

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 (18/116/132/F32/F64 for nc1,nc2,nc4,nc4c; F32/F64 for grb2,srv,ext,ieg; 1-24 for grb1,grb2)
-f <format>	Add L or B for Little or Big endian byteorder
-g <grid>	Outputformat: grb1,grb2,nc1,nc2,nc4,nc4c,srv,ext,ieg Grid or file name
-h	Grid names: r<NX>x<NY>, n<N>, gme<NI>
-M	Help information for the operators
-m <missval>	Indicate that the I/O streams have missing values
-O	Set the default missing value (default: -9e+33)
-R	Overwrite existing output file, if checked
-r	Convert GRIB1 data from reduced to regular grid
-s	Generate a relative time axis
-t <table>	Silent mode
-V	Set the parameter table name or file
-v	Predefined tables: echam4 echam5 mpiom1
-z zip	Print the version number
	Print extra details for some operators
	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>	infiles
sinfor	Short information listed by parameter identifier
sinfor	Short information listed by parameter name
<operator>	infiles
diff	Compare two datasets listed by parameter id
diffn	Compare two datasets listed by parameter name
<operator>	infile1 infile2

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>	infile

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>	infile
partab	Parameter table
codetab	Parameter code table
griddes	Grid description
zaxisdes	Z-axis description
vct	Vertical coordinate table
<operator>	infile

File operations

copy	Copy datasets
cat	Concatenate datasets
<operator>	infiles outfile
replace	Replace variables
replace	infile1 infile2 outfile
duplicate	Duplicates a dataset
duplicate[,ndup]	infile outfile
mergegrid	Merge grid
mergegrid	infile1 infile2 outfile
merge	Merge datasets with different fields
mergetime	Merge datasets sorted by date and time
<operator>	infiles outfile
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] infile obase

splithour	Split hours
spltday	Split days
splitseas	Split seasons
splityear	Split years
splityearmon	Split in years and months
<operator>	infile obase
splitmon	Split months
splitmon[,format]	infile obase
splitsel	Split time selection
splitsel,nsets[,noffset,nskip]	infile obase

distgrid	Distribute horizontal grid
distgrid,nx[,ny]	infile obase
collgrid	Collect horizontal grid
collgrid[,nx[,names]]	infiles outfile

Selection

select	Select fields
delete	Delete fields
<operator>	,params infiles outfile
selmulti	Select multiple fields
delmulti	Delete multiple fields
changemulti	Change identification of multiple fields
<operator>	,selection-specification infile outfile

selparam	Select parameters by identifier
delparam	Delete parameters by identifier
<operator>	,params infile outfile
selcode	Select parameters by code number
delcode	Delete parameters by code number
<operator>	,codes infile outfile
selname	Select parameters by name
delname	Delete parameters by name
<operator>	,names infile outfile
selstdname	Select parameters by standard name
selstdname,stdnames	infile outfile
sellevel	Select levels
sellevel,levels	infile outfile
sellevidx	Select levels by index
sellevidx,levidx	infile outfile
selgrid	Select grids
selgrid,grids	infile outfile
selzaxis	Select z-axes
selzaxis,zaxes	infile outfile
selzaxisname	Select z-axes by name
selzaxisname,zaxisnames	infile outfile
selltype	Select GRIB level types
selltype,ltypes	infile outfile
seltabnum	Select parameter table numbers
seltabnum,tabnums	infile outfile

sel timestep	Select timesteps
sel timestep,timesteps	infile outfile
seltime	Select times
seltime,times	infile outfile
selhour	Select hours
selhour,hours	infile outfile
selday	Select days
selday,days	infile outfile
selmonth	Select months
selmonth,months	infile outfile
selyear	Select years
selyear,years	infile outfile
selseason	Select seasons
selseason,seasons	infile outfile
seldate	Select dates
seldate,date1[,date2]	infile outfile
selsmon	Select single month
selsmon,month[,nts1[,nts2]]	infile outfile

