

# CDO Reference Card

Climate Data Operators

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## Syntax

cdo	[Options]	Operators
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## Options

-a	Convert from relative to absolute time axis
-f <format>	Output file format (grb, nc, nc2, srv, ext, ieg)
-g <grid>	Grid name or file Available grids: t<RES>grid, r<NX>x<NY>
-h	Help information for the operators
-m <missval>	Set the default missing value (default: -9e+33)
-p <prec>	Set the precision of the output data in bytes (4/8 for nc, nc2, srv, ext; 1/2/3 for grb)
-R	Convert GRIB data from reduced to regular grid
-r	Convert from absolute to relative time axis
-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

## Operators

### Information

info	Dataset information
map	Dataset information and simple map
Syntax	<operator> ifiles

sinfo	Short dataset information
Syntax	<operator> ifile

diff	Compare two datasets
Syntax	<operator> ifile1 ifile2

ncode	Number of codes
nvar	Number of variables
nlevel	Number of levels
nyear	Number of years
nmon	Number of months
ndate	Number of dates
ntime	Number of time steps
Syntax	<operator> ifile

showcode	Show codes
showvar	Show variable names
showlevel	Show levels
showyear	Show years
showmon	Show months
showdate	Show dates
showtime	Show time steps
Syntax	<operator> ifile

vardes	Variable description
griddes	Grid description
vct	Vertical coordinate table
Syntax	<operator> ifile

## File operations

copy	Copy datasets
cat	Concatenate datasets
Syntax	<operator> ifiles ofile

replace	Replace variables
Syntax	replace ifile1 ifile2 ofile

merge	Merge datasets with different fields
mergetime	Merge datasets sorted by date and time
Syntax	<operator> ifiles ofile

splitcode	Split codes
splitvar	Split variables
splitlevel	Split levels
splitgrid	Split grids
splitzaxis	Split zaxis
splitrec	Split records
Syntax	<operator> ifile oprefix

splithour	Split hours
splitday	Split days
splitmon	Split months
splitseas	Split seasons
splityear	Split years
Syntax	<operator> ifile oprefix

## Selection

selcode	Select codes
delcode	Delete codes
Syntax	<operator> ,codes ifile ofile

selvar	Select variables
delvar	Delete variables
Syntax	<operator> ,vars ifile ofile

sellevel	Select levels
Syntax	sellevel, levels ifile ofile

selgrid	Select grids
Syntax	selgrid, grids ifile ofile

selgridname	Select grid by name
Syntax	selgridname, gridnames ifile ofile

selzaxis	Select zaxis
Syntax	selzaxis, zaxis ifile ofile

selzaxisname	Select zaxis by name
Syntax	selzaxisname, zaxisnames ifile ofile

seltabnum	Select parameter table number
Syntax	seltabnum, tabnum ifile ofile

selrec	Select records
Syntax	selrec, records ifile ofile

selimestep	Select time steps
Syntax	selimestep, timesteps ifile ofile

seltime	Select times
Syntax	seltime, times ifile ofile

selhour	Select hours
Syntax	selhour, hours ifile ofile

selday	Select days
Syntax	selday, days ifile ofile

selmon	Select months
Syntax	selmon, months ifile ofile

selyear	Select years
Syntax	selyear, years ifile ofile

seleas	Select seasons
Syntax	seleas, seasons ifile ofile

seldate	Select dates
Syntax	seldate, date1[, date2] ifile ofile

selonlatbox	Select lon/lat box
Syntax	selonlatbox, lon1, lon2, lat1, lat2 ifile ofile

selindexbox	Select index box
Syntax	selindexbox, idx1, idx2, idy1, idy2 ifile ofile

## Conditional selection

ifthen	If then
ifnotthen	If not then
Syntax	<operator> ifile1 ifile2 ofile

ifthenelse	If then else
Syntax	ifthenelse ifile1 ifile2 ifile3 ofile

ifthenc	If then constant
ifnotthenc	If not then constant
Syntax	<operator> ,c ifile ofile

