CDO Reference Card

Climate Data Operators
Version 1.9.0
August 2017

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https://code.zmaw.de/projects/cdo

Syntax

cdo [Options] **Operator1** [–**Operator2** [–**OperatorN**]]

Options

-a	Generate an absolute time axis
-b <*nbits*>	Set the number of bits for the output precision (I8/I16/I32/F32/F64 for nc1,nc2,nc4,nc4c; F32/F64 for grb2,srv,ext,ieg; 1-24 for grb1,grb2) Add L or B for Little or Big endian byteorder
-f <*format*>	Outputformat: grb1,grb2,nc1,nc2,nc4,nc4c,srv,ext,ie
-g <*grid*>	Grid or file name Grid names: `r<NX>x<NY>`, `n<N>`, `gme<NI>`
-h	Help information for the operators
-M	Indicate that the I/O streams have missing values
-m <*missval*>	Set the default missing value (default: `-9e+33`)
-O	Overwrite existing output file, if checked
-R	Convert GRIB1 data from reduced to regular grid
-r	Generate a relative time axis
-s	Silent mode
-t <*table*>	Set the parameter table name or file Predefined tables: echam4 echam5 mpiom1
-V	Print the version number
-v	Print extra details for some operators
-z szip	SZIP compression of GRIB1 records

Operators

Information

info	Dataset information listed by parameter identifier
infon	Dataset information listed by parameter name
map	Dataset information and simple map
<*operator*> `infiles`	

sinfo	Short information listed by parameter identifier
sinfon	Short information listed by parameter name
<*operator*> `infiles`	

diff	Compare two datasets listed by parameter id
diffn	Compare two datasets listed by parameter name
<*operator*> `infile1 infile2`	

npar	Number of parameters
nlevel	Number of levels
nyear	Number of years
nmon	Number of months
ndate	Number of dates
ntime	Number of timesteps
ngridpoints	Number of gridpoints
ngrids	Number of horizontal grids
<*operator*> `infile`	

showformat	Show file format
showcode	Show code numbers
showname	Show variable names
showstdname	Show standard names
showlevel	Show levels
showltype	Show GRIB level types
showyear	Show years
showmon	Show months
showdate	Show date information
showtime	Show time information
showtimestam	Show timestamp
<*operator*> `infile`	

partab	Parameter table
codetab	Parameter code table
griddes	Grid description
zaxisdes	Z-axis description
vct	Vertical coordinate table
<*operator*> `infile`	

File operations

copy	Copy datasets
cat	Concatenate datasets
<*operator*> `infiles outfile`	

replace	Replace variables
replace `infile1 infile2 outfile`	

duplicate	Duplicates a dataset
duplicate[,*ndup*] `infile outfile`	

mergegrid	Merge grid
mergegrid `infile1 infile2 outfile`	

merge	Merge datasets with different fields
mergetime	Merge datasets sorted by date and time
<*operator*> `infiles outfile`	

splitcode	Split code numbers
splitparam	Split parameter identifiers
splitname	Split variable names
splitlevel	Split levels
splitgrid	Split grids
splitzaxis	Split z-axes
splittabnum	Split parameter table numbers
<*operator*>[,*params*] `infile obase`	

splithour	Split hours
splitday	Split days
splitseas	Split seasons
splityear	Split years
splityearmon	Split in years and months
<*operator*> `infile obase`	
splitmon	Split months
splitmon[,*format*] `infile obase`	

splitsel	Split time selection
splitsel,*nsets*[,*noffset*[,*nskip*]] `infile obase`	

distgrid	Distribute horizontal grid
distgrid,*nx*[,*ny*] `infile obase`	

collgrid	Collect horizontal grid
collgrid[,*nx*[,*names*]] `infiles outfile`	

Selection

select	Select fields
delete	Delete fields
<*operator*>,*params* `infiles outfile`	

selmulti	Select multiple fields
delmulti	Delete multiple fields
changemulti	Change identication of multiple fields
<*operator*>,*selection-specification* `infile outfile`	

