

CDO Reference Card

Climate Data Operators
Version 1.7.2
June 2016

Uwe Schulzweida
Max-Planck-Institute for Meteorology

<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 (18/116/132/F32/F64 for nc,nc2,nc4,nc4c; F32/F64 for grb2,srv,ext,ieg; 1-24 for grb,grb2) Add L or B for Little or Big endian byteorder
-f <format>	Outputformat: grb,grb2,nc,nc2,nc4,nc4c,srv,ext,ieg
-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> ifiles	
sinfo	Short information listed by parameter identifier
sinfon	Short information listed by parameter name
<operator> ifiles	
diff	Compare two datasets listed by parameter id
diffn	Compare two datasets listed by parameter name
<operator> ifile1 ifile2	

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> ifile	

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

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

File operations

copy	Copy datasets
cat	Concatenate datasets
<operator> ifiles ofile	

replace	Replace variables
replace ifile1 ifile2 ofile	

duplicate	Duplicates a dataset
duplicate[.ndup] ifile ofile	

mergegrid	Merge grid
mergegrid ifile1 ifile2 ofile	

merge	Merge datasets with different fields
mergetime	Merge datasets sorted by date and time
<operator> ifiles ofile	

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

splthour	Split hours
spltday	Split days
splitseas	Split seasons
splityear	Split years
splityearmon	Split in years and months
<operator> ifile obase	
splitmon	Split months
splitmon[.format] ifile obase	

spltsel	Split time selection
spltsel,nsets[,noffset[,nskip]] ifile obase	
distgrid	Distribute horizontal grid
distgrid,nx[,ny] ifile obase	

collgrid	Collect horizontal grid
collgrid[,nx[,names]] ifiles ofile	

Selection

select	Select fields
delete	Delete fields
<operator> ,.params ifiles ofile	

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

sel timestep	Select timesteps
sel timestep,timesteps ifile ofile	
seltime	Select times
seltime,times ifile ofile	
selhour	Select hours
selhour,hours ifile ofile	
selday	Select days
selday,days ifile ofile	
selmonth	Select months
selmonth,months ifile ofile	
selyear	Select years
selyear,years ifile ofile	
selseason	Select seasons
selseason,seasons ifile ofile	
seldate	Select dates
seldate,date[,date2] ifile ofile	
selmon	Select single month
selmon,month[,nts1[,nts2]] ifile ofile	

sel lonlatbox	Select a longitude/latitude box
sel lonlatbox,lon1,lat1,lat2 ifile ofile	
sel indexbox	Select an index box
sel indexbox,idx1,idx2,idy1,idy2 ifile ofile	

Conditional selection

ifthen	If then
ifnotthen	If not then
<operator> ifile1 ifile2 ofile	

ifthenelse	If then else
ifthenelse ifile1 ifile2 ifile3 ofile	

ifthenc	If then constant
ifnotthenc	If not then constant
<operator> ,c ifile ofile	

reducegrid	Reduce input file variables to locations, where mask
reducegrid,mask[,limitCoordsOutput] ifile ofile	

Comparison

eq	Equal
ne	Not equal
le	Less equal
lt	Less than
ge	Greater equal
gt	Greater than
<operator> ifile1 ifile2 ofile	

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 ifile ofile	

Modification

setpartabp	Set parameter table
setpartabn	Set parameter table
<operator> ,.table[,convert] ifile ofile	

setcodetab	Set parameter code table
setcodetab,table ifile ofile	
setcode	Set code number
setcode,code ifile ofile	

setparam	Set parameter identifier
setparam,param ifile ofile	

setname	Set variable name
setname,name ifile ofile	
setunit	Set variable unit
setunit,unit ifile ofile	

setlevel	Set level
setlevel,level ifile ofile	
setlvltype	Set GRIB level type
setlvltype,ltype ifile ofile	

setdate	Set date
setdate,date ifile ofile	

settime	Set time of the day
settime,time ifile ofile	

setday	Set day
setday,day ifile ofile	

setmon	Set month
setmon,month ifile ofile	

setyear	Set year
setyear,year ifile ofile	

setunits	Set time units
setunits,units ifile ofile	

settaxis	Set time axis
settaxis,date,time[,inc] ifile ofile	

settbounds	Set time bounds
settbounds,frequency ifile ofile	

setreftime	Set reference time
setreftime,date,time[,units] ifile ofile	

setcalendar	Set calendar
setcalendar,calendar ifile ofile	

shifttime	Shift timesteps
shifttime,sval ifile ofile	

chcode	Change code number
chcode,oldcode,newcode[,...] ifile ofile	

chparam	Change parameter identifier
chparam,oldparam,newparam,... ifile ofile	

chname	Change variable name
chname,oldname,newname,... ifile ofile	

chunit	Change variable unit
chunit,oldunit,newunit,... ifile ofile	

chlevel	Change level
chlevel,oldlev,newlev,... ifile ofile	

chlevelc	Change level of one code
chlevelc,code,oldlev,newlev ifile ofile	

chlevelv	Change level of one variable
chlevelv,name,oldlev,newlev ifile ofile	

setgrid	Set grid
setgrid,grid ifile ofile	
setgridtype	Set grid type
setgridtype,gridtype ifile ofile	
setgridarea	Set grid cell area
setgridarea,gridarea ifile ofile	

