CDO Reference Card

Climate Data Operators
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http://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 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
<operator> ifile	

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
showtimestamp	Show timestamp
<operator> ifile	

File operations

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

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 parammeter identifiers
splitname	Split variable names
splitlevel	Split levels
splitgrid	Split grids
splitzaxis	Split z-axes
splittabnum	Split parameter table numbers
<operator>[,swap] ifile obase	

splithour	Split hours
splitday	Split days
splitmon	Split months
splitseas	Split seasons
splityear	Split years
<operator> ifile obase	

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

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	

sellevidx	Select levels by index
sellevidx*,levidx* ifile ofile	

selgrid	Select grids
selgrid*,grids* ifile ofile	

selzaxis	Select z-axes
selzaxis*,zaxes* ifile ofile	

selltype	Select GRIB level types
selltype*,ltypes* ifile ofile	

seltabnum	Select parameter table numbers
seltabnum*,tabnums* ifile ofile	

seltimestep	Select timesteps
seltimestep*,timesteps* ifile ofile	

seltime	Select times
seltime*,times* ifile ofile	

selhour	Select hours
selhour*,hours* ifile ofile	

selday	Select days
selday*,days* ifile ofile	

selmon	Select months
selmon*,months* ifile ofile	

selyear	Select years
selyear*,years* ifile ofile	

selseas	Select seasons
selseas*,seasons* ifile ofile	

seldate	Select dates
seldate*,date1[,date2]* ifile ofile	

selsmon	Select single month
selsmon*,month[,nts1[,nts2]]* ifile ofile	

sellonlatbox	Select a longitude/latitude box
sellonlatbox*,lon1,lon2,lat1,lat2* ifile ofile	
selindexbox	Select an index box
selindexbox*,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	

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

setpartab	Set parameter table
setpartab*,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	
setltype	Set GRIB level type
setltype*,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	
settunits	Set time units
settunits*,units* ifile ofile	
settaxis	Set time axis
settaxis*,date,time[,inc]* 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	

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
setctomiss — 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

Arithmetic

expr — Evaluate expressions
expr,*instr* ifile ofile
exprf — Evaluate expressions from script file
exprf,*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
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

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> 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

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

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

ensrkhistspace — 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
timselpctl — Time range percentiles
timselpctl,*p,nsets[,noffset[,nskip]]* ifile1 ifile2 ifile3 ofile

run<*stat*> — Running statistical values
<operator>,*nts* ifile ofile
runpctl — Running percentiles
runpctl,*p,nts* ifile1 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

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
remapbic — Bicubic interpolation
remapdis — Distance-weighted average remapping
remapnn — Nearest neighbor remapping
remapcon — First order conservative remapping
remapcon2 — Second order conservative remapping
remaplaf — Largest area fraction remapping
<operator>,*grid* ifile ofile

genbil — Generate bilinear interpolation weights
genbic — Generate bicubic interpolation weights
gendis — Generate distance-weighted average remap weights
gennn — Generate nearest neighbor remap weights
gencon — Generate 1st order conservative remap weights
gencon2 — Generate 2nd order conservative remap weights
genlaf — Generate largest area fraction remap weights
<operator>,*grid* ifile ofile

remap — SCRIP 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

intlevel — Linear level interpolation
intlevel,*levels* ifile ofile

intlevel3d — Linear level interpolation onto a 3d vertical coordina
intlevelx3d — like intlevel3d but with extrapolation
<operator>,*icoordinate* 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_amsr — Import AMSR binary files
import_amsr ifile ofile

input — ASCII input
input,*grid* 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`	

Miscellaneous

gradsdes1	GrADS data descriptor file (version 1 GRIB map)
gradsdes2	GrADS data descriptor file (version 2 GRIB map)
<operator> `ifile`	
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`	
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`	
stdatm	Create values for pressure and temperature for hydr
stdatm,*levels* `ofile`	
rotuvb	Backward rotation
rotuvb,*u*,*v*,... `ifile ofile`	
mastrfu	Mass stream function
mastrfu `ifile ofile`	
adisit	Potential temperature to in-situ temperature
adisit[,*pressure*] `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`	
strbre	Strong breeze days index per time period
strbre `ifile ofile`	
strgal	Strong gale days index per time period
strgal `ifile ofile`	

