CDO Reference Card

Climate Data Operators
Version 1.5.7
August 2012

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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

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 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	
setlevel	Set level
setlevel,*level* ifile ofile	
setltype	Set GRIB level type
setltype,*ltype* ifile ofile	

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

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	
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**
standard deviation	**std**

(second column)

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		

(third column)

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		

(fourth column)

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 coordinate	
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`	

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_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
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_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 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 reference period
eca_tx90p `ifile1 ifile2 ofile`	