

# CDO Reference Card

Climate Data Operators
Version 1.0.1
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## Syntax

<b>cdo</b>	<b>[Options]</b>	<b>Operators</b>
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## Options

<b>-a</b>	Convert from a relative to an absolute time axis
<b>-b</b> <i>&lt;nbits&gt;</i>	Set the number of bits for the output precision (4/8 for nc, nc2, srv, ext; 1/2/3 for grb)
<b>-f</b> <i>&lt;format&gt;</i>	Output file format (grb, nc, nc2, srv, ext, ieg)
<b>-g</b> <i>&lt;grid&gt;</i>	Grid name or file Available grids: t<RES>grid, r<NX>x<NY>
<b>-h</b>	Help information for the operators
<b>-m</b> <i>&lt;missval&gt;</i>	Set the default missing value (default: <b>-9e+33</b> )
<b>-R</b>	Convert GRIB data from reduced to regular grid
<b>-r</b>	Convert from an absolute to a relative time axis
<b>-t</b> <i>&lt;table&gt;</i>	Set the parameter table name or file Predefined tables: echam4 echam5 mpiom1
<b>-V</b>	Print the version number
<b>-v</b>	Print extra details for some operators

## Operators

### Information

<b>info</b> <b>infov</b> <b>map</b>	Dataset information listed by code number Dataset information listed by variable name Dataset information and simple map
Syntax	<b>&lt;operator&gt; ifiles</b>
<b>sinfo</b> <b>sinfov</b>	Short dataset information listed by code number Short dataset information listed by variable name
Syntax	<b>&lt;operator&gt; ifile</b>
<b>diff</b> <b>diffv</b>	Compare two datasets listed by code number Compare two datasets listed by variable name
Syntax	<b>&lt;operator&gt; ifile1 ifile2</b>
<b>ncode</b> <b>nvar</b> <b>nlevel</b> <b>nyear</b> <b>nmon</b> <b>ndate</b> <b>ntime</b>	Number of codes Number of variables Number of levels Number of years Number of months Number of dates Number of time steps
Syntax	<b>&lt;operator&gt; ifile</b>
<b>showcode</b> <b>showvar</b> <b>showstdname</b> <b>showlevel</b> <b>showyear</b> <b>showmon</b> <b>showdate</b> <b>showtime</b>	Show codes Show variable names Show standard names Show levels Show years Show months Show dates Show time steps
Syntax	<b>&lt;operator&gt; ifile</b>
<b>vardes</b> <b>griddes</b> <b>vct</b>	Variable description Grid description Vertical coordinate table
Syntax	<b>&lt;operator&gt; ifile</b>

### File operations

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

### Selection

<b>selcode</b> <b>delcode</b>	Select codes Delete codes
Syntax	<b>&lt;operator&gt;.codes ifile ofile</b>
<b>selvar</b> <b>delvar</b>	Select variables Delete variables
Syntax	<b>&lt;operator&gt;.vars ifile ofile</b>
<b>selstdname</b>	Select standard names
Syntax	<b>selstdname,stdnames ifile ofile</b>
<b>sellevel</b>	Select levels
Syntax	<b>sellevel,levels ifile ofile</b>
<b>selgrid</b>	Select grids
Syntax	<b>selgrid,grids ifile ofile</b>
<b>selgridname</b>	Select grids by name
Syntax	<b>selgridname,gridnames ifile ofile</b>
<b>selzaxis</b>	Select zaxes
Syntax	<b>selzaxis,zaxes ifile ofile</b>
<b>selzaxisname</b>	Select zaxes by name
Syntax	<b>selzaxisname,zaxisnames ifile ofile</b>
<b>seltabnum</b>	Select parameter table numbers
Syntax	<b>seltabnum,tabnums ifile ofile</b>
<b>selrec</b>	Select records
Syntax	<b>selrec,records ifile ofile</b>
<b>seltimestep</b>	Select time steps
Syntax	<b>seltimestep,timesteps ifile ofile</b>
<b>seltime</b>	Select times
Syntax	<b>seltime,times ifile ofile</b>
<b>selhour</b>	Select hours
Syntax	<b>selhour,hours ifile ofile</b>
<b>selday</b>	Select days
Syntax	<b>selday,days ifile ofile</b>
<b>selmon</b>	Select months
Syntax	<b>selmon,months ifile ofile</b>
<b>selyear</b>	Select years
Syntax	<b>selyear,years ifile ofile</b>
<b>selseas</b>	Select seasons
Syntax	<b>selseas,seasons ifile ofile</b>
<b>seldate</b>	Select dates
Syntax	<b>seldate,date1[,date2] ifile ofile</b>
<b>sellonlatbox</b>	Select a longitude/latitude box
Syntax	<b>sellonlatbox,lon1,lon2,lat1,lat2 ifile ofile</b>
<b>selindexbox</b>	Select an index box
Syntax	<b>selindexbox,idx1,idx2,idy1,idy2 ifile ofile</b>