## Comparison

eq	Equal
ne	Not equal
le	Less equal
lt	Less than
ge	Greater equal
gt	Greater than
Syntax	<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 then constant
Syntax	<operator> ,c ifile ofile

## Modification

setpartab	Set parameter table
Syntax	setpartab, table ifile ofile

setcode	Set code number
Syntax	setcode, code ifile ofile

setvar	Set variable name
Syntax	setvar, name ifile ofile

setlevel	Set level
Syntax	setlevel, level ifile ofile

setdate	Set date
Syntax	setdate, date ifile ofile

settime	Set time
Syntax	settime, time ifile ofile

setday	Set day
Syntax	setday, day ifile ofile

setmon	Set month
Syntax	setmon, month ifile ofile

setyear	Set year
Syntax	setyear, year ifile ofile

setunits	Set time units
Syntax	setunits, units ifile ofile

settaxis	Set time axis
Syntax	settaxis, date, time[, inc] ifile ofile

setreftime	Set reference time
Syntax	setreftime, date, time ifile ofile

setcalendar	Set calendar
Syntax	setcalendar, calendar ifile ofile

shifttime	Shift time steps
Syntax	shifttime, sval ifile ofile

chcode	Change code number
Syntax	chcode, oldcode, newcode[,...] ifile ofile

chvar	Change variable name
Syntax	chvar, ovar, nvar,... ifile ofile

chlevel	Change level
Syntax	chlevel, oldlev, newlev,... ifile ofile

chlevelc	Change level of one code
Syntax	chlevelc, code, oldlev, newlev ifile ofile
chlevelv	Change level of one variable
Syntax	chlevelv, var, oldlev, newlev ifile ofile

setgrid	Set grid
Syntax	setgrid, grid ifile ofile

setgridtype	Set grid type
Syntax	setgridtype, gridtype ifile ofile

setzaxis	Set zaxis
Syntax	setzaxis, zaxis ifile ofile

setgatt	Set global attribute
Syntax	setgatt, attname, attstring ifile ofile

setgatts	Set global attributes
Syntax	setgatts, attfile ifile ofile

invertlat	Invert latitude
invertlon	Invert longitude
invertlatdes	Invert latitude description
invertlondes	Invert longitude description
invertlatdata	Invert latitude data
invertlondata	Invert longitude data
Syntax	<operator> ifile ofile

masklonlatbox	Mask lon/lat box
Syntax	masklonlatbox, lon1, lon2, lat1, lat2 ifile ofile

maskindexbox	Mask index box
Syntax	maskindexbox, idx1, idx2, idy1, idy2 ifile ofile

enlarge	Enlarge fields
Syntax	enlarge, grid ifile ofile

setmissval	Set a new missing value
Syntax	setmissval, miss ifile ofile

setctomiss	Set constant to missing value
setmisstoc	Set missing value to constant
Syntax	<operator> ,c ifile ofile

setrtomiss	Set range to missing value
Syntax	setrtomiss, rmin, rmax ifile ofile

## Arithmetic

expr	Evaluate expressions
Syntax	expr, instr ifile ofile

exprf	Evaluate expressions from script file
Syntax	exprf, filename ifile ofile

abs	Absolute value
sqr	Square
sqr	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
Syntax	<operator> ifile ofile

addc	Add a constant
subc	Subtract a constant
mulc	Multiply with a constant
divc	Divide by a constant
Syntax	<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
Syntax	<operator> ifile1 ifile2 ofile

ymonadd	Add multi-year monthly time average
ymonsub	Subtract multi-year monthly time average
ymonmul	Multiply multi-year monthly time average
ymonddiv	Divide multi-year monthly time average
Syntax	<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
Syntax	<operator> ifile ofile

