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
<*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`	

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`	
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

setpartabp	Set parameter table
setpartabn	Set parameter table
<*operator*>,*table*[,*convert*] `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`	
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`	
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`	

Arithmetic

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
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`	

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**

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* `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`	

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
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
gendis	Generate distance-weighted average remap weights
<*operator*>,*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
remapcon2,*grid* `ifile ofile`	
gencon2	Generate 2nd order conservative remap weights
gencon2,*grid2* `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 Model to pressure level interpolation
ap2pl,*plevels* `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`

outputtab Table output
outputtab,*params* `ifiles ofile`

Miscellaneous

gradsdes GrADS data descriptor file
gradsdes[,*mapversion*] `ifile`

after ECHAM standard post processor
after `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`

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 hydr
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`