

# CDO Reference Card

Climate Data Operators  
Version 1.4.3  
February 2010

Uwe Schulzweida  
Max-Planck-Institute for Meteorology

http://www.mpimet.mpg.de/cdo

## Syntax

cdo	[Options]	Operator1	[ −Operator2	[ −OperatorN	]
-----	-----------	-----------	--------------	--------------	---

## Options

-a	Generate an absolute time axis
-b <nbits>	Set the number of bits for the output precision (32/64 for nc,nc2,nc4,srv,ext,ieg; 1 - 32 for grb) Add L or B for Little or Big endian byteorder
-f <format>	Output file format (grb,nc,nc2,nc4,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	Indicate that the I/O streams have missing values
-m <missval>	Set the default missing value (default: -9e+33)
-R	Convert GRIB data from reduced to regular grid
-r	Generate a relative time axis
-s	Silent mode
-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
-z szip	Compress GRIB records with szip

## Operators

### Information

info	Dataset information listed by code number
infov	Dataset information listed by variable name
map	Dataset information and simple map
Syntax	<operator> ifiles

sinfo	Short dataset information listed by code number
sinfov	Short dataset information listed by variable name
Syntax	<operator> ifiles

diff	Compare two datasets listed by code number
diffv	Compare two datasets listed by variable name
Syntax	<operator> ifile1 ifile2

npar	Number of parameters
nlevel	Number of levels
nyear	Number of years
nmon	Number of months
ndate	Number of dates
ntime	Number of time steps
Syntax	<operator> ifile

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
Syntax	<operator> ifile

pardes	Parameter description
griddes	Grid description
zaxisdes	Z-axis 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 code numbers
splitname	Split variable names
splitlevel	Split levels
splitgrid	Split grids
splitzaxis	Split z-axes
splittabnum	Split parameter table numbers
Syntax	<operator> ifile oprefix

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

splitsel	Split time selection
Syntax	splitsel,nsets[,noffset[,nskip]] ifile oprefix

## Selection

selcode	Select variables by code number
delcode	Delete variables by code number
Syntax	<operator> ,codes ifile ofile
selname	Select variables by name
delname	Delete variables by name
Syntax	<operator> ,varnames ifile ofile
selstdname	Select variables by standard name
Syntax	selstdname,stdnames ifile ofile

sellevel	Select levels
Syntax	sellevel,levels ifile ofile
sellevelidx	Select levels by index
Syntax	sellevelidx,levelidx ifile ofile
selgrid	Select grids
Syntax	selgrid,grids ifile ofile
selzaxis	Select z-axes
Syntax	selzaxis,zaxes ifile ofile
selltype	Select GRIB level types
Syntax	selltype,types ifile ofile
seltabnum	Select parameter table numbers
Syntax	seltabnum,tabnums 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
selseas	Select seasons
Syntax	selseas,seasons ifile ofile
seldate	Select dates
Syntax	seldate,date1[,date2] ifile ofile
selsmon	Select single month
Syntax	selsmon,month[,nts1[,nts2]] 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	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 than 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
setname	Set variable name
Syntax	setname,name ifile ofile
setlevel	Set level
Syntax	setlevel,level ifile ofile
setltype	Set GRIB level type
Syntax	setltype,ltype ifile ofile

setdate	Set date
Syntax	setdate,date ifile ofile
settime	Set time of the day
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
settimeunits	Set time units
Syntax	settimeunits,units ifile ofile
settimeaxis	Set time axis
Syntax	settimeaxis,date,time[,inc] ifile ofile
setreftime	Set reference time
Syntax	setreftime,date,time[,units] 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
chname	Change variable name
Syntax	chname,oldname,newname,... 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,name,oldlev,newlev ifile ofile

setgrid	Set grid
Syntax	setgrid,grid ifile ofile
setgridtype	Set grid type
Syntax	setgridtype,gridtype ifile ofile

setzaxis	Set z-axis
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 latitudes
Syntax	invertlat ifile ofile

invertlev	Invert levels
Syntax	invertlev ifile ofile

maskregion	Mask regions
Syntax	maskregion,regions 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

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

enlarge	Enlarge fields
Syntax	enlarge,grid ifile ofile

setmissval	Set a new missing value
Syntax	setmissval,newmiss 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
setvrange	Set valid range
Syntax	<operator> ,rmin,rmax ifile ofile

