

CDO Reference Card

Climate Data Operators

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

Syntax

cdo	[Options]	Operator1 [−Operator2 [−OperatorN]]
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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
infor	Dataset information listed by parameter name
map	Dataset information and simple map
<operator>	ifiles

sinfo	Short information listed by parameter identifier
sinfo	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
showtimestam	Show timestamp
<operator>	ifile

pardes	Parameter description
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 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
splitseas	Split seasons
splityear	Split years
splityearmon	Split in years and months
<operator>	ifile obase

splitmon	Split months
splitmon[,format/] ifile obase	

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

distgrid	Distribute horizontal grid
distgrid,nx[,ny] ifile obase	

collgrid	Collect horizontal grid
collgrid[,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
delscode	Delete parameters by code number
<operator>	,codes ifile ofile

selname	Select parameters by name
delsname	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	
seltype	Select GRIB level types
seltype,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	
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	
selmon	Select single month
selmon,month[,nts1[,nts2]] ifile ofile	

sel lonlatbox	Select a longitude/latitude box
sel lonlatbox,lon1,lon2,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

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 ifile ofile

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	

setunits	Set time units
setunits,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>,<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>,<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
monddiv	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
yseassub	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		
ensrkhistpspace	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[,nofset[,nskip]] ifile ofile	
timselfctl	Time range percentiles
timselfctl,p,nsets[,nofset[,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 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>,<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>,<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>,<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>,<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>,<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
outputtext	EXTRA ASCII output
< operator > ifiles	
outputtab	Table output
outputtab, params ifiles ofile	

Miscellaneous

gradsdes	GrADS data descriptor file
gradsdes[, mapversion] 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	
tmsort	Sort over the time
tmsort 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 hydrostatic
stdatm, levels ofile	
rotuvb	Backward rotation
rotuvb, u, v, ... ifile ofile	
mastrfu	Mass stream function
mastrfu ifile ofile	
sealevelpressur	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	
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	
fillmiss	Fill missing values
fillmiss ifile ofile	
fillmiss2	Fill missing values
fillmiss2[, maxiter] 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 period
eca_cwdi[, nday[, T]] ifile1 ifile2 ofile	
eca_cwfi	Cold-spell days index wrt 10th percentile of reference period
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 ifile	
eca_hwdi	Heat wave duration index wrt mean of reference period
eca_hwdi[, nday[, T]] ifile1 ifile2 ofile	
eca_hwfi	Warm spell days index wrt 90th percentile of reference period
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 period
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 period
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 period
eca_rx1day[, mode] ifile ofile	
eca_rx5day	Highest five-day precipitation amount per time period
eca_rx5day[, x] ifile ofile	
eca_sdi	Simple daily intensity index per time period
eca_sdi[, 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	