sel lonlatbox	Select a longitude/latitude box
sel lonlatbox,lon1,lon2,lat1,lat2	infile outfile
sel indexbox	Select an index box
sel indexbox,idx1,idx2,idy1,idy2	infile outfile

sel gridcell	Select grid cells
del gridcell	Delete grid cells
<operator>	,indexes infile outfile

samplegrid	Resample grid
samplegrid,factor	infile outfile

Conditional selection

ifthen	If then
ifnotthen	If not then
<operator>	infile1 infile2 outfile
ifthenelse	If then else
ifthenelse	infile1 infile2 infile3 outfile
ifthenc	If then constant
ifnotthenc	If not then constant
<operator>	,c infile outfile
reducegrid	Reduce input file variables to locations, where mask
reducegrid,mask[,limitCoordsOutput]	infile outfile

Comparison

eq	Equal
ne	Not equal
le	Less equal
lt	Less than
ge	Greater equal
gt	Greater than
<operator>	infile1 infile2 outfile
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 infile outfile

Modification

setattribute	Set attributes
setattribute,attributes	infile outfile
setpartabp	Set parameter table
setpartabn	Set parameter table
<operator>	,table[,convert] infile outfile
setcodetab	Set parameter code table
setcodetab,table	infile outfile
setcode	Set code number
setcode,code	infile outfile
setparam	Set parameter identifier
setparam,param	infile outfile
setname	Set variable name
setname,name	infile outfile
setunit	Set variable unit
setunit,unit	infile outfile
setlevel	Set level
setlevel,level	infile outfile
setltype	Set GRIB level type
setltype,ltype	infile outfile
setdate	Set date
setdate,date	infile outfile
settime	Set time of the day
settime,time	infile outfile
setday	Set day
setday,day	infile outfile
setmon	Set month
setmon,month	infile outfile
setyear	Set year
setyear,year	infile outfile
setunits	Set time units
setunits,units	infile outfile
settaxis	Set time axis
settaxis,date,time[,inc]	infile outfile
settbounds	Set time bounds
settbounds,frequency	infile outfile
setreftime	Set reference time
setreftime,date,time[,units]	infile outfile
setcalendar	Set calendar
setcalendar,calendar	infile outfile
shifttime	Shift timesteps
shifttime,sval	infile outfile

chcode	Change code number
chcode,oldcode,newcode[,...]	infile outfile
chparam	Change parameter identifier
chparam,oldparam,newparam,...	infile outfile
chname	Change variable name
chname,oldname,newname,...	infile outfile
chunit	Change variable unit
chunit,oldunit,newunit,...	infile outfile
chlevel	Change level
chlevel,oldlev,newlev,...	infile outfile
chlevele	Change level of one code
chlevele,code,oldlev,newlev	infile outfile
chlevelv	Change level of one variable
chlevelv,name,oldlev,newlev	infile outfile

setgrid	Set grid
setgrid,grid	infile outfile
setgridtype	Set grid type
setgridtype,gridtype	infile outfile
setgridarea	Set grid cell area
setgridarea,gridarea	infile outfile

setzaxis	Set z-axis
setzaxis,zaxis	infile outfile
genlevelbound	Generate level bounds
genlevelbounds[,zbot[,ztop]]	infile outfile

invertlat	Invert latitudes
invertlat	infile outfile

invertlev	Invert levels
invertlev	infile outfile

shiftx	Shift x
shifty	Shift y
< operator > ,nshift<i>i</i> ,jcylic<i>i</i> ,jcoor<i>i</i>	infile outfile

maskregion	Mask regions
maskregion,regions	infile outfile

masklonlatbox	Mask a longitude/latitude box
masklonlatbox,lon1,lon2,lat1,lat2	infile outfile
maskindexbox	Mask an index box
maskindexbox,idx1,idx2,idy1,idy2	infile outfile

setclonlatbox	Set a longitude/latitude box to constant
setclonlatbox,c,lon1,lon2,lat1,lat2	infile outfile
setcindexbox	Set an index box to constant
setcindexbox,c,idx1,idx2,idy1,idy2	infile outfile

enlarge	Enlarge fields
enlarge,grid	infile outfile

setmissval	Set a new missing value
setmissval,newmiss	infile outfile
setctomiss	Set constant to missing value
setmisstoc	Set missing value to constant
< operator > ,c	infile outfile

setrtomiss	Set range to missing value
setvrange	Set valid range
< operator > ,rmin,rmax	infile outfile
setmisstonn	Set missing value to nearest neighbor
setmisstonn	infile outfile
setmisstodis	Set missing value to distance-weighted average
setmisstodis[,neighbors]	infile outfile