### Conditional selection

<b>ifthen</b> <b>ifnotthen</b>	If then If not then
Syntax	<b>&lt;operator&gt; ifile1 ifile2 ofile</b>
<b>ifthenelse</b>	If then else
Syntax	<b>ifthenelse ifile1 ifile2 ifile3 ofile</b>
<b>ifthenc</b> <b>ifnotthenc</b>	If then constant If not then constant
Syntax	<b>&lt;operator&gt;,c ifile ofile</b>

### Comparison

<b>eq</b> <b>ne</b> <b>le</b> <b>lt</b> <b>ge</b> <b>gt</b>	Equal Not equal Less equal Less than Greater equal Greater than
Syntax	<b>&lt;operator&gt; ifile1 ifile2 ofile</b>
<b>eqc</b> <b>nec</b> <b>lec</b> <b>ltc</b> <b>gec</b> <b>gtc</b>	Equal constant Not equal constant Less equal constant Less then constant Greater equal constant Greater then constant
Syntax	<b>&lt;operator&gt;,c ifile ofile</b>

### Modification

<b>setpartab</b>	Set parameter table
Syntax	<b>setpartab,table ifile ofile</b>
<b>setcode</b>	Set code number
Syntax	<b>setcode,code ifile ofile</b>
<b>setvar</b>	Set variable name
Syntax	<b>setvar,name ifile ofile</b>
<b>setlevel</b>	Set level
Syntax	<b>setlevel,level ifile ofile</b>
<b>setdate</b>	Set date
Syntax	<b>setdate,date ifile ofile</b>
<b>settime</b>	Set time
Syntax	<b>settime,time ifile ofile</b>
<b>setday</b>	Set day
Syntax	<b>setday,day ifile ofile</b>
<b>setmon</b>	Set month
Syntax	<b>setmon,month ifile ofile</b>
<b>setyear</b>	Set year
Syntax	<b>setyear,year ifile ofile</b>
<b>setunits</b>	Set time units
Syntax	<b>setunits,units ifile ofile</b>
<b>settaxis</b>	Set time axis
Syntax	<b>settaxis,date,time[,inc] ifile ofile</b>
<b>setreftime</b>	Set reference time
Syntax	<b>setreftime,date,time ifile ofile</b>
<b>setcalendar</b>	Set calendar
Syntax	<b>setcalendar,calendar ifile ofile</b>
<b>shifttime</b>	Shift time steps
Syntax	<b>shifttime,sval ifile ofile</b>
<b>chcode</b>	Change code number
Syntax	<b>chcode,oldcode,newcode[,...] ifile ofile</b>
<b>chvar</b>	Change variable name
Syntax	<b>chvar,ovar,nvar,... ifile ofile</b>
<b>chlevel</b>	Change level
Syntax	<b>chlevel,oldlev,newlev,... ifile ofile</b>
<b>chlevelc</b>	Change level of one code
Syntax	<b>chlevelc,code,oldlev,newlev ifile ofile</b>
<b>chlevelv</b>	Change level of one variable
Syntax	<b>chlevelv,var,oldlev,newlev ifile ofile</b>