selparam	Select parameters by identifier
delparam	Delete parameters by identifier
<*operator*>,*params* `infile outfile`	
selcode	Select parameters by code number
delcode	Delete parameters by code number
<*operator*>,*codes* `infile outfile`	
selname	Select parameters by name
delname	Delete parameters by name
<*operator*>,*names* `infile outfile`	
selstdname	Select parameters by standard name
selstdname,*stdnames* `infile outfile`	
sellevel	Select levels
sellevel,*levels* `infile outfile`	
sellevidx	Select levels by index
sellevidx,*levidx* `infile outfile`	
selgrid	Select grids
selgrid,*grids* `infile outfile`	
selzaxis	Select z-axes
selzaxis,*zaxes* `infile outfile`	
selzaxisname	Select z-axes by name
selzaxisname,*zaxisnames* `infile outfile`	
selltype	Select GRIB level types
selltype,*ltypes* `infile outfile`	
seltabnum	Select parameter table numbers
seltabnum,*tabnums* `infile outfile`	

seltimestep	Select timesteps
seltimestep,*timesteps* `infile outfile`	
seltime	Select times
seltime,*times* `infile outfile`	
selhour	Select hours
selhour,*hours* `infile outfile`	
selday	Select days
selday,*days* `infile outfile`	
selmonth	Select months
selmonth,*months* `infile outfile`	
selyear	Select years
selyear,*years* `infile outfile`	
selseason	Select seasons
selseason,*seasons* `infile outfile`	
seldate	Select dates
seldate,*date1*[,*date2*] `infile outfile`	
selsmon	Select single month
selsmon,*month*[,*nts1*[,*nts2*]] `infile outfile`	

sellonlatbox	Select a longitude/latitude box
sellonlatbox,*lon1*,*lon2*,*lat1*,*lat2* `infile outfile`	
selindexbox	Select an index box
selindexbox,*idx1*,*idx2*,*idy1*,*idy2* `infile outfile`	

selgridcell	Select grid cells
delgridcell	Delete grid cells
<*operator*>,*indexes* `infile outfile`	

samplegrid	Resample grid
samplegrid,*factor* `infile outfile`	

Conditional selection

ifthen	If then
ifnotthen	If not then
<*operator*> `infile1 infile2 outfile`	

ifthenelse	If then else
ifthenelse `infile1 infile2 infile3 outfile`	

ifthenc	If then constant
ifnotthenc	If not then constant
<*operator*>,*c* `infile outfile`	

reducegrid	Reduce input file variables to locations, where mask
reducegrid,*mask*[,*limitCoordsOutput*] `infile outfile`	

Comparison

eq	Equal
ne	Not equal
le	Less equal
lt	Less than
ge	Greater equal
gt	Greater than
<*operator*> `infile1 infile2 outfile`	

eqc	Equal constant
nec	Not equal constant
lec	Less equal constant
ltc	Less than constant
gec	Greater equal constant
gtc	Greater than constant
<*operator*>,*c* `infile outfile`	

Modification

setattribute	Set attributes
setattribute,*attributes* `infile outfile`	

setpartabp	Set parameter table
setpartabn	Set parameter table
<*operator*>,*table*[,*convert*] `infile outfile`	

setcodetab	Set parameter code table
setcodetab,*table* `infile outfile`	
setcode	Set code number
setcode,*code* `infile outfile`	
setparam	Set parameter identifier
setparam,*param* `infile outfile`	
setname	Set variable name
setname,*name* `infile outfile`	
setunit	Set variable unit
setunit,*unit* `infile outfile`	
setlevel	Set level
setlevel,*level* `infile outfile`	
setltype	Set GRIB level type
setltype,*ltype* `infile outfile`	

setdate	Set date
setdate,*date* `infile outfile`	
settime	Set time of the day
settime,*time* `infile outfile`	
setday	Set day
setday,*day* `infile outfile`	
setmon	Set month
setmon,*month* `infile outfile`	
setyear	Set year
setyear,*year* `infile outfile`	
settunits	Set time units
settunits,*units* `infile outfile`	
settaxis	Set time axis
settaxis,*date*,*time*[,*inc*] `infile outfile`	
settbounds	Set time bounds
settbounds,*frequency* `infile outfile`	
setreftime	Set reference time
setreftime,*date*,*time*[,*units*] `infile outfile`	
setcalendar	Set calendar
setcalendar,*calendar* `infile outfile`	
shifttime	Shift timesteps
shifttime,*sval* `infile outfile`	