setzaxis	Set z-axis
setzaxis,zaxis ifile ofile	
genlevelbound:	Generate level bounds
genlevelbounds[,zbot[,ztop]] ifile ofile	
setgatt	Set global attribute
setgatt,attname,attstring ifile ofile	
setgatts	Set global attributes
setgatts,attfile ifile ofile	
invertlat	Invert latitudes
invertlat ifile ofile	
invertlev	Invert levels
invertlev ifile ofile	
maskregion	Mask regions
maskregion,regions ifile ofile	
masklonlatbox	Mask a longitude/latitude box
masklonlatbox,lon1,lon2,lat1,lat2 ifile ofile	
maskindexbox	Mask an index box
maskindexbox,idx1,idx2,idy1,idy2 ifile ofile	
setclonlatbox	Set a longitude/latitude box to constant
setclonlatbox,c,lon1,lon2,lat1,lat2 ifile ofile	
setcindexbox	Set an index box to constant
setcindexbox,c,idx1,idx2,idy1,idy2 ifile ofile	
enlarge	Enlarge fields
enlarge,grid ifile ofile	
setmissval	Set a new missing value
setmissval,newmiss ifile ofile	
setcomiss	Set constant to missing value
setmisstoc	Set missing value to constant
<operator >,c ifile ofile	
setrtomiss	Set range to missing value
setvrange	Set valid range
<operator >,rmin,rmax ifile ofile	
setmisstonn	Set missing value to nearest neighbor
setmisstonn ifile ofile	
setmisstodis	Set missing value to distance-weighted average
setmisstodis[,neighbors] ifile ofile	

Arithmetic

expr	Evaluate expressions
expr,instr ifile ofile	
exprf	Evaluate expressions script
exprf,filename ifile ofile	
aexpr	Evaluate expressions and append results
aexpr,instr ifile ofile	
aexprf	Evaluate expression script and append results
aexprf,filename ifile ofile	
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 > ifile ofile	
addc	Add a constant
subc	Subtract a constant
mulc	Multiply with a constant
divc	Divide by a constant
<operator >,c ifile ofile	

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 > ifile1 ifile2 ofile	
monadd	Add monthly time series
monsub	Subtract monthly time series
monmul	Multiply monthly time series
mondiv	Divide monthly time series
<operator > ifile1 ifile2 ofile	
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 > ifile1 ifile2 ofile	
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 > ifile1 ifile2 ofile	
ymonadd	Add multi-year monthly time series
ymonsub	Subtract multi-year monthly time series
ymonmul	Multiply multi-year monthly time series
ymonddiv	Divide multi-year monthly time series
<operator > ifile1 ifile2 ofile	
yseasadd	Add multi-year seasonal time series
yseasub	Subtract multi-year seasonal time series
yseasmul	Multiply multi-year seasonal time series
yseasdiv	Divide multi-year seasonal time series
<operator > ifile1 ifile2 ofile	
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 > ifile ofile	

Statistical values

	Available statistical functions	<stat >
	minimum	min
	maximum	max
	sum	sum
	mean	mean
	average	avg
	variance	var, var1
	standard deviation	std, std1
consects	Consecutive Timesteps	
<operator > ifile ofile		
ens<stat >	Statistical values over an ensemble	
<operator > ifiles ofile		
enspctl	Ensemble percentiles	
enspctl,p ifiles ofile		
ensrkhistospace	Ranked Histogram averaged over time	
ensrkhisttime	Ranked Histogram averaged over space	
ensroc	Ensemble Receiver Operating characteristics	
<operator > obsfile ensfiles ofile		
enscrps	Ensemble CRPS and decomposition	
enscrps rfile ifiles ofilebase		
ensbrs	Ensemble Brier score	
ensbrs,x rfile ifiles ofilebase		
fld<stat >	Statistical values over a field	
<operator > ifile ofile		
fldpctl	Field percentiles	
fldpctl,p ifile ofile		

