# CDO Reference Card

Climate Data Operators
Version 1.0.8
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## Syntax

**cdo** [**Options**] **Operators**

## Options

| | |
|---|---|
| **-a** | Convert from a relative to an absolute time axis |
| **-b** <*nbits*> | Set the number of bits for the output precision (32/64 for nc, nc2, srv, ext, ieg; 1 - 32 for grb) |
| **-f** <*format*> | Output file format (grb, nc, nc2, srv, ext, ieg) |
| **-g** <*grid*> | Grid name or file<br>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`) |
| **-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<br>Predefined tables: echam4 echam5 mpiom1 |
| **-V** | Print the version number |
| **-v** | Print extra details for some operators |

## 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*> `ifile` |

| | |
|---|---|
| **diff** | Compare two datasets listed by code number |
| **diffv** | Compare two datasets listed by variable name |
| 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` |

| | |
|---|---|
| **showformat** | Show file format |
| **showcode** | Show codes |
| **showvar** | Show variable names |
| **showstdname** | Show standard names |
| **showlevel** | Show levels |
| **showltype** | Show GRIB level types |
| **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` |

| | |
|---|---|
| **selstdname** | Select standard names |
| Syntax | **selstdname**,*stdnames* `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` |

| | |
|---|---|
| **selltype** | Select GRIB level types |
| Syntax | **selltype**,*ltypes* `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` |

| | |
|---|---|
| **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 then 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` |

| | |
|---|---|
| **setltype** | Set GRIB level type |
| Syntax | **setltype**,*ltype* `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` |

| | |
|---|---|
| **settunits** | Set time units |
| Syntax | **settunits**,*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 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**,*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 |
| **int** | Integer value |
| **nint** | Nearest integer value |
| **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 |
| 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 |
| **ymondiv** | 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

| | |
|---|---|
| **ensmin** | Ensemble minimum |
| **ensmax** | Ensemble maximum |
| **enssum** | Ensemble sum |
| **ensmean** | Ensemble mean |
| **ensavg** | Ensemble average |
| **ensvar** | Ensemble variance |
| **ensstd** | Ensemble standard deviation |
| Syntax | <*operator*> `ifiles ofile` |

| | |
|---|---|
| **enspctl** | Ensemble percentiles |
| Syntax | **enspctl**,*p* `ifiles ofile` |

| | |
|---|---|
| **fldmin** | Field minimum |
| **fldmax** | Field maximum |
| **fldsum** | Field sum |
| **fldmean** | Field mean |
| **fldavg** | Field average |
| **fldvar** | Field variance |
| **fldstd** | Field standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **fldpctl** | Field percentiles |
| Syntax | **fldpctl**,*p* `ifile ofile` |

| | |
|---|---|
| **zonmin** | Zonal minimum |
| **zonmax** | Zonal maximum |
| **zonsum** | Zonal sum |
| **zonmean** | Zonal mean |
| **zonavg** | Zonal average |
| **zonvar** | Zonal variance |
| **zonstd** | Zonal standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **zonpctl** | Zonal percentiles |
| Syntax | **zonpctl**,*p* `ifile ofile` |

| | |
|---|---|
| **mermin** | Meridional minimum |
| **mermax** | Meridional maximum |
| **mersum** | Meridional sum |
| **mermean** | Meridional mean |
| **meravg** | Meridional average |
| **mervar** | Meridional variance |
| **merstd** | Meridional standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **merpctl** | Meridional percentiles |
| Syntax | **merpctl**,*p* `ifile ofile` |

| | |
|---|---|
| **vertmin** | Vertical minimum |
| **vertmax** | Vertical maximum |
| **vertsum** | Vertical sum |
| **vertmean** | Vertical mean |
| **vertavg** | Vertical average |
| **vertvar** | Vertical variance |
| **vertstd** | Vertical standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **selmin** | Time range minimum |
| **selmax** | Time range maximum |
| **selsum** | Time range sum |
| **selmean** | Time range mean |
| **selavg** | Time range average |
| **selvar** | Time range variance |
| **selstd** | Time range standard deviation |
| Syntax | <*operator*>,*nsets*[,*noffset*[,*nskip*]] `ifile ofile` |

| | |
|---|---|
| **selpctl** | Time range percentiles |
| Syntax | **selpctl**,*p*,*nsets*[,*noffset*[,*nskip*]] `in1 in2 in3 out` |

| | |
|---|---|
| **runmin** | Running minimum |
| **runmax** | Running maximum |
| **runsum** | Running sum |
| **runmean** | Running mean |
| **runavg** | Running average |
| **runvar** | Running variance |
| **runstd** | Running standard deviation |
| Syntax | <*operator*>,*nts* `ifile ofile` |

