**ARCMIP Data Archive**

**Files:**
    *model_runvers_mon_yymm*.nc
    *model_runvers_col_yymmdd*.nc
    *model_runvers_may_yymmdd*.nc
    *model_ruvers_*domain.nc
    *model_runvers_*metadata.txt

    Where: *model* - 6 character model name
        *runvers* — 4 character model run version number
        *yy* — 2 digit year
        *mm* — 2 digit month
        *dd* — 2 digit day of month

*model_runvers_mon_yymm*.nc
    Contains monthly mean values at the surface and on constant pressure levels for all model horizontal grid points (including lateral boundary forcing zones).

*model_runvers_col_yymmdd*.nc
    Contains instantaneous 3h values at surface and on constant pressure levels for 9 model horizontal grid points centered on SHEBA ship location.

*model_runvers_may_yymmdd*.nc
    Contains instantaneous 3h values at surface and on constant pressure levels for all model horizontal grid locations (including lateral boundary forcing zones).

*model_runvers_*domain.nc
    Contains model domain information (terrain elevation, latitude, and longitude at each model grid point).

*model_runvers_*metadata.txt
    Contains a description of all model options used when running your ARCMIP simulations. A description should be provided for each model run stored in the ARCMIP data archive (each run will be identified by a unique model run version number that is part of each archived filename). The information contained in this file should be sufficient to allow another person to setup your model and rerun an identical simulation as is provided in the ARCMIP data archive. Items to list in this file include model physics options, domain size and location, model version number, forcing data used, type and size of lateral boundary forcing zones, etc.

**File format:**

The ARCMIP archive files will be written in netCDF format. Conversions program to convert from your native model data format to netCDF are available on the ARCMIP web page. The program *write_netcdf.F* is used to convert model output data into netCDF format, while the program *domain_netcdf.F* is used to convert your model domain information into netCDF format.

The programs *write_netcdf.F* and *domain_netcdf.F* are written for ARCSyM model data, but can be modified for use with other model data formats.

In addition to modifying these programs to read your model data you need to set the following variables in these programs:

*model* — 6 character model name

*runvers* — model run version number (this is just a unique number used to identify your model run, and will be part of the filename and is also associated with a meta file that describes the full details of your model setup for the run).

*modeler* — the name of the person that conducted the model run

*fullname* — the full name of the model

*comments* — additional comments to be included in the ARCMIP netCDF files

*ix* — number of model grid points in east/west direction

*jx* — number of model grid points in north/south direction

(Note for *write_netcdf.F* the values of *ix* and *jx* are set in the include/domain.h file, while in *domain_netcdf.F* the values of *ix* and *jx* need to be set in the subroutines *output_netcdf* and *read_domain*)

For ARCSyM model output a separate program is used to postprocess the raw model output and derive the variables needed for the ARCMIP archive. This program is called *arcmip_postproc.F* and is available on the ARCMIP web page. Feel free to use this program as a template for postprocessing your model data, but be warned that this program has a number of ARCSyM specific options and may be difficult to modify for use with other models. Details on the postprocessing for ARCMIP variables are provided below.

**Variables:**

| 2d Surface Variables | | | |
|---|---|---|---|
| **Variable Name** | **Full Name** | **Units** | **Files** |
| psfc | surface pressure | hPa | mon, col, may |
| tsfc | surface temperature | K | mon, col, may |
| t2m | 2m air temperature | K | mon, col, may |
| t2m_min | minimum 2m air temperature | K | mon, col, may |
| t2m_max | maximum 2m air temperature | K | mon, col, may |
| t1m_soil | 1m soil temperature | K | mon, col, may |
| soil_wat | average volumetric soil water content from surface to depth of 1m | fraction | mon, col, may |
| precip | accumulated precipitation | mm | mon, col, may |
| rain | accumulated rain | mm | mon, col, may |
| snow | accumulated snow | mm | mon, col, may |
| swe | snow water equivalent | mm | mon, col, may |
| tot_cld_frac | total column cloud fraction | fraction | mon, col, may |
| cld_base | height of lowest cloud base | m | mon, col, may |
| lhf | surface latent heat flux | $W/m^2$ | mon, col, may |
| shf | surface sensible heat flux | $W/m^2$ | mon, col, may |
| ust | friction velocity | m/s | mon, col, may |
| swd_sfc | downward shortwave radiation at surface | $W/m^2$ | mon, col, may |
| swu_sfc | upward shortwave radiation at surface | $W/m^2$ | mon, col, may |
| lwd_sfc | downward longwave radiation at surface | $W/m^2$ | mon, col, may |
| lwu_sfc | upward longwave radiation at surface | $W/m^2$ | mon, col, may |
| swd_toa | downward shortwave radiation at top of atmosphere | $W/m^2$ | mon, col, may |
| swu_toa | upward shortwave radiation at top of atmosphere | $W/m^2$ | mon, col, may |
| lwu_toa | upward longwave radiation at top of atmosphere | $W/m^2$ | mon, col, may |
| lat | latitude of model grid point | deg | col |
| lon | longitude of model grid point | deg | col |