chcode	Change code number
chcode,*oldcode,newcode[,...]* `infile outfile`	
chparam	Change parameter identifier
chparam,*oldparam,newparam,...* `infile outfile`	
chname	Change variable name
chname,*oldname,newname,...* `infile outfile`	
chunit	Change variable unit
chunit,*oldunit,newunit,...* `infile outfile`	
chlevel	Change level
chlevel,*oldlev,newlev,...* `infile outfile`	
chlevelc	Change level of one code
chlevelc,*code,oldlev,newlev* `infile outfile`	
chlevelv	Change level of one variable
chlevelv,*name,oldlev,newlev* `infile outfile`	

setgrid	Set grid
setgrid,*grid* `infile outfile`	
setgridtype	Set grid type
setgridtype,*gridtype* `infile outfile`	
setgridarea	Set grid cell area
setgridarea,*gridarea* `infile outfile`	

setzaxis	Set z-axis
setzaxis,*zaxis* `infile outfile`	
genlevelbound	Generate level bounds
genlevelbounds*[,zbot[,ztop]]* `infile outfile`	

invertlat	Invert latitudes
invertlat `infile outfile`	

invertlev	Invert levels
invertlev `infile outfile`	

shiftx	Shift x
shifty	Shift y
<operator>,*¡nshift¿*,*¡cyclic¿*,*¡coord¿* `infile outfile`	

maskregion	Mask regions
maskregion,*regions* `infile outfile`	

masklonlatbox	Mask a longitude/latitude box
masklonlatbox,*lon1,lon2,lat1,lat2* `infile outfile`	
maskindexbox	Mask an index box
maskindexbox,*idx1,idx2,idy1,idy2* `infile outfile`	

setclonlatbox	Set a longitude/latitude box to constant
setclonlatbox,*c,lon1,lon2,lat1,lat2* `infile outfile`	
setcindexbox	Set an index box to constant
setcindexbox,*c,idx1,idx2,idy1,idy2* `infile outfile`	

enlarge	Enlarge fields
enlarge,*grid* `infile outfile`	

setmissval	Set a new missing value
setmissval,*newmiss* `infile outfile`	
setctomiss	Set constant to missing value
setmisstoc	Set missing value to constant
<operator>,*c* `infile outfile`	
setrtomiss	Set range to missing value
setvrange	Set valid range
<operator>,*rmin,rmax* `infile outfile`	
setmisstonn	Set missing value to nearest neighbor
setmisstonn `infile outfile`	
setmisstodis	Set missing value to distance-weighted average
setmisstodis*[,neighbors]* `infile outfile`	

Arithmetic

expr	Evaluate expressions
expr,*instr* `infile outfile`	
exprf	Evaluate expressions script
exprf,*filename* `infile outfile`	
aexpr	Evaluate expressions and append results
aexpr,*instr* `infile outfile`	
aexprf	Evaluate expression script and append results
aexprf,*filename* `infile outfile`	

abs	Absolute value
int	Integer value
nint	Nearest integer value
pow	Power
sqr	Square
sqrt	Square root
exp	Exponential
ln	Natural logarithm
log10	Base 10 logarithm
sin	Sine
cos	Cosine
tan	Tangent
asin	Arc sine
acos	Arc cosine
atan	Arc tangent
reci	Reciprocal value
<operator> `infile outfile`	

addc	Add a constant
subc	Subtract a constant
mulc	Multiply with a constant
divc	Divide by a constant
<operator>,*c* `infile outfile`	

add	Add two fields
sub	Subtract two fields
mul	Multiply two fields
div	Divide two fields
min	Minimum of two fields
max	Maximum of two fields
atan2	Arc tangent of two fields
<operator> `infile1 infile2 outfile`	

monadd	Add monthly time series
monsub	Subtract monthly time series
monmul	Multiply monthly time series
mondiv	Divide monthly time series
<operator> `infile1 infile2 outfile`	

yhouradd	Add multi-year hourly time series
yhoursub	Subtract multi-year hourly time series
yhourmul	Multiply multi-year hourly time series
yhourdiv	Divide multi-year hourly time series
<operator> `infile1 infile2 outfile`	