Statistical values

<b>ensmin</b>	Ensemble minimum
<b>ensmax</b>	Ensemble maximum
<b>enssum</b>	Ensemble sum
<b>ensmean</b>	Ensemble mean
<b>ensavg</b>	Ensemble average
<b>ensstd</b>	Ensemble standard deviation
<b>ensvar</b>	Ensemble variance
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>fldmin</b>	Field minimum
<b>fldmax</b>	Field maximum
<b>fldsum</b>	Field sum
<b>fldmean</b>	Field mean
<b>fldavg</b>	Field average
<b>fldstd</b>	Field standard deviation
<b>fldvar</b>	Field variance
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>zonmin</b>	Zonal minimum
<b>zonmax</b>	Zonal maximum
<b>zonsum</b>	Zonal sum
<b>zonmean</b>	Zonal mean
<b>zonavg</b>	Zonal average
<b>zonstd</b>	Zonal standard deviation
<b>zonvar</b>	Zonal variance
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>mermin</b>	Meridional minimum
<b>mermax</b>	Meridional maximum
<b>mersum</b>	Meridional sum
<b>mermean</b>	Meridional mean
<b>meravg</b>	Meridional average
<b>merstd</b>	Meridional standard deviation
<b>mervar</b>	Meridional variance
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>vertmin</b>	Vertical minimum
<b>vertmax</b>	Vertical maximum
<b>vertsum</b>	Vertical sum
<b>vertmean</b>	Vertical mean
<b>vertavg</b>	Vertical average
<b>vertstd</b>	Vertical standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>selmin</b>	Time range minimum
<b>selmax</b>	Time range maximum
<b>selsum</b>	Time range sum
<b>selmean</b>	Time range mean
<b>selavg</b>	Time range average
<b>selstd</b>	Time range standard deviation
Syntax	<b>&lt;operator&gt;,nsets[,noffset[,nskip]] ifile ofile</b>

<b>runmin</b>	Running minimum
<b>runmax</b>	Running maximum
<b>runsum</b>	Running sum
<b>runmean</b>	Running mean
<b>runavg</b>	Running average
<b>runstd</b>	Running standard deviation
Syntax	<b>&lt;operator&gt;,nts ifile ofile</b>

<b>timmin</b>	Time minimum
<b>timmax</b>	Time maximum
<b>timsum</b>	Time sum
<b>timmean</b>	Time mean
<b>timavg</b>	Time average
<b>timstd</b>	Time standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>hourmin</b>	Hourly minimum
<b>hourmax</b>	Hourly maximum
<b>hoursum</b>	Hourly sum
<b>hourmean</b>	Hourly mean
<b>houravg</b>	Hourly average
<b>hourstd</b>	Hourly standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>daymin</b>	Daily minimum
<b>daymax</b>	Daily maximum
<b>daysum</b>	Daily sum
<b>daymean</b>	Daily mean
<b>dayavg</b>	Daily average
<b>daystd</b>	Daily standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>monmin</b>	Monthly minimum
<b>monmax</b>	Monthly maximum
<b>monsum</b>	Monthly sum
<b>monmean</b>	Monthly mean
<b>monavg</b>	Monthly average
<b>monstd</b>	Monthly standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>yearmin</b>	Yearly minimum
<b>yearmax</b>	Yearly maximum
<b>yearsum</b>	Yearly sum
<b>yearmean</b>	Yearly mean
<b>yearavg</b>	Yearly average
<b>yearstd</b>	Yearly standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>seasmin</b>	Seasonally minimum
<b>seasmax</b>	Seasonally maximum
<b>seassum</b>	Seasonally sum
<b>seasmean</b>	Seasonally mean
<b>seasavg</b>	Seasonally average
<b>seasstd</b>	Seasonally standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>ydaymin</b>	Multi-year daily minimum
<b>ydaymax</b>	Multi-year daily maximum
<b>ydaymean</b>	Multi-year daily mean
<b>ydayavg</b>	Multi-year daily average
<b>ydaystd</b>	Multi-year daily standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>ymonmin</b>	Multi-year monthly minimum
<b>ymonmax</b>	Multi-year monthly maximum
<b>ymonmean</b>	Multi-year monthly mean
<b>ymonavg</b>	Multi-year monthly average
<b>ymonstd</b>	Multi-year monthly standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>yseasmin</b>	Multi-year seasonally minimum
<b>yseasmax</b>	Multi-year seasonally maximum
<b>yseasmean</b>	Multi-year seasonally mean
<b>yseasavg</b>	Multi-year seasonally average
<b>yseasstd</b>	Multi-year seasonally standard deviation
Syntax	<b>&lt;operator&gt; ifile ofile</b>

