CDO Reference Card

Climate Data Operators
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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
	(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
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
showltype	Show GRIB level types
showyear	Show years
showmon	Show months
showdate	Show date information
showtime	Show time information
showtimestamp	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
splitgrid	Split grids
splitzaxis	Split z-axes
splittabnum	Split parameter table numbers
$<operator>$[,params] 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[,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	

sellevidx	Select levels by index
sellevidx,levidx 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	

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	

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,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	

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	
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	
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	

Operator	Description
setzaxis	Set z-axis
setzaxis,*zaxis* `ifile ofile`	
genlevelbounds	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`	
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`	
setmisstonn	Set missing value to nearest neighbor
setmisstonn `ifile ofile`	
setmisstodis	Set missing value to distance-weighted average
setmisstodis*[,neighbors]* `ifile ofile`	

Arithmetic

Operator	Description
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`	

Operator	Description
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
ymondiv	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**

Operator	Description
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`	

Operator	Description
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* `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`	

Operator	Description
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.

Operator	Description
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

Operator	Description
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

Operator	Description
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

Operator	Description
remapbil	Bilinear interpolation
genbil	Generate bilinear interpolation weights
<operator>,*grid* `ifile ofile`	
remapbic	Bicubic interpolation
genbic	Generate bicubic interpolation weights
<operator>,*grid* `ifile ofile`	
remapnn	Nearest neighbor remapping
gennn	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>,*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[,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 hydro	
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`		

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`		