| | |
|---|---|
| **runpctl** | Running percentiles |
| Syntax | **runpctl**,*p*,*nts* `ifile1 ofile` |

| | |
|---|---|
| **timmin** | Time minimum |
| **timmax** | Time maximum |
| **timsum** | Time sum |
| **timmean** | Time mean |
| **timavg** | Time average |
| **timvar** | Time variance |
| **timstd** | Time standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **timpctl** | Time percentiles |
| Syntax | **timpctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **hourmin** | Hourly minimum |
| **hourmax** | Hourly maximum |
| **hoursum** | Hourly sum |
| **hourmean** | Hourly mean |
| **houravg** | Hourly average |
| **hourvar** | Hourly variance |
| **hourstd** | Hourly standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **hourpctl** | Hourly percentiles |
| Syntax | **hourpctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **daymin** | Daily minimum |
| **daymax** | Daily maximum |
| **daysum** | Daily sum |
| **daymean** | Daily mean |
| **dayavg** | Daily average |
| **dayvar** | Daily variance |
| **daystd** | Daily standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **daypctl** | Daily percentiles |
| Syntax | **daypctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **monmin** | Monthly minimum |
| **monmax** | Monthly maximum |
| **monsum** | Monthly sum |
| **monmean** | Monthly mean |
| **monavg** | Monthly average |
| **monvar** | Monthly variance |
| **monstd** | Monthly standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **monpctl** | Monthly percentiles |
| Syntax | **monpctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **yearmin** | Yearly minimum |
| **yearmax** | Yearly maximum |
| **yearsum** | Yearly sum |
| **yearmean** | Yearly mean |
| **yearavg** | Yearly average |
| **yearvar** | Yearly variance |
| **yearstd** | Yearly standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **yearpctl** | Yearly percentiles |
| Syntax | **yearpctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **seasmin** | Seasonal minimum |
| **seasmax** | Seasonal maximum |
| **seassum** | Seasonal sum |
| **seasmean** | Seasonal mean |
| **seasavg** | Seasonal average |
| **seasvar** | Seasonal variance |
| **seasstd** | Seasonal standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **seaspctl** | Seasonal percentiles |
| Syntax | **seaspctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **ydaymin** | Multi-year daily minimum |
| **ydaymax** | Multi-year daily maximum |
| **ydaysum** | Multi-year daily sum |
| **ydaymean** | Multi-year daily mean |
| **ydayavg** | Multi-year daily average |
| **ydayvar** | Multi-year daily variance |
| **ydaystd** | Multi-year daily standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **ydaypctl** | Multi-year daily percentiles |
| Syntax | **ydaypctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **ymonmin** | Multi-year monthly minimum |
| **ymonmax** | Multi-year monthly maximum |
| **ymonsum** | Multi-year monthly sum |
| **ymonmean** | Multi-year monthly mean |
| **ymonavg** | Multi-year monthly average |
| **ymonvar** | Multi-year monthly variance |
| **ymonstd** | Multi-year monthly standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **ymonpctl** | Multi-year monthly percentiles |
| Syntax | **ymonpctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **yseasmin** | Multi-year seasonal minimum |
| **yseasmax** | Multi-year seasonal maximum |
| **yseassum** | Multi-year seasonal sum |
| **yseasmean** | Multi-year seasonal mean |
| **yseasavg** | Multi-year seasonal average |
| **yseasvar** | Multi-year seasonal variance |
| **yseasstd** | Multi-year seasonal standard deviation |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **yseaspctl** | Multi-year seasonal percentiles |
| Syntax | **yseaspctl**,*p* `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **ydrunmin** | Multi-year daily running minimum |
| **ydrunmax** | Multi-year daily running maximum |
| **ydrunsum** | Multi-year daily running sum |
| **ydrunmean** | Multi-year daily running mean |
| **ydrunavg** | Multi-year daily running average |
| **ydrunvar** | Multi-year daily running variance |
| **ydrunstd** | Multi-year daily running standard deviation |
| Syntax | <*operator*>,*nts* `ifile ofile` |

| | |
|---|---|
| **ydrunpctl** | Multi-year daily running percentiles |
| Syntax | **ydrunpctl**,*p*,*nts* `ifile1 ifile2 ifile3 ofile` |

## Regression

| | |
|---|---|
| **detrend** | Detrend |
| Syntax | **detrend** `ifile ofile` |

| | |
|---|---|
| **trend** | Trend |
| Syntax | **trend** `ifile ofile1 ofile2` |

| | |
|---|---|
| **subtrend** | Subtract trend |
| Syntax | **subtrend** `ifile1 ifile2 ifile3 ofile` |

