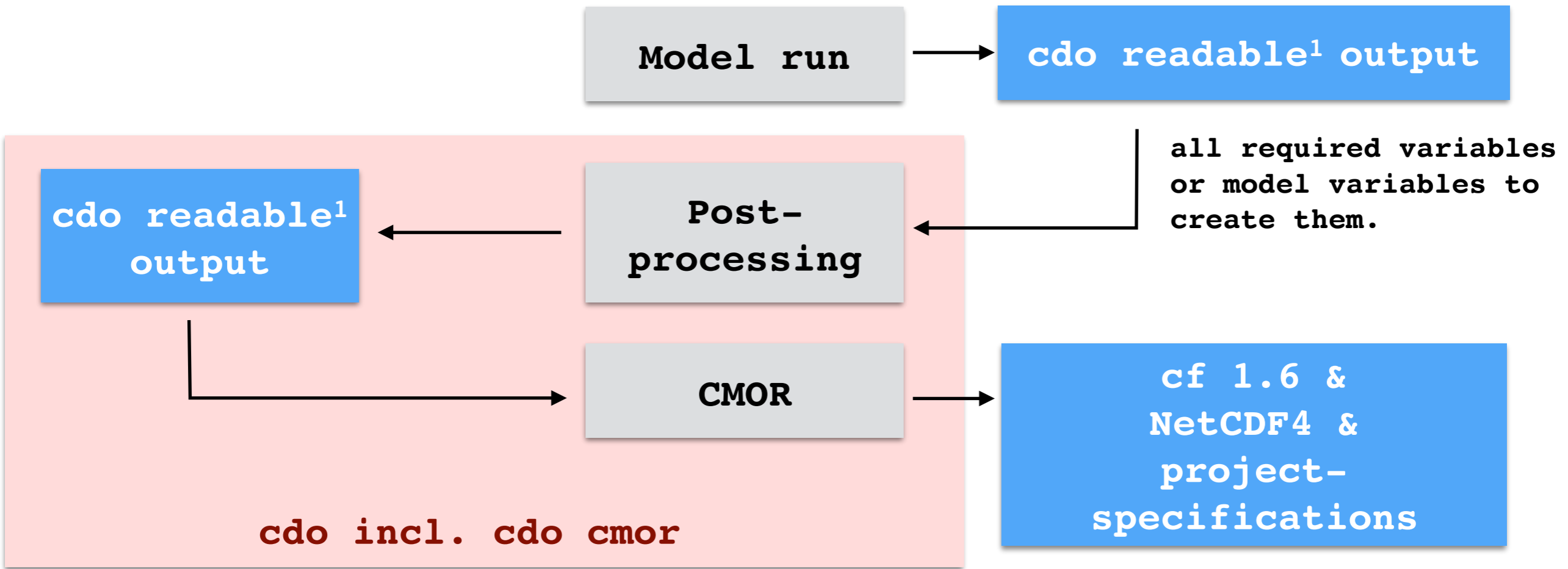# cdo cmor
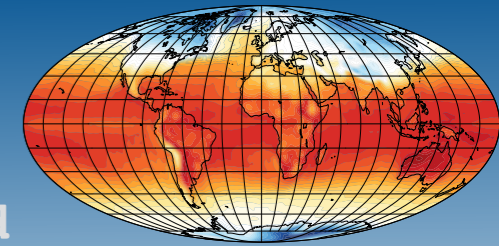
1. After the model run
2. Supporting files & tables
3. cdo cmor: operative
4. cdo cmor: interactive
5. Required tables: mip
6. One item from CMIP6_Amon.json
7. local tables: mod_var_tab
8. Json file
9. DRS & filenames
10. Important links
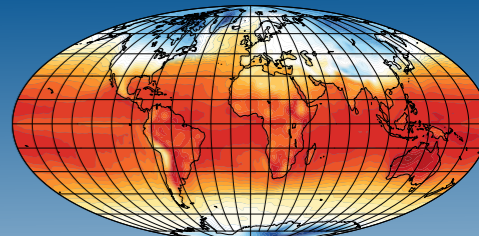
After the model run

```
Model run  →  cdo readable[1] output
```

all required variables
or model variables to
create them.