Regression

<b>detrend</b>	Detrend
Syntax	<b>detrend ifile ofile</b>

<b>trend</b>	Trend
Syntax	<b>trend ifile ofile1 ofile2</b>

<b>subtrend</b>	Subtract trend
Syntax	<b>subtrend ifile1 ifile2 ifile3 ofile</b>

Interpolation

<b>remapbil</b>	Bilinear interpolation
<b>remapbic</b>	Bicubic interpolation
<b>remapcon</b>	Conservative remapping
<b>remapdis</b>	Distance-weighted averaging
Syntax	<b>&lt;operator&gt;,grid ifile ofile</b>

<b>genbil</b>	Generate bilinear interpolation weights
<b>genbic</b>	Generate bicubic interpolation weights
<b>gencon</b>	Generate conservative interpolation weights
<b>gendis</b>	Generate distance-weighted averaging weights
Syntax	<b>&lt;operator&gt;,grid ifile ofile</b>

<b>remap</b>	SCRIP grid remapping
Syntax	<b>remap,grid,weights ifile ofile</b>

<b>interpolate</b>	PINGO grid interpolation
<b>intgridbil</b>	Bilinear grid interpolation
Syntax	<b>&lt;operator&gt;,grid ifile ofile</b>

<b>ml2pl</b>	Model to pressure level interpolation
Syntax	<b>ml2pl,plevels ifile ofile</b>

<b>ml2hl</b>	Model to height level interpolation
Syntax	<b>ml2hl,hlevels ifile ofile</b>

<b>inttime</b>	Time interpolation
Syntax	<b>inttime,date,time[,inc] ifile ofile</b>

<b>intyear</b>	Year interpolation
Syntax	<b>intyear,years ifile1 ifile2 oprefix</b>

Transformation

<b>sp2gp</b>	Spectral to gridpoint
<b>sp2gpl</b>	Spectral to gridpoint linear
<b>gp2sp</b>	Gridpoint to spectral
<b>gp2spl</b>	Gridpoint to spectral linear
Syntax	<b>&lt;operator&gt; ifile ofile</b>

<b>sp2sp</b>	Spectral to spectral
Syntax	<b>sp2sp,trunc ifile ofile</b>

<b>uv2dv</b>	U and V wind to divergence and vorticity
<b>dv2uv</b>	Divergence and vorticity to U and V wind
Syntax	<b>&lt;operator&gt; ifile ofile</b>

Formatted I/O

<b>input</b>	ASCII input
Syntax	<b>input,grid ofile</b>
<b>inputsrv</b>	SERVICE input
<b>inputext</b>	EXTRA input
Syntax	<b>&lt;operator&gt; ofile</b>

<b>output</b>	ASCII output
Syntax	<b>output ifiles</b>
<b>outputf</b>	Formatted output
Syntax	<b>outputf,format,nelem ifiles</b>

<b>outputint</b>	Integer output
<b>outputsrv</b>	SERVICE output
<b>outputext</b>	EXTRA output
Syntax	<b>&lt;operator&gt; ifiles</b>

Miscellaneous

<b>timsort</b>	Sort over the time
Syntax	<b>timsort ifile ofile</b>

<b>const</b>	Create a constant field
Syntax	<b>const,const,grid ofile</b>
<b>random</b>	Create field with random values
Syntax	<b>random,grid ofile</b>

<b>vardup</b>	Duplicate variables
Syntax	<b>vardup ifile ofile</b>

<b>varmul</b>	Multiply variables
Syntax	<b>varmul,nmul ifile ofile</b>

<b>gradsdes</b>	GrADS data descriptor file
<b>gradsdes2</b>	GrADS data descriptor file (version 2 map)
Syntax	<b>&lt;operator&gt; ifile</b>

<b>rotuvb</b>	Backward rotation
Syntax	<b>rotuvb,u,v,... ifile ofile</b>

<b>mastrfu</b>	Mass stream function
Syntax	<b>mastrfu ifile ofile</b>