## Interpolation

| | |
|---|---|
| **remapbil** | Bilinear interpolation |
| **remapbic** | Bicubic interpolation |
| **remapcon** | Conservative remapping |
| **remapdis** | Distance-weighted averaging |
| Syntax | <*operator*>,*grid* `ifile ofile` |

| | |
|---|---|
| **genbil** | Generate bilinear interpolation weights |
| **genbic** | Generate bicubic interpolation weights |
| **gencon** | Generate conservative interpolation weights |
| **gendis** | Generate distance-weighted averaging weights |
| Syntax | <*operator*>,*grid* `ifile ofile` |

| | |
|---|---|
| **remap** | SCRIP grid remapping |
| Syntax | **remap**,*grid*,*weights* `ifile ofile` |

| | |
|---|---|
| **interpolate** | PINGO grid interpolation |
| **intgridbil** | Bilinear grid interpolation |
| Syntax | <*operator*>,*grid* `ifile ofile` |

| | |
|---|---|
| **remapeta** | Remap model level |
| Syntax | **remapeta**,*vct*[,*oro*] `ifile ofile` |

| | |
|---|---|
| **ml2pl** | Model to pressure level interpolation |
| Syntax | **ml2pl**,*plevels* `ifile ofile` |

| | |
|---|---|
| **ml2hl** | Model to height level interpolation |
| Syntax | **ml2hl**,*hlevels* `ifile ofile` |

| | |
|---|---|
| **inttime** | Time interpolation |
| Syntax | **inttime**,*date*,*time*[,*inc*] `ifile ofile` |

| | |
|---|---|
| **intntime** | Time interpolation |
| Syntax | **intntime**,*n* `ifile ofile` |

| | |
|---|---|
| **intyear** | Year interpolation |
| Syntax | **intyear**,*years* `ifile1 ifile2 oprefix` |

## Transformation

| | |
|---|---|
| **sp2gp** | Spectral to gridpoint |
| **sp2gpl** | Spectral to gridpoint (linear) |
| **gp2sp** | Gridpoint to spectral |
| **gp2spl** | Gridpoint to spectral (linear) |
| Syntax | <*operator*> `ifile ofile` |

| | |
|---|---|
| **sp2sp** | Spectral to spectral |
| Syntax | **sp2sp**,*trunc* `ifile ofile` |

| | |
|---|---|
| **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) |
| Syntax | <*operator*> `ifile ofile` |

## Formatted I/O

| | |
|---|---|
| **input** | ASCII input |
| Syntax | **input**,*grid* `ofile` |

| | |
|---|---|
| **inputsrv** | SERVICE input |
| **inputext** | EXTRA input |
| Syntax | <*operator*> `ofile` |

| | |
|---|---|
| **output** | ASCII output |
| Syntax | **output** `ifiles` |

| | |
|---|---|
| **outputf** | Formatted output |
| Syntax | **outputf**,*format*,*nelem* `ifiles` |

| | |
|---|---|
| **outputint** | Integer output |
| **outputsrv** | SERVICE output |
| **outputext** | EXTRA output |
| Syntax | <*operator*> `ifiles` |

## Miscellaneous

| | |
|---|---|
| **gradsdes1** | GrADS data descriptor file (version 1 GRIB map) |
| **gradsdes2** | GrADS data descriptor file (version 2 GRIB map) |
| Syntax | *<operator>* `ifile` |

| | |
|---|---|
| **timsort** | Sort over the time |
| Syntax | **timsort** `ifile ofile` |

| | |
|---|---|
| **const** | Create a constant field |
| Syntax | **const**,*const*,*grid* `ofile` |
| **random** | Create a field with random values |
| Syntax | **random**,*grid* `ofile` |

| | |
|---|---|
| **vardup** | Duplicate variables |
| Syntax | **vardup** `ifile ofile` |
| **varmul** | Multiply variables |
| Syntax | **varmul**,*nmul* `ifile ofile` |

| | |
|---|---|
| **rotuvb** | Backward rotation |
| Syntax | **rotuvb**,*u,v,...* `ifile ofile` |

| | |
|---|---|
| **mastrfu** | Mass stream function |
| Syntax | **mastrfu** `ifile ofile` |

| | |
|---|---|
| **hi** | Humidity index (C) |
| Syntax | **hi** `ifile1 ifile2 ifile3 ofile` |

| | |
|---|---|
| **wct** | Windchill temperature (C) |
| Syntax | **wct** `ifile1 ifile2 ofile` |