Arithmetic

expr	Evaluate expressions
expr,instr	infile outfile
exprf	Evaluate expressions script
exprf,filename	infile outfile
aexpr	Evaluate expressions and append results
aexpr,instr	infile outfile
aexprf	Evaluate expression script and append results
aexprf,filename	infile outfile

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 >	infile outfile

addc	Add a constant
subc	Subtract a constant
mulc	Multiply with a constant
divc	Divide by a constant
< operator > ,c	infile outfile

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 >	infile1 infile2 outfile

monadd	Add monthly time series
monsub	Subtract monthly time series
monmul	Multiply monthly time series
monddiv	Divide monthly time series
< operator >	infile1 infile2 outfile

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 >	infile1 infile2 outfile

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 >	infile1 infile2 outfile

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 >	infile1 infile2 outfile

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 >	infile1 infile2 outfile

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 >	infile outfile

Statistical values

Available statistical functions	< <i>stat</i> >
minimum	min
maximum	max
sum	sum
mean	mean
average	avg
variance	var, var1
standard deviation	std, std1

timcumsum	Cumulative sum over all timesteps
timcumsum	infile outfile

consects	Consecutive Timesteps
< operator >	infile outfile

ens< stat >	Statistical values over an ensemble
< operator >	infiles outfile
enspctl	Ensemble percentiles
enspctl,p	infiles outfile

ensrkhistspace	Ranked Histogram averaged over time
ensrkhisttime	Ranked Histogram averaged over space
ensroc	Ensemble Receiver Operating characteristics
< operator >	obsfile ensfiles outfile

enscrps	Ensemble CRPS and decomposition
enscrps rf	infiles outfilebase
ensbrs	Ensemble Brier score
ensbrs,x rf	infiles outfilebase

fld< stat >	Statistical values over a field
< operator >	infile outfile
fldpctl	Field percentiles
fldpctl,p	infile outfile

zon< stat >	Zonal statistical values
< operator >	infile outfile
fldpctl	Field percentiles
fldpctl,p	infile outfile

mer< stat >	Meridional statistical values
< operator >	infile outfile
merpctl	Meridional percentiles
merpctl,p	infile outfile

gridbox< stat >	Statistical values over grid boxes
< operator > ,nx,ny	infile outfile

vert< stat >	Vertical statistical values
< operator >	infile outfile

timsel< stat >	Time range statistical values
< operator > ,nsets[,noffset[,nskip]]	infile outfile

timselfctl	Time range percentiles
timselfctl,p,nsets[,noffset[,nskip]]	infile1 infile2 infile3 outfile

