

CDO Reference Card

Climate Data Operators
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https://code.mpimet.mpg.de/projects/cdo

Syntax

cdo	[Options]	Operator1	[–Operator2	[–OperatorN]
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Options

-a	Generate an absolute time axis
-b <i><nbits></i>	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 <i><format></i>	Add L or B for Little or Big endian byteorder
-g <i><grid></i>	Outputformat: grb1,grb2,nc1,nc2,nc4,nc4c,srv,ext,ieg 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 <i><missval></i>	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 <i><table></i>	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 <i>zip</i>	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
<i><operator></i> infiles	
sinfo	Short information listed by parameter identifier
sinfon	Short information listed by parameter name
<i><operator></i> infiles	
diff	Compare two datasets listed by parameter id
diffn	Compare two datasets listed by parameter name
<i><operator></i> 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
<i><operator></i> infile	

showformat	Show file format
showcode	Show code numbers
showname	Show variable names
showstdname	Show standard names
showatts	Show all attributes
showattsglob	Show all global attributes
showlevel	Show levels
showltype	Show GRIB level types
showyear	Show years
showmon	Show months
showdate	Show date information
showtime	Show time information
showtimestam	Show timestamp
<i><operator></i> infile	
showattribute	Show a global attribute or a variable attribute
<i>showattribute,attribute</i> infile	
showattsvar	Show all variable attributes.
<i>showattsvar[,var_nm]</i> infile	
partab	Parameter table
codetab	Parameter code table
griddes	Grid description
zaxisdes	Z-axis description
vct	Vertical coordinate table
<i><operator></i> infile	

File operations

copy	Copy datasets
cat	Concatenate datasets
<i><operator></i> infiles outfile	
tee	Duplicate a data stream
<i>tee infile outfile1 outfile2</i>	
replace	Replace variables
<i>replace infile1 infile2 outfile</i>	
duplicate	Duplicates a dataset
<i>duplicate[,ndup]</i> infile outfile	
mergegrid	Merge grid
<i>mergegrid infile1 infile2 outfile</i>	
merge	Merge datasets with different fields
mergetime	Merge datasets sorted by date and time
<i><operator></i> 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
<i><operator></i> [,params] infile obase	
splitlhour	Split hours
splitday	Split days
splitseas	Split seasons
splityear	Split years
splityearmon	Split in years and months
<i><operator></i> infile obase	
splitmon	Split months
<i>splitmon[,format]</i> infile obase	
splitsel	Split time selection
<i>splitsel,nsets[,noffset[,nskip]]</i> infile obase	
distgrid	Distribute horizontal grid
<i>distgrid,nx[,ny]</i> infile obase	
collgrid	Collect horizontal grid
<i>collgrid[,nx[,names]]</i> infiles outfile	

Selection

select	Select fields
delete	Delete fields
<i><operator></i> [,params infile outfile	
selmulti	Select multiple fields
delmulti	Delete multiple fields
changemulti	Change identification of multiple fields
<i><operator></i> [,selection-specification infile outfile	
selparam	Select parameters by identifier
delparam	Delete parameters by identifier
<i><operator></i> [,params infile outfile	
selcode	Select parameters by code number
delcode	Delete parameters by code number
<i><operator></i> [,codes infile outfile	
selname	Select parameters by name
dename	Delete parameters by name
<i><operator></i> [,names infile outfile	
selstdname	Select parameters by standard name
<i>selstdname,stdnames</i> infile outfile	
sellevel	Select levels
<i>sellevel,levels</i> infile outfile	
sellevidx	Select levels by index
<i>sellevidx,levidx</i> infile outfile	
selgrid	Select grids
<i>selgrid,grids</i> infile outfile	
selzaxis	Select z-axes
<i>selzaxis,zaxes</i> infile outfile	
selzaxisname	Select z-axes by name
<i>selzaxisname,zaxisnames</i> infile outfile	
selltype	Select GRIB level types
<i>selltype,ltypes</i> infile outfile	
seltabnum	Select parameter table numbers
<i>seltabnum,tabnums</i> infile outfile	
sel timestep	Select timesteps
<i>sel timestep,timesteps</i> infile outfile	
seltime	Select times
<i>seltime,times</i> infile outfile	
selhour	Select hours
<i>selhour,hours</i> infile outfile	
selday	Select days
<i>selday,days</i> infile outfile	
selmonth	Select months
<i>selmonth,months</i> infile outfile	
selyear	Select years
<i>selyear,years</i> infile outfile	
selseason	Select seasons
<i>selseason,seasons</i> infile outfile	
seldate	Select dates
<i>seldate,date1[,date2]</i> infile outfile	
selsmon	Select single month
<i>selsmon,month[,nts1[,nts2]]</i> infile outfile	