cdo readable[1]
output ← Post-
processing ←

CMOR → cf 1.6 &
NetCDF4 &
project-
specifications

cdo incl. cdo cmor

cdo readable = NetCDF1/2/3/4, ieg oder grib1/2

Supporting files and tables

CMOR needs:

- **data** — ifile
- **global attributes** — json file or info files
- **variable attributes** — mip table
- **tabledirectory** — info files
  inputdirectory — info files
  outputdirectory — info files
- **grid informations** — ifile or grid file
- **time informations** — ifile or grid file
- **zaxis informations** — ifile or grid file
- **axis-bounds** — ifile or grid file

in addition everything can be overwritten by command line input
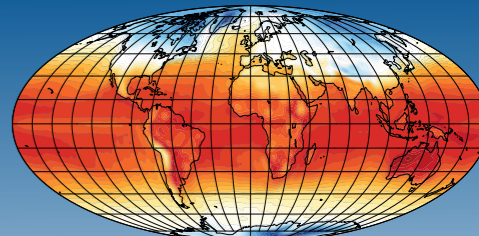
The cdo cmor operator: operative use

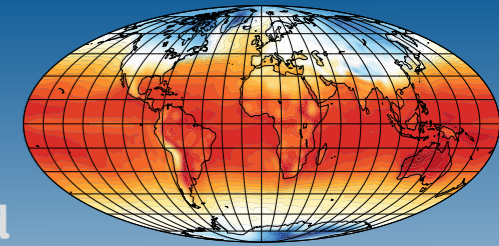**Cdo cmor,Amon,vars=tas,info=efile,mfile,ufile,ginfo=grid_file ifile**

mip-tables:
cmip6-cmor-tables
with
CMIP6_Amon.json
CMIP6_Omon.json
CMIP6_LImon.json
CMIP6_SImon.json
...

mod-var-tables:
MPIESM1_CMIP5.txt

&parameter code=167 \
name=temp2 \
out_name=tas   \
positive="" \
units="K" \
cell_method=m \
standard_name=\
air_temperature \
delete=0/

#experiment info
PROJECT_ID=
PRODUCT=
COMMENT=
HISTORY=
EXPERIMENT_ID=
MEMBER=
FORCING=
REQ_TIME_UNITS=
BRANCH_TIMES=

#model info
MODEL_ID=
REFERENCES=
SOURCE=
CALENDAR=
GRID_FILE=
MOD_TAB_DIR=
MOD_TAB=

#user info
INSTITUTE_ID=
INSTITUTION=
CONTACT=
TABLE_DIR=

CORDEX_EUR-11_grid.nc

rlat=412
rlon=424
float lon(rlat, rlon) ;
float lat(rlat, rlon) ;
float rlon(rlon) ;
float rlat(rlat) ;

GA-cmor3.json

The cdo cmor operator: interactive use

```
cdo cmor,Amon,vars=tas,prc,ps \

-settaxis,[param]

-settbounds,[param] \

-setreftime,[parm] \

-setzaxis,[param] \

-genlevbounds,[param] \

-invertlat \

ifile
```

mip-tables:
cmip6-cmor-tables
with
CMIP6_Amon.json
CMIP6_Omon.json
CMIP6_LImon.json
CMIP6_SImon.json
...

mod-var-tables:
MPIESM1_CMIP5.txt

**&parameter code=167 **
**name=temp2 **
**out_name=tas   **
**positive="" **
**units="K" **
**cell_method=m **
standard_name=
**air_temperature **
delete=0/