hurr	Hurricane days index per time period
hurr `ifile ofile`	

Climate indices

eca_cdd	Consecutive dry days index per time period
eca_cdd[,*R*] `ifile ofile`	
eca_cfd	Consecutive frost days index per time period
eca_cfd `ifile ofile`	
eca_csu	Consecutive summer days index per time period
eca_csu[,*T*] `ifile ofile`	
eca_cwd	Consecutive wet days index per time period
eca_cwd[,*R*] `ifile ofile`	
eca_cwdi	Cold wave duration index wrt mean of reference per
eca_cwdi[,*nday*[,*T*]] `ifile1 ifile2 ofile`	
eca_cwfi	Cold-spell days index wrt 10th percentile of referenc
eca_cwfi[,*nday*] `ifile1 ifile2 ofile`	
eca_etr	Intra-period extreme temperature range
eca_etr `ifile1 ifile2 ofile`	
eca_fd	Frost days index per time period
eca_fd `ifile ofile`	
eca_gsl	Growing season length index
eca_gsl[,*nday*[,*T*[,*fland*]]] `ifile1 ifile2 ofile`	
eca_hd	Heating degree days per time period
eca_hd[,*T1*[,*T2*]] `ifile ofile`	
eca_hwdi	Heat wave duration index wrt mean of reference per
eca_hwdi[,*nday*[,*T*]] `ifile1 ifile2 ofile`	
eca_hwfi	Warm spell days index wrt 90th percentile of referen
eca_hwfi[,*nday*] `ifile1 ifile2 ofile`	
eca_id	Ice days index per time period
eca_id `ifile ofile`	
eca_r75p	Moderate wet days wrt 75th percentile of reference
eca_r75p `ifile1 ifile2 ofile`	
eca_r75ptot	Precipitation percent due to R75p days
eca_r75ptot `ifile1 ifile2 ofile`	
eca_r90p	Wet days wrt 90th percentile of reference period
eca_r90p `ifile1 ifile2 ofile`	
eca_r90ptot	Precipitation percent due to R90p days
eca_r90ptot `ifile1 ifile2 ofile`	
eca_r95p	Very wet days wrt 95th percentile of reference period
eca_r95p `ifile1 ifile2 ofile`	
eca_r95ptot	Precipitation percent due to R95p days
eca_r95ptot `ifile1 ifile2 ofile`	
eca_r99p	Extremely wet days wrt 99th percentile of reference
eca_r99p `ifile1 ifile2 ofile`	
eca_r99ptot	Precipitation percent due to R99p days
eca_r99ptot `ifile1 ifile2 ofile`	
eca_pd	Precipitation days index per time period
eca_pd,*x* `ifile ofile`	
eca_r10mm	Heavy precipitation days index per time period
eca_r20mm	Very heavy precipitation days index per time period
<operator> `ifile ofile`	
eca_rr1	Wet days index per time period
eca_rr1[,*R*] `ifile ofile`	
eca_rx1day	Highest one day precipitation amount per time perio
eca_rx1day[,*mode*] `ifile ofile`	
eca_rx5day	Highest five-day precipitation amount per time perio
eca_rx5day[,*x*] `ifile ofile`	
eca_sdii	Simple daily intensity index per time period
eca_sdii[,*R*] `ifile ofile`	

eca_su	Summer days index per time period
eca_su[,*T*] `ifile ofile`	
eca_tg10p	Cold days percent wrt 10th percentile of reference period
eca_tg10p `ifile1 ifile2 ofile`	
eca_tg90p	Warm days percent wrt 90th percentile of reference period
eca_tg90p `ifile1 ifile2 ofile`	
eca_tn10p	Cold nights percent wrt 10th percentile of reference period
eca_tn10p `ifile1 ifile2 ofile`	
eca_tn90p	Warm nights percent wrt 90th percentile of reference period
eca_tn90p `ifile1 ifile2 ofile`	
eca_tr	Tropical nights index per time period
eca_tr[,*T*] `ifile ofile`	
eca_tx10p	Very cold days percent wrt 10th percentile of reference period
eca_tx10p `ifile1 ifile2 ofile`	
eca_tx90p	Very warm days percent wrt 90th percentile of reference period
eca_tx90p `ifile1 ifile2 ofile`	