

Climate Model Output Rewriter (CMOR 2)

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CMOR background

- CF-compliant files that include a very specific set of metadata were required by CMIP3, but few modelling groups were familiar with CF.
- CMOR is a library of FORTRAN subroutines which facilitated/enforced compliance with CMIP3 requirements.
- CMOR was designed to be easily adapted to the different metadata requirements of other "model intercomparison projects" (e.g., CFMIP, HTAP, PMIP)
- ~90% of the model output stored in the PCMDI CMIP3 archive was processed through CMOR.

Project-specific CMOR tables facilitate and ensure consistency of model output from contributing groups

- Proper specification of several coordinate attributes, including:
 - Correct standard name
 - "axis", "positive", and "formula_terms" attributes, as appropriate
- Proper specification of several variable attributes, including:
 - Correct standard name
 - Required dimensions
 - "cell_methods" attribute
- A capability to
 - Reorder axis order
 - Reverse axis direction (or translate longitude dimension)
 - Convert units (through udunits)

CMOR flags common errors, including

- Pointing out when required metadata are omitted.
- Rejecting incorrect metadata (wrong units, inadmissible attribute values, etc.)
- Rejecting inconsistent coordinate dimensions passed by user to CMOR.
- Rejecting non-monotonic coordinate values or inconsistent boundary values, as passed by user.
- Rejecting values that are clearly unrealistic (likely indicating improper units conversion or incorrect sign).

Why CMOR-2?

- Original CMOR
 - accommodated only data stored on cartesian longitude-latitude grids.
 - Written in FORTRAN 95 mainly by a climate scientist with limited time to maintain and extend it.
- CMOR-2
 - Can write Output on model "native" grids that are *not* cartesian longitude-latitude.
 - Station data (needed, for example, by the HTAP project), including metadata for station names and station locations
 - Written in C (with optional FORTRAN 95 interface) by a computer scientist with ongoing commitment to support it.
 - The calls to CMOR-2 are identical to those in CMOR except as needed to make use of the new extended capabilities.

CMOR status

- CMIP5 data may be written using CMOR-2 or CMOR (when the extensions of CMOR2 are unneeded).
- CMOR-2 is available for beta-testing and will be ready for production runs by the end of the year.

Outstanding issues for CMOR and the CF-conventions

- Difficult to see extending CMOR to write the grid-description files mandated by the GridSpec proposal.
- Probably possible, however, to write the actual data files through CMOR (and leave it to other software to produce the special GridSpec files).
- Software to map output from an unstructured grid to a cartesian longitude-latitude grid must be developed now!
 - SCRIP may handle all current model grids
 - It requires a special "grid description" file
 - It is being used by many groups already.