zon<stat >	Zonal statistical values
<operator > ifile ofile	
zonpctl	Zonal percentiles
zonpctl,p ifile ofile	
mer<stat >	Meridional statistical values
<operator > ifile ofile	
merpctl	Meridional percentiles
merpctl,p ifile ofile	
gridbox<stat >	Statistical values over grid boxes
<operator >,nx,ny ifile ofile	
vert<stat >	Vertical statistical values
<operator > ifile ofile	
timsel<stat >	Time range statistical values
<operator >,nsets[,noffset[,nskip]] ifile ofile	
timselfctl	Time range percentiles
timselfctl,p,nsets[,noffset[,nskip]] ifile1 ifile2 ifile3 ofile	
run<stat >	Running statistical values
<operator >,nts ifile ofile	
runpctl	Running percentiles
runpctl,p,nts ifile ofile	
tim<stat >	Statistical values over all timesteps
<operator > ifile ofile	
timpctl	Time percentiles
timpctl,p ifile1 ifile2 ifile3 ofile	
hour<stat >	Hourly statistical values
<operator > ifile ofile	
hourpctl	Hourly percentiles
hourpctl,p ifile1 ifile2 ifile3 ofile	
day<stat >	Daily statistical values
<operator > ifile ofile	
daypctl	Daily percentiles
daypctl,p ifile1 ifile2 ifile3 ofile	
mon<stat >	Monthly statistical values
<operator > ifile ofile	
monpctl	Monthly percentiles
monpctl,p ifile1 ifile2 ifile3 ofile	
yearmonmean	Yearly mean from monthly data
yearmonmean ifile ofile	
year<stat >	Yearly statistical values
<operator > ifile ofile	
yearpctl	Yearly percentiles
yearpctl,p ifile1 ifile2 ifile3 ofile	
seas<stat >	Seasonal statistical values
<operator > ifile ofile	
seaspctl	Seasonal percentiles
seaspctl,p ifile1 ifile2 ifile3 ofile	
yhour<stat >	Multi-year hourly statistical values
<operator > ifile ofile	
yday<stat >	Multi-year daily statistical values
<operator > ifile ofile	
ydaypctl	Multi-year daily percentiles
ydaypctl,p ifile1 ifile2 ifile3 ofile	
ymon<stat >	Multi-year monthly statistical values
<operator > ifile ofile	
ymonpctl	Multi-year monthly percentiles
ymonpctl,p ifile1 ifile2 ifile3 ofile	
yseas<stat >	Multi-year seasonal statistical values
<operator > ifile ofile	
yseaspctl	Multi-year seasonal percentiles
yseaspctl,p ifile1 ifile2 ifile3 ofile	

ydrun<stat >	Multi-year daily running statistical values
<operator >,nts ifile ofile	
ydrunpctl	Multi-year daily running percentiles
ydrunpctl,p,nts ifile1 ifile2 ifile3 ofile	

Correlation and co.

fldcor	Correlation in grid space
fldcor ifile1 ifile2 ofile	
timcor	Correlation over time
timcor ifile1 ifile2 ofile	
fldcovar	Covariance in grid space
fldcovar ifile1 ifile2 ofile	
timcovar	Covariance over time
timcovar ifile1 ifile2 ofile	

Regression

regres	Regression
regres ifile ofile	
detrend	Detrend
detrend ifile ofile	
trend	Trend
trend ifile ofile1 ofile2	
subtrend	Subtract trend
subtrend ifile1 ifile2 ifile3 ofile	

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 ifile ofile1 ofile2	
eofcoeff	Calculate principal coefficients of EOFs
eofcoeff ifile1 ifile2 obase	

Interpolation

remapbil	Bilinear interpolation
genbil	Generate bilinear interpolation weights
<operator >,grid ifile ofile	
remapbic	Bicubic interpolation
genbic	Generate bicubic interpolation weights
<operator >,grid ifile ofile	
remapnnc	Nearest neighbor remapping
gennnc	Generate nearest neighbor remap weights
<operator >,grid ifile ofile	
remapdis	Distance-weighted average remapping
remapdis,grid[,neighbors] ifile ofile	
gendis	Generate distance-weighted average remap weights
gendis,grid ifile ofile	
remapycon	First order conservative remapping
genycon	Generate 1st order conservative remap weights
<operator >,grid ifile ofile	
remapcon	First order conservative remapping
gencon	Generate 1st order conservative remap weights
<operator >,grid ifile ofile	
remapcon2	Second order conservative remapping
gencon2	Generate 2nd order conservative remap weights
<operator >,grid ifile ofile	
remaplaf	Largest area fraction remapping
genlaf	Generate largest area fraction remap weights
<operator >,grid ifile ofile	