ydayadd	Add multi-year daily time series
ydaysub	Subtract multi-year daily time series
ydaymul	Multiply multi-year daily time series
ydaydiv	Divide multi-year daily time series
<operator> `infile1 infile2 outfile`	

ymonadd	Add multi-year monthly time series
ymonsub	Subtract multi-year monthly time series
ymonmul	Multiply multi-year monthly time series
ymondiv	Divide multi-year monthly time series
<operator> `infile1 infile2 outfile`	

yseasadd	Add multi-year seasonal time series
yseassub	Subtract multi-year seasonal time series
yseasmul	Multiply multi-year seasonal time series
yseasdiv	Divide multi-year seasonal time series
<operator> `infile1 infile2 outfile`	

muldpm	Multiply with days per month
divdpm	Divide by days per month
muldpy	Multiply with days per year
divdpy	Divide by days per year
<operator> `infile outfile`	

Statistical values

Available statistical functions	*<stat>*
minimum	**min**
maximum	**max**
range	**range**
sum	**sum**
mean	**mean**
average	**avg**
variance	**var, var1**
standard deviation	**std, std1**

timcumsum	Cumulative sum over all timesteps
timcumsum `infile outfile`	

consects	Consecutive Timesteps
<operator> `infile outfile`	

ens*<stat>*	Statistical values over an ensemble
ensrange	Ensemble range
<operator> `infiles outfile`	
enspctl	Ensemble percentiles
enspctl,*p* `infiles outfile`	

ensrkhistspace	Ranked Histogram averaged over time
ensrkhisttime	Ranked Histogram averaged over space
ensroc	Ensemble Receiver Operating characteristics
<operator> `obsfile ensfiles outfile`	

enscrps	Ensemble CRPS and decomposition
enscrps `rfile infiles outfilebase`	
ensbrs	Ensemble Brier score
ensbrs,*x* `rfile infiles outfilebase`	

fld*<stat>*	Statistical values over a field
fldrange	Field range
<operator> `infile outfile`	
fldpctl	Field percentiles
fldpctl,*p* `infile outfile`	

zon*<stat>*	Zonal statistical values
zonrange	Zonal range
<operator> `infile outfile`	
zonpctl	Zonal percentiles
zonpctl,*p* `infile outfile`	

mer*<stat>*	Meridional statistical values
merrange	Meridional range
<operator> `infile outfile`	
merpctl	Meridional percentiles
merpctl,*p* `infile outfile`	

gridbox*<stat>*	Statistical values over grid boxes
gridboxrange	Gridbox range
<operator>,*nx,ny* `infile outfile`	

vert*<stat>*	Vertical statistical values
vertrange	Vertical range
<operator> `infile outfile`	

timsel*<stat>*	Time range statistical values
timselrange	Time selection range
<operator>,*nsets[,noffset[,nskip]]* `infile outfile`	

timselpctl	Time range percentiles
timselpctl,*p,nsets[,noffset[,nskip]]* `infile1 infile2 infile3 outfile`	

run*<stat>*	Running statistical values
runrange	Running range
<operator>,*nts* `infile outfile`	

runpctl	Running percentiles
runpctl,*p,nts* `infile outfile`	

tim*<stat>*	Statistical values over all timesteps
timrange	Time range
<operator> `infile outfile`	

timpctl	Time percentiles
timpctl,*p* `infile1 infile2 infile3 outfile`	

hour*<stat>*	Hourly statistical values
hourrange	Hourly range
<operator> `infile outfile`	

hourpctl	Hourly percentiles
hourpctl,*p* `infile1 infile2 infile3 outfile`	

day*<stat>*	Daily statistical values
dayrange	Daily range
<operator> `infile outfile`	

daypctl	Daily percentiles
daypctl,*p* `infile1 infile2 infile3 outfile`	

mon*<stat>*	Monthly statistical values
monrange	Monthly range
<operator> `infile outfile`	

monpctl	Monthly percentiles
monpctl,*p* `infile1 infile2 infile3 outfile`	

yearmonmean	Yearly mean from monthly data
yearmonmean `infile outfile`	

year*<stat>*	Yearly statistical values
yearrange	Yearly range
<operator> `infile outfile`	

yearpctl	Yearly percentiles
yearpctl,*p* `infile1 infile2 infile3 outfile`	

seas*<stat>*	Seasonal statistical values
seasrange	Seasonal range
<operator> `infile outfile`	