MPI: info=efile,mfile,ufile = .cdocmorinfo (defaults)
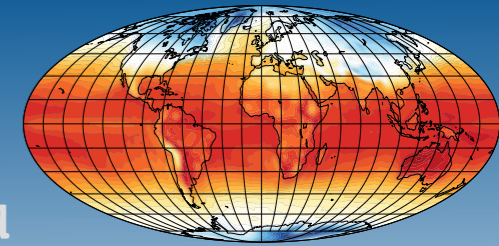
Required Tables: mip

CMIP6_3hr.json

CMIP6_6hrLev.json

CMIP6_6hrPlev.json

CMIP6_6hrPlevpt.json

CMIP6_aerannual.json

CMIP6_aerdaily.json

CMIP6_aerfixed.json

CMIP6_aerhourly.json

CMIP6_aermonthly.json

CMIP6_aero.json

CMIP6_AmonAdj.json

CMIP6_Amon.json

CMIP6_CCMI1_hourly.json

CMIP6_CCMI1_monthly.json

CMIP6_cf3hr.json

CMIP6_cfDay.json

CMIP6_cfMon.json

CMIP6_cfsites.json

CMIP6_cfSites.json

CMIP6_CORDEX_day.json

CMIP6_CV.json
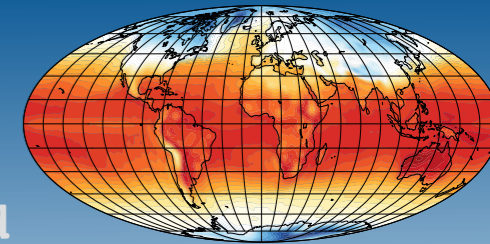
CMIP6_day.json

CMIP6_em3hr.json

CMIP6_em3hrpt.json

CMIP6_emDay.json

CMIP6_emDayZ.json

CMIP6_emFx.json

CMIP6_emMon.json

CMIP6_emMonZ.json

CMIP6_emSubhr.json

CMIP6_emYr.json

CMIP6_excerpts.json

CMIP6_fx.json

CMIP6_grids.json

CMIP6_LImon.json

CMIP6_Lmon.json

CMIP6_Oclim.json

CMIP6_Oday.json

CMIP6_Omon.json

CMIP6_Oyr.json

CMIP6_SImon.json

experiments.json
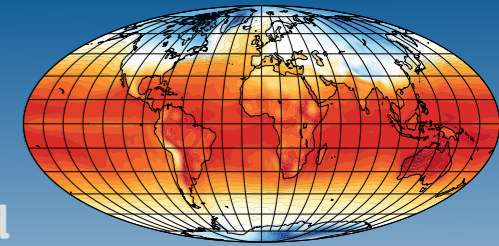
One item from CMIP6_Amon.json

```json
"tas": {
    "comment": "near-surface (usually, 2 meter) air temperature",
    "dimensions": "longitude latitude time height2m",
    "positive": "",
    "valid_min": "180.6",
    "long_name": "Near-Surface Air Temperature",
    "standard_name": "air_temperature",
    "modeling_realm": "atmos",
    "cell_measures": "time: mean",
    "cell_methods": "area: areacella",
    "ok_min_mean_abs": "262.4",
    "units": "K",
    "out_name": "tas",
    "type": "real",
    "valid_max": "335.1",
    "ok_max_mean_abs": "293"
},
```
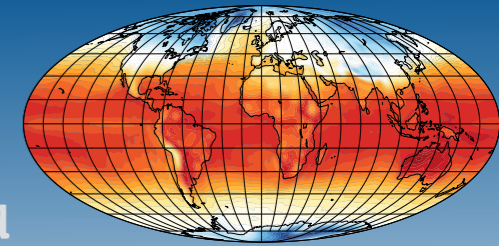
Local Tables: mod-var-tab

```
&parameter code=167 \
         name=temp2 \
         out_name=tas \
         positive=" "  \
         units="K" \
         cell_method="mean" \  ! point,mean,clim
