest -
246 105 22 veg_t3 vegetation_cover_broad-leaf_forest -
246 105 23 droot_t1 root_depth_open_land m
246 105 24 droot_t2 root_depth_conif_forest m
246 105 25 droot_t3 root_depth_broad-leaf_forest m
246 105 26 dsoil_t1 soil_depth_open_land m
246 105 27 dsoil_t2 soil_depth_conif_forest m
246 105 28 dsoil_t3 soil_depth_broad-leaf_forest m
246 105 29 rsmin_t1 minimum_surface_resistance_open_land s_m^{-1}
246 105 30 rsmin_t2 minimum_surface_resistance_conif_forest s_m^{-1}
246 105 31 rsmin_t3 minimum_surface_resistance s_m^{-1}
246 105 32 alb_veg_t1 albedo_vegetation_open_land -
246 105 33 alb_veg_t2 albedo_vegetation_conif_forest -
246 105 34 alb_veg_t3 albedo_vegetation -
246 105 35 texture texture_according_to_texture_triangle -
246 105 36 minlai_t1 annual_min_of_LAI_open_land -
246 105 37 minlai_t2 annual_min_of_LAI_conif_forest -
246 105 38 minlai_t3 annual_min_of_LAI_broad-leaf_forest -
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246 105 39 maxlai_t1 annual_max_of_LAI_open_land -
246 105 40 maxlai_t2 annual_max_of_LAI_conif_forest -
246 105 41 maxlai_t3 annual_max_of_LAI_broad-leaf_forest -
246 105 42 frac_lake fraction_of_lake -
246 105 43 soil_carb soil_carbon kg_m^{-2}
246 105 44 frdeeplake fraction_of_deep_lake -
246 105 45 frmedlake fraction_of_medium_lake -
246 105 46 frshalllake fraction_of_shallow_lake -
246 105 47 dptdeeplake depth_of_deep_lake m
246 105 48 dptmedlake depth_of_medium_lake m
246 105 49 dptshalllake depth_of_shallow_lake m
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