Arithmetic

<b>expr</b>	Evaluate expressions
Syntax	<b>expr</b> , <i>instr</i> ifile ofile
<b>exprf</b>	Evaluate expressions from script file
Syntax	<b>exprf</b> , <i>filename</i> ifile ofile
<b>abs</b>	Absolute value
<b>int</b>	Integer value
<b>nint</b>	Nearest integer value
<b>pow</b>	Power
<b>sqr</b>	Square
<b>sqr</b>	Square root
<b>exp</b>	Exponential
<b>ln</b>	Natural logarithm
<b>log10</b>	Base 10 logarithm
<b>sin</b>	Sine
<b>cos</b>	Cosine
<b>tan</b>	Tangent
<b>asin</b>	Arc sine
<b>acos</b>	Arc cosine
<b>reci</b>	Reciprocal value
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>addc</b>	Add a constant
<b>subc</b>	Subtract a constant
<b>mulc</b>	Multiply with a constant
<b>divc</b>	Divide by a constant
Syntax	<b>&lt;operator&gt;</b> , <i>c</i> ifile ofile
<b>add</b>	Add two fields
<b>sub</b>	Subtract two fields
<b>mul</b>	Multiply two fields
<b>div</b>	Divide two fields
<b>min</b>	Minimum of two fields
<b>max</b>	Maximum of two fields
<b>atan2</b>	Arc tangent of two fields
Syntax	<b>&lt;operator&gt;</b> ifile1 ifile2 ofile
<b>monadd</b>	Add monthly time series
<b>monsub</b>	Subtract monthly time series
<b>monmul</b>	Multiply monthly time series
<b>mondiv</b>	Divide monthly time series
Syntax	<b>&lt;operator&gt;</b> ifile1 ifile2 ofile
<b>ymonadd</b>	Add multi-year monthly time series
<b>ymonsub</b>	Subtract multi-year monthly time series
<b>ymonmul</b>	Multiply multi-year monthly time series
<b>ymondiv</b>	Divide multi-year monthly time series
Syntax	<b>&lt;operator&gt;</b> 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;</b> ifile ofile

Statistical values

Available statistical functions		<STAT>
minimum		min
maximum		max
sum		sum
mean		mean
average		avg
variance		var
standard deviation		std

ens<STAT>	Statistical values over an ensemble
Syntax	<operator> ifiles ofile
enspctl	Ensemble percentiles
Syntax	enspctl,p ifiles ofile
fld<STAT>	Statistical values over a field
Syntax	<operator> ifile ofile
fldpctl	Field percentiles
Syntax	fldpctl,p ifile ofile

<b>zon&lt;STAT&gt;</b>	Zonal statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>zonpctl</b>	Zonal percentiles
Syntax	<b>zonpctl</b> , <i>p</i> ifile ofile
<b>mer&lt;STAT&gt;</b>	Meridional statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>merpctl</b>	Meridional percentiles
Syntax	<b>merpctl</b> , <i>p</i> ifile ofile
<b>vert&lt;STAT&gt;</b>	Vertical statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>timsel&lt;STAT&gt;</b>	Time range statistical values
Syntax	<b>&lt;operator&gt;</b> , <i>nsets</i> [, <i>noffset</i> ][, <i>nskip</i> ] ifile ofile
<b>timselpctl</b>	Time range percentiles
Syntax	<b>timselpctl</b> , <i>p</i> , <i>nsets</i> [, <i>noffset</i> ][, <i>nskip</i> ] ifile1 ifile2 ofile
<b>run&lt;STAT&gt;</b>	Running statistical values
Syntax	<b>&lt;operator&gt;</b> , <i>nts</i> ifile ofile
<b>runpctl</b>	Running percentiles
Syntax	<b>runpctl</b> , <i>p</i> , <i>nts</i> ifile1 ofile
<b>tim&lt;STAT&gt;</b>	Statistical values over all time steps
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>timpctl</b>	Time percentiles
Syntax	<b>timpctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>hour&lt;STAT&gt;</b>	Hourly statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>hourpctl</b>	Hourly percentiles
Syntax	<b>hourpctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>day&lt;STAT&gt;</b>	Daily statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>daypctl</b>	Daily percentiles
Syntax	<b>daypctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>mon&lt;STAT&gt;</b>	Monthly statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>monpctl</b>	Monthly percentiles
Syntax	<b>monpctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>year&lt;STAT&gt;</b>	Yearly statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>yearpctl</b>	Yearly percentiles
Syntax	<b>yearpctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>seas&lt;STAT&gt;</b>	Seasonal statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>seaspctl</b>	Seasonal percentiles
Syntax	<b>seaspctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>yhour&lt;STAT&gt;</b>	Multi-year hourly statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>yday&lt;STAT&gt;</b>	Multi-year daily statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>ydaypctl</b>	Multi-year daily percentiles
Syntax	<b>ydaypctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>ymon&lt;STAT&gt;</b>	Multi-year monthly statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>ymonpctl</b>	Multi-year monthly percentiles
Syntax	<b>ymonpctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>yseas&lt;STAT&gt;</b>	Multi-year seasonal statistical values
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>yseaspctl</b>	Multi-year seasonal percentiles
Syntax	<b>yseaspctl</b> , <i>p</i> ifile1 ifile2 ifile3 ofile
<b>ydrun&lt;STAT&gt;</b>	Multi-year daily running statistical values
Syntax	<b>&lt;operator&gt;</b> , <i>nts</i> ifile ofile
<b>ydrunpctl</b>	Multi-year daily running percentiles
Syntax	<b>ydrunpctl</b> , <i>p</i> , <i>nts</i> ifile1 ifile2 ifile3 ofile

