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 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 time steps
<*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`	

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`	

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*> `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

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 time steps
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`	
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 time steps
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`	
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`	

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**
standard deviation	**std**

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 time steps
<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

fldcor	Correlation in grid space
fldcor `ifile1 ifile2 ofile`	

timcor	Correlation over time
timcor `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`	

inttime	Interpolation between time steps
inttime,*date*,*time*[,*inc*] `ifile ofile`	
intntime	Interpolation between time steps
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`

rotuvb Backward rotation
rotuvb,*u*,*v*,... `ifile ofile`

mastrfu Mass stream function
mastrfu `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 `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 `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 ofile`

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 referen
eca_hwfi[,*nday*] `ifile1 ifile2 ofile`

eca_id Ice days index per time period
eca_id `ifile 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_r75p Moderate wet days wrt 75th percentile of reference p
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 perio
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_rr1 Wet days index per time period
eca_rr1 `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 `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 pe
eca_tg10p `ifile1 ifile2 ofile`

eca_tg90p Warm days percent wrt 90th percentile of reference
eca_tg90p `ifile1 ifile2 ofile`

eca_tn10p Cold nights percent wrt 10th percentile of reference
eca_tn10p `ifile1 ifile2 ofile`

eca_tn90p Warm nights percent wrt 90th percentile of referenc
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 referen
eca_tx10p `ifile1 ifile2 ofile`

eca_tx90p Very warm days percent wrt 90th percentile of refere
eca_tx90p `ifile1 ifile2 ofile`