**ASRE Model-Observation Evaluation Tool**

The ASRE Model-Observation Evaluation Tool developed within the NOAA ESRL Atmospheric Science for Renewable Energy Development (ASRE) group enables comparison between atmospheric model and measurement data. This web application should facilitate model development and instrument maintenance during field campaigns. To enable further analyses, the authors make these data used in analyses available in NetCDF format via the website FTP download links.

**DATA DESCRIPTION**

The FTP download links enable direct access to the measurement and model data used in the creation of the Model-Observation Evaluation plots. The data are provided in NetCDF format using the naming convention:

**YYYYMMDD.SID.data\_type.nc**

YYYY denotes the year with century as a decimal number (e.g. 2019), MM denotes the month as a zero-padded decimal number (e.g. 01, 02, etc.), DD denotes the day of the month as a zero-padded decimal number (e.g. 01, 02, etc.), SID denotes the measurement site station ID, and data\_type is a string denoting the requested data type. The full list of measurement site station IDs and data type strings are defined in the tables below.

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| --- | --- |
| **Station Name/Location** | **Station ID (i.e. SID)** |
| Central Facility, Lamont, OK | C1 |
| Central Facility Extension, Lamont, OK | E13 |
| Central Facility Extension, Lamont, OK | E14 |
| Medford, OK | E32 |
| Waukomis, OK | E37 |
| Morrison, OK | E39 |
| Peckham, OK | E41 |

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| --- | --- |
| **Data Type** | **Data Type String (i.e. data\_type)** |
| Station Measurement Data | arm\_meas |
| HRRR Version 3 Model Data | hrrr\_v3 |
| HRRR Version 4 Model Data | hrrr\_v4 |
| RAP Version 4 Model Data | rap\_v4 |
| RAP Version 5 Model Data | rap\_v5 |

Please find in the sections below a detailed description of the available measurement and model data.

**Measurement Data File Description (e.g. YYYYMMDD.SID.arm\_meas.nc):**

Available measurement data from the date and site selected are provided to the user in NetCDF format. In the comments section of the NetCDF file, a list of the ARM SGP datastreams (e.g. sgp915rwpwindavgC1.a1.20200407.000000.nc) that were used to construct the data file is provided. These datastreams can be directly accessed via the ARM Data Discovery Web Portal (<https://adc.arm.gov/discovery/#/>). A free ARM user account is required to access these data; information on how to register can be found here: <https://adc.arm.gov/armuserreg/#/new>.

The assigned measurement time is determined by combining the *base\_time* (seconds since epoch [1 Jan 1970]) and *time\_offset* (seconds since the *base\_time*) variables. Measurement sampling frequency and averaging techniques differ between the various instrument types. Therefore, an instrument-specific prefix is appended to these time variables (i.e. *base\_time* and *time\_offset*) to inform the user of the corresponding instrument; the same instrument-specific prefix is also appended to the saved atmospheric variables. A description of these instrument-specific prefixes and the instruments they represent are provided below. Although the evaluation plots can show data from multiple dates (i.e. to conform with the various model initialization times and forecast lengths), the downloaded data file will only include data from the requested date.

|  |  |
| --- | --- |
| **Variable Prefix** | **Instrument Type** |
| sfc\_met\_ | Surface Meteorological Data |
| rwp\_ | Radar Wind Profiler |
| dl\_ | Profiling Doppler Lidar |
| sfc\_rad | Surface Radiation Data |
| ecor\_ | Eddy Correlation Flux Measurement System |
| baebbr\_ | Best-Estimate Fluxes from EBBR Measurements and Bulk Aerodynamic Calculations |
| tow\_winds\_ | 60-m Tower Wind Data |
| tow\_met\_ | 60-m Tower Meteorological (i.e. Non-Wind) Data |

Datastreams on the ARM Data Discovery Web Portal are used to create the available data files. Because individual datastreams are uploaded to the web portal at different lag times (e.g. one day behind real time, two days behind real time, etc.), the data files are modified daily pending the availability of new data. However, after 90 days it is assumed that all relevant data have been uploaded to the web portal, and therefore, the data made available via FTP are no longer modified.