selgridcell	Select grid cells
delgridcell	Delete grid cells
<i><operator></i> [,indexes infile outfile	

samplegrid	Resample grid
<i>samplegrid,factor</i> infile outfile	

Conditional selection

ifthen	If then
ifnotthen	If not then
<i><operator></i> infile1 infile2 outfile	
ifthenelse	If then else
<i>ifthenelse</i> infile1 infile2 infile3 outfile	

ifthen	If then constant
ifnotthenc	If not then constant
<i><operator></i> [,c infile outfile	
reducegrid	Reduce input file variables to locations, where mask
<i>reducegrid,mask[,limitCoordsOutput]</i> infile outfile	

Comparison

eq	Equal
ne	Not equal
le	Less equal
lt	Less than
ge	Greater equal
gt	Greater than
<i><operator></i> infile1 infile2 outfile	
eqc	Equal constant
ne	Not equal constant
lec	Less equal constant
ltc	Less than constant
gec	Greater equal constant
gtc	Greater than constant
<i><operator></i> [,c infile outfile	

Modification

setattribute	Set attributes
<i>setattribute,attributes</i> infile outfile	
setpartabp	Set parameter table
setpartabn	Set parameter table
<i><operator></i> [,table[,convert] infile outfile	
setcodetab	Set parameter code table
<i>setcodetab,table</i> infile outfile	
setcode	Set code number
<i>setcode,code</i> infile outfile	
setparam	Set parameter identifier
<i>setparam,param</i> infile outfile	
setname	Set variable name
<i>setname,name</i> infile outfile	
setunit	Set variable unit
<i>setunit,unit</i> infile outfile	
setlevel	Set level
<i>setlevel,level</i> infile outfile	
setltype	Set GRIB level type
<i>setltype,ltype</i> infile outfile	
setdate	Set date
<i>setdate,date</i> infile outfile	
settime	Set time of the day
<i>settime,time</i> infile outfile	
setday	Set day
<i>setday,day</i> infile outfile	
setmon	Set month
<i>setmon,month</i> infile outfile	
setyear	Set year
<i>setyear,year</i> infile outfile	
setunits	Set time units
<i>setunits,units</i> infile outfile	
settaxi	Set time axis
<i>settaxi,date,time[,inc]</i> infile outfile	
settbounds	Set time bounds
<i>settbounds,frequency</i> infile outfile	
setreftime	Set reference time
<i>setreftime,date,time[,units]</i> infile outfile	
setcalendar	Set calendar
<i>setcalendar,calendar</i> infile outfile	
shifttime	Shift timesteps
<i>shifttime,sval</i> 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	
chlevelc	Change level of one code
chlevelc,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> [,cyclic<i>i</i> [,coord<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
not	Logical NOT
<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	<stat>
minimum	min
maximum	max
range	range
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
ensrange	Ensemble range
<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 rfile infiles outfilebase	
ensbrs	Ensemble Brier score
ensbrs,x rfile infiles outfilebase	

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

zon<stat>	Zonal statistical values
zonrange	Zonal range
<operator> infile outfile	
zonpctl	Zonal percentiles
zonpctl,p infile outfile	

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

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

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

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

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

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

runpctl	Running percentiles
runpctl,p,nts infile outfile	

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

timpctl	Time percentiles
timpctl,p infile1 infile2 infile3 outfile	

hour<stat>	Hourly statistical values
hourrange	Hourly range
<operator>,> infile outfile	

hourpctl	Hourly percentiles
hourpctl,p infile1 infile2 infile3 outfile	

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

daypctl	Daily percentiles
daypctl,p infile1 infile2 infile3 outfile	

mon<stat>	Monthly statistical values
monrange	Monthly range
<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
yearrange	Yearly range
<operator> infile outfile	

yearpctl	Yearly percentiles
yearpctl,p infile1 infile2 infile3 outfile	

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

seaspctl	Seasonal percentiles
seaspctl,p infile1 infile2 infile3 outfile	

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

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

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

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

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

yseas<stat>	Multi-year seasonal statistical values
yseasrange	Multi-year seasonal range
<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	

ml2pl	Model to pressure level interpolation
ml2pl,plevels infile outfile	
ml2hl	Model to height level interpolation
ml2hl,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
sp2gpl	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
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 > 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 atmosphere
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	

sealevelpressui	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	

NCL

uv2vr_cfd	U and V wind to relative vorticity
uv2dv_cfd	U and V wind to divergence
< operator >[,u,v,boundOpt,outMode] infile outfile	