run< stat >	Running statistical values
< operator > ,nts	infile outfile

runpctl	Running percentiles
runpctl,p,nts	infile outfile

tim< stat >	Statistical values over all timesteps
< operator >	infile outfile

timpctl	Time percentiles
timpctl,p	infile1 infile2 infile3 outfile

hour< stat >	Hourly statistical values
< operator >	infile outfile

hourpctl	Hourly percentiles
hourpctl,p	infile1 infile2 infile3 outfile

day< stat >	Daily statistical values
< operator >	infile outfile

daypctl	Daily percentiles
daypctl,p	infile1 infile2 infile3 outfile

mon< stat >	Monthly statistical values
< operator >	infile outfile

monpctl	Monthly percentiles
monpctl,p	infile1 infile2 infile3 outfile

yearmonmean	Yearly mean from monthly data
yearmonmean	infile outfile

year< stat >	Yearly statistical values
< operator >	infile outfile

yearpctl	Yearly percentiles
yearpctl,p	infile1 infile2 infile3 outfile

seas< stat >	Seasonal statistical values
< operator >	infile outfile

seaspctl	Seasonal percentiles
seaspctl,p	infile1 infile2 infile3 outfile

yhour< stat >	Multi-year hourly statistical values
< operator >	infile outfile

yday< stat >	Multi-year daily statistical values
< operator >	infile outfile

ydaypctl	Multi-year daily percentiles
ydaypctl,p	infile1 infile2 infile3 outfile

ymon< stat >	Multi-year monthly statistical values
< operator >	infile outfile

ymonpctl	Multi-year monthly percentiles
ymonpctl,p	infile1 infile2 infile3 outfile

yseas< stat >	Multi-year seasonal statistical values
< operator >	infile outfile

yseaspctl	Multi-year seasonal percentiles
yseaspctl,p	infile1 infile2 infile3 outfile

ydrun< stat >	Multi-year daily running statistical values
< operator > ,nts	infile outfile

ydrunpctl	Multi-year daily running percentiles
ydrunpctl,p,nts	infile1 infile2 infile3 outfile

Correlation and co.

fldcor	Correlation in grid space
fldcor	infile1 infile2 outfile

timcor	Correlation over time
timcor	infile1 infile2 outfile

fldcovar	Covariance in grid space
fldcovar	infile1 infile2 outfile

timcovar	Covariance over time
timcovar	infile1 infile2 outfile

Regression

regres	Regression
regres	infile outfile

detrend	Detrend
detrend	infile outfile

trend	Trend
trend	infile outfile1 outfile2

subtrend	Subtract trend
subtrend	infile1 infile2 infile3 outfile

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	infile outfile1 outfile2

eofcoeff	Calculate principal coefficients of EOFs
eofcoeff	infile1 infile2 obase

Interpolation

remapbil	Bilinear interpolation
genbil	Generate bilinear interpolation weights
< operator > ,grid infile outfile	
remapbic	Bicubic interpolation
genbic	Generate bicubic interpolation weights
< operator > ,grid infile outfile	
remapnn	Nearest neighbor remapping
gennn	Generate nearest neighbor remap weights
< operator > ,grid infile outfile	
remapdis	Distance-weighted average remapping
remapdis ,grid[,neighbors] infile outfile	
gendis	Generate distance-weighted average remap weights
gendis ,grid infile outfile	
remapycon	First order conservative remapping
genycon	Generate 1st order conservative remap weights
< operator > ,grid infile outfile	
remapcon	First order conservative remapping
gencon	Generate 1st order conservative remap weights
< operator > ,grid infile outfile	
remapcon2	Second order conservative remapping
gencon2	Generate 2nd order conservative remap weights
< operator > ,grid infile outfile	
remaplaf	Largest area fraction remapping
genlaf	Generate largest area fraction remap weights
< operator > ,grid infile outfile	

remap	Grid remapping
remap ,grid ,weights infile outfile	

remapeta	Remap vertical hybrid level
remapeta ,vct[,oro] infile outfile	

m12pl	Model to pressure level interpolation
m12pl ,plevels infile outfile	
m12hl	Model to height level interpolation
m12hl ,hlevels infile outfile	

ap2pl	Air pressure to pressure level interpolation
ap2pl ,plevels infile outfile	
ap2hl	Air pressure to height level interpolation
ap2hl ,hlevels infile outfile	

intlevel	Linear level interpolation
intlevel ,levels infile outfile	

intlevel3d	Linear level interpolation onto a 3d vertical coordinate
intlevelx3d	like intlevel3d but with extrapolation
< operator > ,icoordinate infile1 infile2 outfile	

inttime	Interpolation between timesteps
inttime ,date,time[,inc] infile outfile	
intntime	Interpolation between timesteps
intntime ,n infile outfile	

intyear	Interpolation between two years
intyear ,years infile1 infile2 obase	

Transformation

sp2gp	Spectral to gridpoint
sp2gp1	Spectral to gridpoint (linear)
gp2sp	Gridpoint to spectral
gp2spl	Gridpoint to spectral (linear)
< operator > infile outfile	
sp2sp	Spectral to spectral
sp2sp ,trunc infile outfile	

dv2uv	Divergence and vorticity to U and V wind
dv2uwl	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 > infile outfile	