seaspctl	Seasonal percentiles
seaspctl,*p* `infile1 infile2 infile3 outfile`	

yhour*<stat>*	Multi-year hourly statistical values
yhourrange	Multi-year hourly range
<operator> `infile outfile`	

yday*<stat>*	Multi-year daily statistical values
ydayrange	Multi-year daily range
<operator> `infile outfile`	

ydaypctl	Multi-year daily percentiles
ydaypctl,*p* `infile1 infile2 infile3 outfile`	

ymon*<stat>*	Multi-year monthly statistical values
ymonrange	Multi-year monthly range
<operator> `infile outfile`	

ymonpctl	Multi-year monthly percentiles
ymonpctl,*p* `infile1 infile2 infile3 outfile`	

yseas*<stat>*	Multi-year seasonal statistical values
yseasrange	Multi-year seasonal range
<operator> `infile outfile`	

yseaspctl	Multi-year seasonal percentiles
yseaspctl,*p* `infile1 infile2 infile3 outfile`	

ydrun*<stat>*	Multi-year daily running statistical values
<operator>,*nts* `infile outfile`	

ydrunpctl	Multi-year daily running percentiles
ydrunpctl,*p,nts* `infile1 infile2 infile3 outfile`	

Correlation and co.

fldcor	Correlation in grid space
fldcor `infile1 infile2 outfile`	

timcor	Correlation over time
timcor `infile1 infile2 outfile`	

fldcovar	Covariance in grid space
fldcovar `infile1 infile2 outfile`	

timcovar	Covariance over time
timcovar `infile1 infile2 outfile`	

Regression

regres	Regression
regres `infile outfile`	

detrend Detrend
detrend infile outfile

trend Trend
trend infile outfile1 outfile2

subtrend Subtract trend
subtrend infile1 infile2 infile3 outfile

EOFs

eof Calculate EOFs in spatial or time space
eoftime Calculate EOFs in time space
eofspatial Calculate EOFs in spatial space
eof3d Calculate 3-Dimensional EOFs in time space
<*operator*>,*neof* infile outfile1 outfile2

eofcoeff Calculate principal coefficients of EOFs
eofcoeff infile1 infile2 obase

Interpolation

remapbil Bilinear interpolation
genbil Generate bilinear interpolation weights
<*operator*>,*grid* infile outfile

remapbic Bicubic interpolation
genbic Generate bicubic interpolation weights
<*operator*>,*grid* infile outfile

remapnn Nearest neighbor remapping
gennn Generate nearest neighbor remap weights
<*operator*>,*grid* infile outfile

remapdis Distance-weighted average remapping
remapdis,*grid[,neighbors]* infile outfile
gendis Generate distance-weighted average remap weights
gendis,*grid* infile outfile

remapycon First order conservative remapping
genycon Generate 1st order conservative remap weights
<*operator*>,*grid* infile outfile

remapcon First order conservative remapping
gencon Generate 1st order conservative remap weights
<*operator*>,*grid* infile outfile

remapcon2 Second order conservative remapping
gencon2 Generate 2nd order conservative remap weights
<*operator*>,*grid* infile outfile

remaplaf Largest area fraction remapping
genlaf Generate largest area fraction remap weights
<*operator*>,*grid* infile outfile

remap Grid remapping
remap,*grid*,*weights* infile outfile

remapeta Remap vertical hybrid level
remapeta,*vct[,oro]* infile outfile

ml2pl Model to pressure level interpolation
ml2pl,*plevels* infile outfile
ml2hl Model to height level interpolation
ml2hl,*hlevels* infile outfile

ap2pl Air pressure to pressure level interpolation
ap2pl,*plevels* infile outfile
ap2hl Air pressure to height level interpolation
ap2hl,*hlevels* infile outfile

intlevel Linear level interpolation
intlevel,*levels* infile outfile

intlevel3d Linear level interpolation onto a 3d vertical coordina
intlevelx3d like intlevel3d but with extrapolation
<*operator*>,*icoordinate* infile1 infile2 outfile

inttime Interpolation between timesteps
inttime,*date*,*time[,inc]* infile outfile
intntime Interpolation between timesteps
intntime,*n* infile outfile