**Model Data File Description (i.e. YYYYMMDD.SID.mdl\_name.nc):**

Available model data from the date and site selected are provided to the user in NetCDF format. The HRRR Version 3 model data can be accessed using the data file suffix *hrrr\_v3.nc*, the HRRR Version 4 model data can be accessed using the data file suffix *hrrr\_v4.nc*, the RAP Version 4 model data can be accessed using the data file suffix *rap\_v4.nc*, and the RAP Version 5 model data can be accessed using the data file suffix *rap\_v5.nc*. The model data for each ARM SGP measurement facility are extracted by Dave Turner ([dave.turner@noaa.gov](mailto:dave.turner@noaa.gov)). Model data for the previous month are typically extracted on the first day of the month (i.e. model data for June are extracted on 1 July), which means the model data are generally available at a one-month lag time (but longer lag times can occur). Bilinear interpolation is used to extract the model data to the ARM SGP measurement site.

Model dimensions (i.e. forecast duration and height) are defined in the NetCDF file. The HRRR Versions 3 and 4 model data extends out 18 hours from the model initialization time, while the RAP Versions 4 and 5 data extends out 21 hours from the model initialization time. Furthermore, each model has four initialization times when the forecast duration exceeds the standard forecast length. At 00, 06, 12, and 18 UTC, the HRRR Version 4 forecast extends out 48 hours from the model initialization time, while the HRRR Version 3 forecast extends out 36 hours from the model initialization time. Alternatively, at 03, 09, 15, and 21 UTC, the RAP Version 5 forecast extends out 51 hours from the model initialization time, while the RAP Version 4 forecast extends out 39 hours from the model initialization time. However, model data are not always available at each forecast hour because of network interruptions that can occur during model extraction. Unlike with measurement data, once the model data have been extracted and made available via the FTP link, there are no subsequent modifications made to the data files.

The table below defines the model variables provided in each NetCDF file. Appended to each model variable is a string denoting the model initialization time. For example, *p1\_ini00* denotes the model forecast for pressure at the 00 UTC initialization time.

|  |  |
| --- | --- |
| **Variable Prefix** | **Atmospheric Variable** |
| height\_ | Forecast Height |
| forecast\_ | Forecast Hour |
| p1\_ | Pressure |
| psfc1\_ | Surface Pressure |
| t1\_ | Temperature |
| tsfc1\_ | Surface Temperature |
| rhsfc1\_ | Surface Relative Humidity |
| r1\_ | Water Vapor Mixing Ratio |
| rsfc1\_ | Surface (2-m) Water Vapor Mixing Ratio |
| wspd1\_ | Wind Speed |
| u1\_ | U-Component of Wind |
| v1\_ | V-Component of Wind |
| w1\_ | W-Component of Wind |
| usfc1\_ | U-Component of Wind at 10 m |
| vsfc1\_ | V-Component of Wind at 10 m |
| u80m1\_ | U-Component of Wind at 80 m |
| v80m1\_ | V-Component of Wind at 80 m |
| lflux1\_ | Latent Heat Flux |
| sflux1\_ | Sensible Heat Flux |
| ustar1\_ | Friction Velocity |
| dswsfc1\_ | Downwelling Short Wave Flux at the Surface |
| uswsfc1\_ | Upwelling Short Wave Flux at the Surface |
| dlwsfc1\_ | Downwelling Long Wave Flux at the Surface |
| ulwsfc1\_ | Upwelling Long Wave flux at the Surface |
| dswdbeam1\_ | Direct Shortwave Down |
| dswdiffuse1\_ | Diffuse Shortwave Down |
| tv1\_ | Virtual Temperature |
| lwc1\_ | Liquid Water Mixing Ratio |

**Contacts**

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