Regression

<b>regres</b>	Regression
Syntax	<b>regres</b> ifile ofile
<b>detrend</b>	Detrend
Syntax	<b>detrend</b> ifile ofile
<b>trend</b>	Trend
Syntax	<b>trend</b> ifile ofile1 ofile2
<b>subtrend</b>	Subtract trend
Syntax	<b>subtrend</b> ifile1 ifile2 ifile3 ofile

Interpolation

<b>remapbil</b>	Bilinear interpolation
<b>remapbic</b>	Bicubic interpolation
<b>remapdis</b>	Distance-weighted average remapping
<b>remapnn</b>	Nearest neighbor remapping
<b>remapcon</b>	First order conservative remapping
<b>remapcon2</b>	Second order conservative remapping
<b>remaplaf</b>	Largest area fraction remapping
Syntax	<b>&lt;operator&gt;</b> , <i>grid</i> ifile ofile
<b>genbil</b>	Generate bilinear interpolation weights
<b>genbic</b>	Generate bicubic interpolation weights
<b>gendis</b>	Generate distance-weighted average remap weights
<b>gennn</b>	Generate nearest neighbor remap weights
<b>gencon</b>	Generate 1st order conservative remap weights
<b>gencon2</b>	Generate 2nd order conservative remap weights
<b>genlaf</b>	Generate largest area fraction remap weights
Syntax	<b>&lt;operator&gt;</b> , <i>grid</i> ifile ofile
<b>remap</b>	SCRIP grid remapping
Syntax	<b>remap</b> , <i>grid</i> , <i>weights</i> ifile ofile
<b>remapeta</b>	Remap vertical hybrid level
Syntax	<b>remapeta</b> , <i>vct</i> [, <i>oro</i> ] ifile ofile
<b>ml2pl</b>	Model to pressure level interpolation
Syntax	<b>ml2pl</b> , <i>plevels</i> ifile ofile
<b>ml2hl</b>	Model to height level interpolation
Syntax	<b>ml2hl</b> , <i>hlevels</i> ifile ofile
<b>intlevel</b>	Linear level interpolation
Syntax	<b>intlevel</b> , <i>levels</i> ifile ofile
<b>inttime</b>	Interpolation between time steps
Syntax	<b>inttime</b> , <i>date</i> , <i>time</i> [, <i>inc</i> ] ifile ofile
<b>intntime</b>	Interpolation between time steps
Syntax	<b>intntime</b> , <i>n</i> ifile ofile
<b>intyear</b>	Interpolation between two years
Syntax	<b>intyear</b> , <i>years</i> ifile1 ifile2 oprefix