remap	Grid remapping
remap,grid,weights	ifile ofile
remapeta	Remap vertical hybrid level
remapeta,vct[,oro]	ifile ofile
ml2pl	Model to pressure level interpolation
ml2pl,plevels	ifile ofile
ml2hl	Model to height level interpolation
ml2hl,hlevels	ifile ofile
ap2pl	Air pressure to pressure level interpolation
ap2pl,plevels	ifile ofile
ap2hl	Air pressure to height level interpolation
ap2hl,hlevels	ifile ofile
intlevel	Linear level interpolation
intlevel,levels	ifile ofile
intlevel3d	Linear level interpolation onto a 3d vertical coordinate
intlevelx3d	like intlevel3d but with extrapolation
< operator > ,i,coordinate	ifile1 ifile2 ofile
inttime	Interpolation between timesteps
inttime,date,time[,inc]	ifile ofile
intntime	Interpolation between timesteps
intntime,n	ifile ofile
intyear	Interpolation between two years
intyear,years	ifile1 ifile2 obase

Transformation

sp2gp	Spectral to gridpoint
sp2gpl	Spectral to gridpoint (linear)
gp2sp	Gridpoint to spectral
gp2spl	Gridpoint to spectral (linear)
< operator >	ifile ofile
sp2sp	Spectral to spectral
sp2sp,trunc	ifile ofile
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 >	ifile ofile

Import/Export

import_binary	Import binary data sets
import_binary	ifile ofile
import_cmsaf	Import CM-SAF HDF5 files
import_cmsaf	ifile ofile
import_amr	Import AMSR binary files
import_amr	ifile ofile
input	ASCII input
input,grid[,zaxis]	ofile
inputsrv	SERVICE ASCII input
inputext	EXTRA ASCII input
< operator >	ofile
output	ASCII output
output	ifiles
outputf	Formatted output
outputf,format[,nelem]	ifiles
outputint	Integer output
outputsrv	SERVICE ASCII output
outputext	EXTRA ASCII output
< operator >	ifiles
outputtab	Table output
outputtab,params	ifiles ofile
gmtxyz	GMT xyz format
gmtcells	GMT multiple segment format
< operator >	ifile

Miscellaneous

gradsdes	GrADS data descriptor file
gradsdes[,mapversion]	ifile
after	ECHAM standard post processor
after[,vct]	ifiles ofile
bandpass	Bandpass filtering
bandpass,fmin,fmax	ifile ofile
lowpass	Lowpass filtering
lowpass,fmax	ifile ofile
highpass	Highpass filtering
highpass,fmin	ifile ofile
gridarea	Grid cell area
gridweights	Grid cell weights
< operator >	ifile ofile
smooth	Smooth grid points
smooth[,options]	ifile ofile
smooth9	9 point smoothing
smooth9	ifile ofile
setvals	Set list of old values to new values
setvals,oldval,newval[,...]	ifile ofile
setrtoc	Set range to constant
setrtoc,rmin,rmax,c	ifile ofile
setrtoc2	Set range to constant others to constant2
setrtoc2,rmin,rmax,c,c2	ifile ofile
timsort	Sort over the time
timsort	ifile ofile
const	Create a constant field
const,const,grid	ofile
random	Create a field with random numbers
random,grid[,seed]	ofile
topo	Create a field with topography
topo[,grid]	ofile
for	Create a time series
for,start,end[,inc]	ofile
stdatm	Create values for pressure and temperature for hydrostatic
stdatm,levels	ofile
rotuvb	Backward rotation
rotuvb,u,v,...	ifile ofile
mastrfu	Mass stream function
mastrfu	ifile ofile
sealevelpressure	Sea level pressure
sealevelpressure	ifile ofile
adisit	Potential temperature to in-situ temperature
adisit[,pressure]	ifile ofile
adipot	In-situ temperature to potential temperature
adipot	ifile ofile
rhopot	Calculates potential density
rhopot[,pressure]	ifile ofile
histcount	Histogram count
histsum	Histogram sum
histmean	Histogram mean
histfreq	Histogram frequency
< operator > ,bounds	ifile ofile
sethalo	Set the left and right bounds of a field
sethalo,lhalo,rhalo	ifile ofile
wct	Windchill temperature
wct	ifile1 ifile2 ofile
fdns	Frost days where no snow index per time period
fdns	ifile1 ifile2 ofile
strwin	Strong wind days index per time period
strwin[,v]	ifile ofile
stbre	Strong breeze days index per time period
stbre	ifile ofile

strgal	Strong gale days index per time period
strgal	ifile ofile
hurr	Hurricane days index per time period
hurr	ifile ofile