<b>setgrid</b>	Set grid
Syntax	<b>setgrid,grid ifile ofile</b>
<b>setgridtype</b>	Set grid type
Syntax	<b>setgridtype,gridtype ifile ofile</b>
<b>setzaxis</b>	Set zaxis
Syntax	<b>setzaxis,zaxis ifile ofile</b>
<b>setgatt</b>	Set global attribute
Syntax	<b>setgatt,attname,attstring ifile ofile</b>
<b>setgatts</b>	Set global attributes
Syntax	<b>setgatts,attfile ifile ofile</b>
<b>invertlat</b> <b>invertlon</b> <b>invertlatdes</b> <b>invertlonides</b> <b>invertlatdata</b> <b>invertlondata</b>	Invert latitude Invert longitude Invert latitude description Invert longitude description Invert latitude data Invert longitude data
Syntax	<b>&lt;operator&gt; ifile ofile</b>
<b>masklonlatbox</b>	Mask a longitude/latitude box
Syntax	<b>masklonlatbox,lon1,lon2,lat1,lat2 ifile ofile</b>
<b>maskindexbox</b>	Mask an index box
Syntax	<b>maskindexbox,idx1,idx2,idy1,idy2 ifile ofile</b>
<b>setclonlatbox</b>	Set a longitude/latitude box to constant
Syntax	<b>setclonlatbox,c,lon1,lon2,lat1,lat2 ifile ofile</b>
<b>setcindexbox</b>	Set an index box to constant
Syntax	<b>setcindexbox,c,idx1,idx2,idy1,idy2 ifile ofile</b>
<b>enlarge</b>	Enlarge fields
Syntax	<b>enlarge,grid ifile ofile</b>
<b>setmissval</b>	Set a new missing value
Syntax	<b>setmissval,miss ifile ofile</b>
<b>setctomiss</b> <b>setmisstoc</b>	Set constant to missing value Set missing value to constant
Syntax	<b>&lt;operator&gt;,c ifile ofile</b>
<b>setrtomiss</b>	Set range to missing value
Syntax	<b>setrtomiss,rmin,rmax ifile ofile</b>

### Arithmetic

<b>expr</b>	Evaluate expressions
Syntax	<b>expr,instr ifile ofile</b>
<b>exprf</b>	Evaluate expressions from script file
Syntax	<b>exprf,filename ifile ofile</b>
<b>abs</b> <b>sqr</b> <b>sqrt</b> <b>exp</b> <b>ln</b> <b>log10</b> <b>sin</b> <b>cos</b> <b>tan</b> <b>asin</b> <b>acos</b> <b>atan</b>	Absolute value Square Square root Exponential Natural logarithm Base 10 logarithm Sine Cosine Tangent Arc sine Arc cosine Arc tangent
Syntax	<b>&lt;operator&gt; ifile ofile</b>
<b>addc</b> <b>subc</b> <b>mulc</b> <b>divc</b>	Add a constant Subtract a constant Multiply with a constant Divide by a constant
Syntax	<b>&lt;operator&gt;,c ifile ofile</b>
<b>add</b> <b>sub</b> <b>mul</b> <b>div</b> <b>min</b> <b>max</b> <b>atan2</b>	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	<b>&lt;operator&gt; ifile1 ifile2 ofile</b>

<b>ymonadd</b>	Add multi-year monthly time average
<b>ymonsub</b>	Subtract multi-year monthly time average
<b>ymonmul</b>	Multiply multi-year monthly time average
<b>ymonddiv</b>	Divide multi-year monthly time average
Syntax	<b>&lt;operator&gt; ifile1 ifile2 ofile</b>
<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>tisum</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 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>