         standard_name=air_temperature \
         delete=0  /
&parameter code=147 \
         name=ahfl \
         out_name=hfls \
         positive="up" \
         units="W m-2" \
         cell_method="mean" \
         standard_name=surface_upward_latent_heat_flux \
         factor=-1 \
         delete=0 /
```
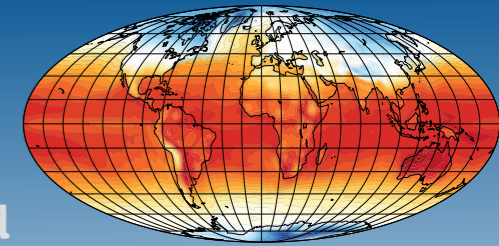
Json file with required attributes

```json
{
            "_control_vocabulary_file": "CMIP6_CV.json",
            "_cmip6_option":             "CMIP6",

    "outpath":                  "/work/bm0021/k204016/SANDBOX/cdo-cmor3",
    "calendar":                 "proleptic_gregorian",
    "model_id":                 "MPI-ESM",
    "history":                  "Model raw output ...",
    "references":               "ECHAM6: n/a; ...",
    "branch_method":            "standard",
    "branch_time":              "0",
    "activity_id":              "CMIP",
    "experiment_id":            "historical",
    "forcing_index":            "1",
    "initialization_index":     "1",
    "grid":                     "native atmosphere T63 gaussian grid (96x192 latxlon)",
    "grid_label":               "gr",
    "grid_resolution":          "250 km",
    "institution":              "Max Planck Institute for Meteorology",
    "institution_id":           "MPI-M",
    "parent_experiment_id":     "N/A",
    "physics_index":            "1",
    "realization_index":        "1",
    "source":                   "MPI-ESM:",
    "source_id":                "MPI-ESM",
    "source_type":              "AOGCM",
    "contact ":                 "cmip5-mpi-esm@dkrz.de",
    "license":                  "One of 2 licenses: ..."
}
```
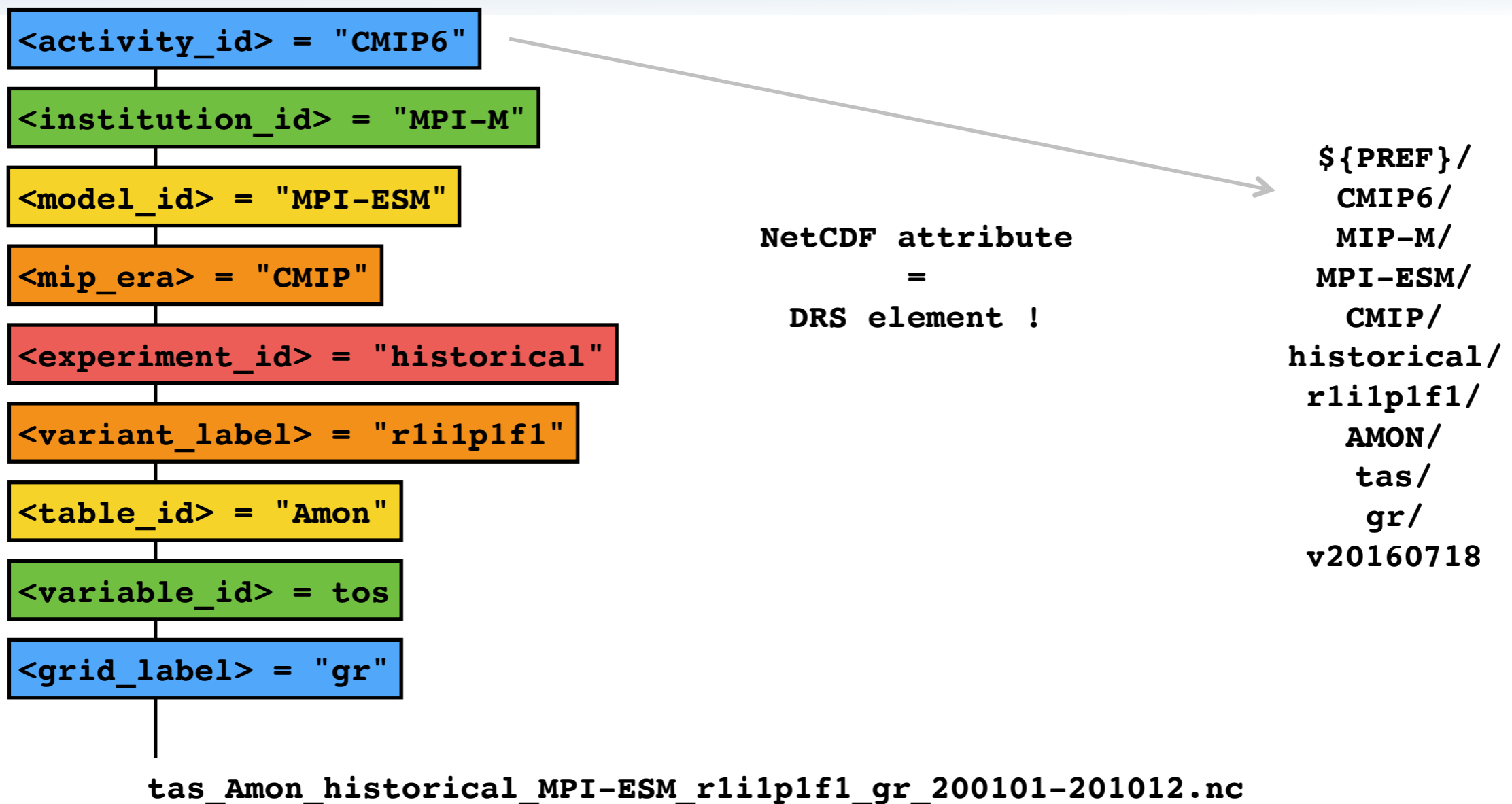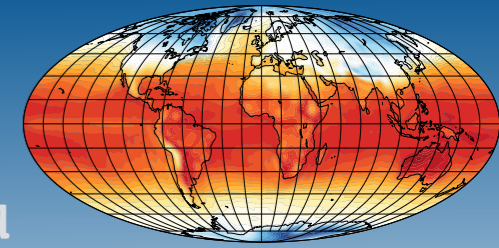
DRS[1] & filename built from global attributes