## ECA indices

| | |
|---|---|
| **eca_cdd** | Consecutive dry days index per time period |
| Syntax | **eca_cdd** `ifile ofile` |

| | |
|---|---|
| **eca_cfd** | Consecutive frost days index per time period |
| Syntax | **eca_cfd** `ifile ofile` |

| | |
|---|---|
| **eca_csu** | Consecutive summer days index per time period |
| Syntax | **eca_csu***[,T]* `ifile ofile` |

| | |
|---|---|
| **eca_cwd** | Consecutive wet days index per time period |
| Syntax | **eca_cwd** `ifile ofile` |

| | |
|---|---|
| **eca_cwdi** | Cold wave duration index wrt mean of reference period |
| Syntax | **eca_cwdi***[,nday[,T]]* `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_cwfi** | Cold-spell days index wrt 10th percentile of reference period |
| Syntax | **eca_cwfi***[,nday]* `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_etr** | Intra-period extreme temperature range |
| Syntax | **eca_etr** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_fd** | Frost days index per time period |
| Syntax | **eca_fd** `ifile ofile` |

| | |
|---|---|
| **eca_fdns** | Frost days where no snow index per time period |
| Syntax | **eca_fdns** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_gsl** | Growing season length index |
| Syntax | **eca_gsl***[,nday[,T]]* `ifile ofile` |

| | |
|---|---|
| **eca_hd** | Heating degree days per time period |
| Syntax | **eca_hd***[,T1[,T2]]* `ifile ofile` |

| | |
|---|---|
| **eca_hwdi** | Heat wave duration index wrt mean of reference period |
| Syntax | **eca_hwdi***[,nday[,T]]* `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_hwfi** | Warm spell days index wrt 90th percentile of reference period |
| Syntax | **eca_hwfi***[,nday]* `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_id** | Ice days index per time period |
| Syntax | **eca_id** `ifile ofile` |

| | |
|---|---|
| **eca_r10mm** | Heavy precipitation days index per time period |
| Syntax | **eca_r10mm** `ifile ofile` |

| | |
|---|---|
| **eca_r20mm** | Very heavy precipitation days index per time period |
| Syntax | **eca_r20mm** `ifile ofile` |

| | |
|---|---|
| **eca_r75p** | Moderate wet days wrt 75th percentile of reference period |
| Syntax | **eca_r75p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_r75ptot** | Precipitation percent due to R75p days |
| Syntax | **eca_r75ptot** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_r90p** | Wet days wrt 90th percentile of reference period |
| Syntax | **eca_r90p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_r90ptot** | Precipitation percent due to R90p days |
| Syntax | **eca_r90ptot** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_r95p** | Very wet days wrt 95th percentile of reference perio |
| Syntax | **eca_r95p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_r95ptot** | Precipitation percent due to R95p days |
| Syntax | **eca_r95ptot** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_r99p** | Extremely wet days wrt 99th percentile of reference |
| Syntax | **eca_r99p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_r99ptot** | Precipitation percent due to R99p days |
| Syntax | **eca_r99ptot** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_rr1** | Wet days index per time period |
| Syntax | **eca_rr1** `ifile ofile` |

| | |
|---|---|
| **eca_rx1day** | Highest one day precipitation amount per time perio |
| Syntax | **eca_rx1day***[,mode]* `ifile ofile` |

| | |
|---|---|
| **eca_rx5day** | Highest five-day precipitation amount per time perio |
| Syntax | **eca_rx5day***[,x]* `ifile ofile` |

| | |
|---|---|
| **eca_sdii** | Simple daily intensity index per time period |
| Syntax | **eca_sdii** `ifile ofile` |

| | |
|---|---|
| **eca_strwin** | Strong wind days index per time period |
| Syntax | **eca_strwin***[,v]* `ifile ofile` |

| | |
|---|---|
| **eca_strbre** | Strong breeze days index per time period |
| Syntax | **eca_strbre** `ifile ofile` |

| | |
|---|---|
| **eca_strgal** | Strong gale days index per time period |
| Syntax | **eca_strgal** `ifile ofile` |

| | |
|---|---|
| **eca_hurr** | Hurricane days index per time period |
| Syntax | **eca_hurr** `ifile ofile` |

| | |
|---|---|
| **eca_su** | Summer days index per time period |
| Syntax | **eca_su***[,T]* `ifile ofile` |

| | |
|---|---|
| **eca_tg10p** | Cold days percent wrt 10th percentile of reference p |
| Syntax | **eca_tg10p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_tg90p** | Warm days percent wrt 90th percentile of reference |
| Syntax | **eca_tg90p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_tn10p** | Cold nights percent wrt 10th percentile of reference |
| Syntax | **eca_tn10p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_tn90p** | Warm nights percent wrt 90th percentile of referenc |
| Syntax | **eca_tn90p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_tr** | Tropical nights index per time period |
| Syntax | **eca_tr***[,T]* `ifile ofile` |

| | |
|---|---|
| **eca_tx10p** | Very cold days percent wrt 10th percentile of referer |
| Syntax | **eca_tx10p** `ifile1 ifile2 ofile` |

| | |
|---|---|
| **eca_tx90p** | Very warm days percent wrt 90th percentile of refer |
| Syntax | **eca_tx90p** `ifile1 ifile2 ofile` |