Import/Export

import_binary	Import binary data sets
import_binary infile outfile	

import_cmsaf	Import CM-SAF HDF5 files
import_cmsaf infile outfile	

import_amsr	Import AMSR binary files
import_amsr infile outfile	

input	ASCII input
input ,grid[,zaxis] outfile	
inputsrv	SERVICE ASCII input
inputext	EXTRA ASCII input
< operator > outfile	

output	ASCII output
output infiles	
outputf	Formatted output
outputf ,format[,nelem] infiles	
outputint	Integer output
outputsrv	SERVICE ASCII output
outputext	EXTRA ASCII output
< operator > infiles	

outputtab	Table output
outputtab ,params infiles outfile	

gmtxyz	GMT xyz format
gmtcells	GMT multiple segment format
< operator > infile	

Miscellaneous

gradsdes	GRADS data descriptor file
gradsdes ,mapversion] infile	

after	ECHAM standard post processor
after ,vct] infiles outfile	

bandpass	Bandpass filtering
bandpass ,fmin,fmax infile outfile	
lowpass	Lowpass filtering
lowpass ,fmax infile outfile	
highpass	Highpass filtering
highpass ,fmin infile outfile	

gridarea	Grid cell area
gridweights	Grid cell weights
< operator > infile outfile	

smooth	Smooth grid points
smooth ,options] infile outfile	
smooth9	9 point smoothing
smooth9 infile outfile	

setvals	Set list of old values to new values
setvals ,oldval,newval[,...] infile outfile	
setrtoc	Set range to constant
setrtoc ,rmin,rmax,c infile outfile	
setrtoc2	Set range to constant others to constant2
setrtoc2 ,rmin,rmax,c,c2 infile outfile	

timsort	Sort over the time
timsort infile outfile	

const	Create a constant field
const ,const,grid outfile	
random	Create a field with random numbers
random ,grid[,seed] outfile	
topo	Create a field with topography
topo [,grid] outfile	
for	Create a time series
for ,start,end[,inc] outfile	
stdatm	Create values for pressure and temperature for hydrostatic
stdatm ,levels outfile	

uvDestag	Destaggering of u/v wind components
uvDestag ,u,v[,,-/+0.5[,,-/+0.5]] infile outfile	
rotuvNorth	Rotate u/v wind to North pole.
projuvLatLon	Cylindrical Equidistant projection
< operator > ,u,v infile outfile	

rotuvb	Backward rotation
rotuvb ,u,v,... infile outfile	

mastrfu	Mass stream function
mastrfu infile outfile	

sealevelpressur	Sea level pressure
sealevelpressure infile outfile	

adisit	Potential temperature to in-situ temperature
adisit [,pressure] infile outfile	
adipot	In-situ temperature to potential temperature
adipot infile outfile	

rhopot	Calculates potential density
rhopot [,pressure] infile outfile	

histcount	Histogram count
histsum	Histogram sum
histmean	Histogram mean
histfreq	Histogram frequency
< operator > ,bounds infile outfile	

sethalo	Set the left and right bounds of a field
sethalo ,lhalo,rhalo infile outfile	

wct	Windchill temperature
wct infile1 infile2 outfile	

fdns	Frost days where no snow index per time period
fdns infile1 infile2 outfile	

strwin	Strong wind days index per time period
strwin [,v] infile outfile	

strbre	Strong breeze days index per time period
strbre infile outfile	

strgal	Strong gale days index per time period
strgal infile outfile	

hurr	Hurricane days index per time period
hurr infile outfile	

cmorlite	CMOR lite
cmorlite ,table[,convert] infile outfile	