[1]data reference syntax

```
<activity_id> = "CMIP6"

<institution_id> = "MPI-M"

<model_id> = "MPI-ESM"

<mip_era> = "CMIP"

<experiment_id> = "historical"

<variant_label> = "r1i1p1f1"

<table_id> = "Amon"

<variable_id> = tos

<grid_label> = "gr"
```

NetCDF attribute
=
DRS element !

${PREF}/
CMIP6/
MIP-M/
MPI-ESM/
CMIP/
historical/
r1i1p1f1/
AMON/
tas/
gr/
v20160718

tas_Amon_historical_MPI-ESM_r1i1p1f1_gr_200101-201012.nc

change output path with **cmor_create_output_path()** for other projects

CF Convention 1.6:

http://cfconventions.org/latest.html

CMIP6 tables:

https://github.com/PCMDI/cmip6-cmor-tables.git

CMOR3 documentation:

https://github.com/PCMDI/cmor3_documentation.git

Unterstützung bei der Datenaufbereitung im CMIP6 Projektstandard
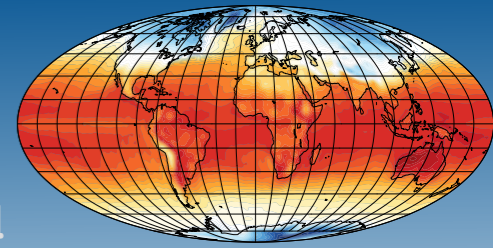
Thanks for listening

Questions?