

# CDO Reference Card

Climate Data Operators
Version 1.0.0
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## Syntax

cdo	[Options]	Operators
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## Options

-a	Convert from a relative to an 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 an absolute to a 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 infov map	Dataset information listed by code number Dataset information listed by variable name Dataset information and simple map
Syntax	<operator> ifiles
sinfo sinfov	Short dataset information listed by code number Short dataset information listed by variable name
Syntax	<operator> ifile
diff diffv	Compare two datasets listed by code number Compare two datasets listed by variable name
Syntax	<operator> ifile1 ifile2
ncode nvar nlevel nyear nmon ndate ntime	Number of codes Number of variables Number of levels Number of years Number of months Number of dates Number of time steps
Syntax	<operator> ifile
showcode showvar showlevel showyear showmon showdate showtime	Show codes Show variable names Show levels Show years Show months Show dates Show time steps
Syntax	<operator> ifile
vardes griddes vct	Variable description Grid description Vertical coordinate table
Syntax	<operator> ifile

### File operations

copy cat	Copy datasets Concatenate datasets
Syntax	<operator> ifiles ofile
replace	Replace variables
Syntax	replace ifile1 ifile2 ofile
merge mergetime	Merge datasets with different fields Merge datasets sorted by date and time
Syntax	<operator> ifiles ofile
splitcode splitvar splitlevel splitgrid splitzaxis splitrec	Split codes Split variables Split levels Split grids Split zaxis Split records
Syntax	<operator> ifile oprefix
splthour splitday splitmon splitseas splityear	Split hours Split days Split months Split seasons Split years
Syntax	<operator> ifile oprefix

### Selection

selcode delcode	Select codes Delete codes
Syntax	<operator> ,codes ifile ofile
selvar delvar	Select variables 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 grids by name
Syntax	selgridname ,gridnames ifile ofile
selzaxis	Select zaxes
Syntax	selzaxis ,zaxes ifile ofile
selzaxisname	Select zaxes by name
Syntax	selzaxisname ,zaxisnames ifile ofile
seltabnum	Select parameter table numbers
Syntax	seltabnum ,tabnums ifile ofile
selrec	Select records
Syntax	selrec ,records ifile ofile
seltimestep	Select time steps
Syntax	seltimestep ,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
selseas	Select seasons
Syntax	selseas ,seasons ifile ofile
seldate	Select dates
Syntax	seldate ,date1[,date2] ifile ofile
sellonlatbox	Select a longitude/latitude box
Syntax	sellonlatbox ,lon1,lon2,lat1,lat2 ifile ofile
selindexbox	Select an index box
Syntax	selindexbox ,idx1,idx2,idy1,idy2 ifile ofile

### Conditional selection

ifthen ifnotthen	If then If not then
Syntax	<operator> ifile1 ifile2 ofile
ifthenelse	If then else
Syntax	ifthenelse ifile1 ifile2 ifile3 ofile
ifthenc ifnotthenc	If then constant If not then constant
Syntax	<operator> ,c ifile ofile

### Comparison

eq ne le lt ge gt	Equal Not equal Less equal Less than Greater equal Greater than
Syntax	<operator> ifile1 ifile2 ofile
eqc nec lec ltc gec gtc	Equal constant Not equal constant Less equal constant Less then constant Greater equal constant 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 invertlon invertlatdes invertlonides invertlatdata invertlondata	Invert latitude Invert longitude Invert latitude description Invert longitude description Invert latitude data Invert longitude data
Syntax	<operator> ifile ofile
masklonlatbox	Mask a longitude/latitude box
Syntax	masklonlatbox ,lon1,lon2,lat1,lat2 ifile ofile
maskindexbox	Mask an 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 setmisstoc	Set constant to missing value 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 sqr sqrt exp ln log10 sin cos tan asin acos atan	Absolute value Square Square root Exponential Natural logarithm Base 10 logarithm Sine Cosine Tangent Arc sine Arc cosine Arc tangent
Syntax	<operator> ifile ofile
addc subc mulc divc	Add a constant Subtract a constant Multiply with a constant Divide by a constant
Syntax	<operator> ,c ifile ofile
add sub mul div min max atan2	Add two fields Subtract two fields Multiply two fields Divide two fields Minimum of two fields Maximum of two fields Arc tangent of two fields
Syntax	<operator> ifile1 ifile2 ofile
ymonadd ymonsub ymonmul ymondiv	Add multi-year monthly time average Subtract multi-year monthly time average Multiply multi-year monthly time average Divide multi-year monthly time average
Syntax	<operator> ifile1 ifile2 ofile

<b>muldpm</b>	Multiply with days per month
<b>divdpm</b>	Divide by days per month
<b>muldpy</b>	Multiply with days per year
<b>divdpy</b>	Divide by days per year
Syntax	<b>&lt;operator&gt; ifile ofile</b>

### 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; ifiles 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>timsun</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>yearsun</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 a 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>