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;</b> ifile ofile
<b>sp2sp</b>	Spectral to spectral
Syntax	<b>sp2sp</b> , <i>trunc</i> ifile ofile
<b>spcut</b>	Cut spectral wave number
Syntax	<b>spcut</b> , <i>wnums</i> ifile ofile
<b>dv2uv</b>	Divergence and vorticity to U and V wind
<b>dv2uvl</b>	Divergence and vorticity to U and V wind (linear)
<b>uv2dv</b>	U and V wind to divergence and vorticity
<b>uv2dvl</b>	U and V wind to divergence and vorticity (linear)
Syntax	<b>&lt;operator&gt;</b> ifile ofile

Formatted I/O

<b>input</b>	ASCII input
Syntax	<b>input</b> , <i>grid</i> ofile
<b>inputsrv</b>	SERVICE ASCII input
<b>inputext</b>	EXTRA ASCII input
Syntax	<b>&lt;operator&gt;</b> ofile
<b>output</b>	ASCII output
Syntax	<b>output</b> ifiles
<b>outputf</b>	Formatted output
Syntax	<b>outputf</b> , <i>format</i> , <i>nelem</i> ifiles
<b>outputint</b>	Integer output
<b>outputsrv</b>	SERVICE ASCII output
<b>outputext</b>	EXTRA ASCII output
Syntax	<b>&lt;operator&gt;</b> ifiles

Miscellaneous

<b>gridarea</b>	Grid cell area
<b>gridweights</b>	Grid cell weights
Syntax	<b>&lt;operator&gt;</b> ifile ofile
<b>gradsdes1</b>	GrADS data descriptor file (version 1 GRIB map)
<b>gradsdes2</b>	GrADS data descriptor file (version 2 GRIB map)
Syntax	<b>&lt;operator&gt;</b> ifile
<b>smooth9</b>	9 point smoothing
Syntax	<b>smooth9</b> ifile ofile
<b>setrtoc</b>	Set range to constant
Syntax	<b>setrtoc</b> , <i>rmin</i> , <i>rmax</i> , <i>c</i> ifile ofile
<b>setrtoc2</b>	Set range to constant others to constant2
Syntax	<b>setrtoc2</b> , <i>rmin</i> , <i>rmax</i> , <i>c</i> , <i>c2</i> ifile ofile
<b>timsort</b>	Sort over the time
Syntax	<b>timsort</b> ifile ofile
<b>const</b>	Create a constant field
Syntax	<b>const</b> , <i>const</i> , <i>grid</i> ofile
<b>random</b>	Create a field with random values
Syntax	<b>random</b> , <i>grid</i> ofile
<b>rotuvb</b>	Backward rotation
Syntax	<b>rotuvb</b> , <i>u</i> , <i>v</i> ,... ifile ofile
<b>mastrfu</b>	Mass stream function
Syntax	<b>mastrfu</b> ifile ofile
<b>histcount</b>	Histogram count
<b>histsum</b>	Histogram sum
<b>histmean</b>	Histogram mean
<b>histfreq</b>	Histogram frequency
Syntax	<b>&lt;operator&gt;</b> , <i>bounds</i> ifile ofile
<b>sethalo</b>	Set the left and right bounds of a field
Syntax	<b>sethalo</b> , <i>lhalo</i> , <i>rhalo</i> ifile ofile
<b>wct</b>	Windchill temperature
Syntax	<b>wct</b> ifile1 ifile2 ofile
<b>fdns</b>	Frost days where no snow index per time period
Syntax	<b>fdns</b> ifile1 ifile2 ofile
<b>strwin</b>	Strong wind days index per time period
Syntax	<b>strwin</b> [, <i>v</i> ] ifile ofile
<b>strbre</b>	Strong breeze days index per time period
Syntax	<b>strbre</b> ifile ofile
<b>strgal</b>	Strong gale days index per time period
Syntax	<b>strgal</b> ifile ofile
<b>hurr</b>	Hurricane days index per time period
Syntax	<b>hurr</b> ifile ofile
<b>import.amsr</b>	Import AMSR binary files
Syntax	<b>import.amsr</b> ifile ofile
<b>import.cmsaf</b>	Import CM-SAF HDF5 files
Syntax	<b>import.cmsaf</b> ifile ofile
<b>import.binary</b>	Import binary data sets
Syntax	<b>import.binary</b> ifile ofile