intyear Interpolation between two years
intyear,*years* infile1 infile2 obase

Transformation

sp2gp Spectral to gridpoint
sp2gpl Spectral to gridpoint (linear)
gp2sp Gridpoint to spectral
gp2spl Gridpoint to spectral (linear)
<*operator*> infile outfile

sp2sp Spectral to spectral
sp2sp,*trunc* infile outfile

dv2uv Divergence and vorticity to U and V wind
dv2uvl Divergence and vorticity to U and V wind (linear)
uv2dv U and V wind to divergence and vorticity
uv2dvl U and V wind to divergence and vorticity (linear)
dv2ps D and V to velocity potential and stream function
<*operator*> infile outfile

Import/Export

import_binary Import binary data sets
import_binary infile outfile

import_cmsaf Import CM-SAF HDF5 files
import_cmsaf infile outfile

import_amsr Import AMSR binary files
import_amsr infile outfile

input ASCII input
input,*grid[,zaxis]* outfile
inputsrv SERVICE ASCII input
inputext EXTRA ASCII input
<*operator*> outfile

output ASCII output
output infiles
outputf Formatted output
outputf,*format[,nelem]* infiles
outputint Integer output
outputsrv SERVICE ASCII output
outputext EXTRA ASCII output
<*operator*> infiles

outputtab Table output
outputtab,*params* infiles outfile

gmtxyz GMT xyz format
gmtcells GMT multiple segment format
<*operator*> infile

Miscellaneous

gradsdes GrADS data descriptor file
gradsdes[,*mapversion*] infile

after ECHAM standard post processor
after[,*vct*] infiles outfile

bandpass Bandpass filtering
bandpass,*fmin*,*fmax* infile outfile
lowpass Lowpass filtering
lowpass,*fmax* infile outfile
highpass Highpass filtering
highpass,*fmin* infile outfile

gridarea Grid cell area
gridweights Grid cell weights
<*operator*> infile outfile

smooth Smooth grid points
smooth[,*options*] infile outfile
smooth9 9 point smoothing
smooth9 infile outfile

setvals Set list of old values to new values
setvals,*oldval*,*newval[,...]* infile outfile
setrtoc Set range to constant
setrtoc,*rmin*,*rmax*,*c* infile outfile
setrtoc2 Set range to constant others to constant2
setrtoc2,*rmin*,*rmax*,*c*,*c2* infile outfile

timsort Sort over the time
timsort infile outfile

const Create a constant field
const,*const*,*grid* outfile
random Create a field with random numbers
random,*grid[,seed]* outfile
topo Create a field with topography
topo[,*grid*] outfile
for Create a time series
for,*start*,*end[,inc]* outfile
stdatm Create values for pressure and temperature for hydrostatic atmosphere
stdatm,*levels* outfile

uvDestag Destaggering of u/v wind components
uvDestag,*u*,*v[,-/+0.5[,-/+0.5]]* infile outfile
rotuvNorth Rotate u/v wind to North pole.
projuvLatLon Cylindrical Equidistant projection
<*operator*>,*u*,*v* infile outfile

rotuvb Backward rotation
rotuvb,*u*,*v*,... infile outfile

mastrfu Mass stream function
mastrfu infile outfile

sealevelpressur Sea level pressure
sealevelpressure infile outfile

adisit Potential temperature to in-situ temperature
adisit[,*pressure*] infile outfile
adipot In-situ temperature to potential temperature
adipot infile outfile

rhopot Calculates potential density
rhopot[,*pressure*] infile outfile

histcount Histogram count
histsum Histogram sum
histmean Histogram mean
histfreq Histogram frequency
<*operator*>,*bounds* infile outfile

sethalo Set the left and right bounds of a field
sethalo,*lhalo*,*rhalo* infile outfile

wct Windchill temperature
wct infile1 infile2 outfile

fdns Frost days where no snow index per time period
fdns infile1 infile2 outfile

strwin Strong wind days index per time period
strwin[,*v*] infile outfile

strbre Strong breeze days index per time period
strbre infile outfile

strgal Strong gale days index per time period
strgal infile outfile

hurr Hurricane days index per time period
hurr infile outfile

cmorlite CMOR lite
cmorlite,*table*[,*convert*] infile outfile