**Variables:**

| 3d Constant Pressure Level Variables | | | |
|---|---|---|---|
| Variable Name | Full Name | Units | Files |
| u | zonal component of wind | m/s | mon, col, may |
| v | meridional component of wind | m/s | mon, col, may |
| w | vertical velocity | m/s | mon, col, may |
| t | air temperature | K | mon, col, may |
| z | height of constant pressure surface | m | mon, col, may |
| rh | relative humidity | % | mon, col, may |
| spechum | specific humidity | kg/kg | mon, col, may |
| cld | cloud water mixing ratio | kg/kg | mon, col, may |
| ice | cloud ice water mixing ratio | kg/kg | mon, col, may |
| cld_frac | cloud fraction | fraction | mon, col, may |
| adv_t | horizontal advective temperature tendency | K/h | col |
| adv_spechum | horizontal advective specific humidity tendency | (kg/kg)/h | col |
| adv_cld | horizontal advective cloud water mixing ratio tendency | (kg/kg)/h | col |
| adv_ice | horizontal advective ice water mixing ratio tendency | (kg/kg)/h | col |

**Pressure levels for 3d variables:**

All 3d variables will be provided on the following constant pressure levels:

    300 hPa
    500 hPa
    600 hPa
    700 hPa
    800 hPa
    850 hPa
    875 hPa
    900 hPa
    925 hPa
    950 hPa
    975 hPa
    1000 hPa

**Additional information about 2d and 3d variables:**

Missing or unavailable values for any variable will be given a value of —9999.99 in the ARCMIP netCDF archive files.

For the monthly mean files all of the variables listed above are averaged over an entire calendar month, from instantaneous values at 3h intervals, except for:

    t2m_min — minimum t2m for entire month
    t2m_max — maximum t2m for entire month
    precip — accumulated precipitation over entire month
    rain — accumulated rain over entire month
    snow — accumulated snow over entire month
    swe — snow water equivalent at end of month

For the column and May files all of the variables listed above are instantaneous values at 3h intervals, except for:

    t2m_min — minimum t2m for previous 3h
    t2m_max — maximum t2m for previous 3h
    precip — accumulated precipitation over previous 3h
    rain — accumulated rain over previous 3h
    snow — accumulated snow over previous 3h

For the zonal and meridional components of the wind make sure that these wind components are relative to true east/west and north/south directions and not relative to your model grid.

For monthly averaged variables perform averaging of variables after interpolation from native model grid to constant pressure levels.

Cloud base variable:

    For model columns with no cloud cover present set cloud base = 25000 m for instantaneous output fields (i.e. May and column output only). For monthly average of cloud base do not include clear cases in averaging, and if no clouds are present in a model column during the entire month set the average cloud base for the month equal to 25000 m.

    All cloud base values should be given as height of cloud base above the surface.

When interpolating variables from the model native vertical coordinates to constant pressure levels:

    If the constant pressure level is above the model top assign the value of the variable on this constant pressure level to be equal to the value of the variable at the highest native vertical level.

    If the constant pressure level is below the model surface assign the value of the variable on this constant pressure level to be equal to the value of the variable at the lowest native vertical level.

If the constant pressure level does not meet either of these criteria interpolate from the nearest native vertical coordinate levels that bound the constant pressure level.

Always calculate the height of the pressure surfaces using the hypsometric equation — do not interpolate the heights from the nearest native vertical coordinate levels.

For column output at the SHEBA ship location use the interpolated SHEBA ship position data provided by Dick Moritz. This data is also being provided on the ARCMIP web page as the text file *interp_ship_position.txt*.

The format for this text file is:

Column 1 = yy            (year)

Column 2 = mm            (month)

Column 3 = dd            (day)

Column 4 = hh            (hour GMT)

Column 5 = ttt.tttt      (time in GMT days since 0000 GMT 1/1/97)

Column 6 = xxx.xxxx      west longitude in decimal degrees

Column 7 = yy.yyyy       north latitude in decimal degrees

Column 8 = uuuu.uuuu     eastward component of velocity in cm/s (not used for ARCMIP data processing)

Column 9 = vvvv.vvvv     northward component of velocity in cm/s (not used for ARCMIP data processing)

For each 3h time period of your model output find the model grid point closest to the SHEBA ship location at this time and use this as the center point for the column output for the ARCMIP archive.

The column output will consist of the 9 grid points surrounding the grid point centered on the SHEBA ship location (i.e. +/- 1 grid point in each direction away from the grid point in your model domain that is closest to the SHEBA ship location).

The advective tendencies for the column output should be calculated from the instantaneous data after it has been interpolated to the constant pressure levels. The advective tendencies should only be calculated for the horizontal components of advection.

For the column and May output files, each file will contain 3 hourly data for one day of the year.