

ARM Data Quality: What You Need to Know

— ARM Data Quality Office —

2016 ARM/ASR PI Meeting

May 2, 2016

Agenda

- Who to contact with problems
- DQ Office Overview
- How to access DQ information
 - Handbooks
 - Embedded QC Flags
 - DQRs
- Live demo of DQ Office plotting tools
- ARM Infrastructure Discussion/Help Session

problems@arm.gov

Any questions or notifications about the level of quality of ARM data can be sent to problems@arm.gov. **No problem is too small.**

DQ Office



Randy Pepler
DQ Office Manager since 2000



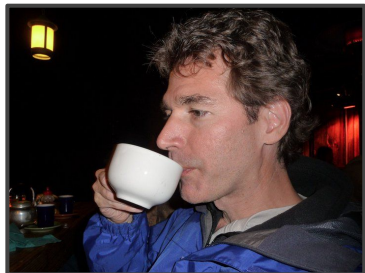
Ken Kehoe - May 2004



Justin Monroe - February 2008



Josh King - 2014



Sean Moore - 1998



Adam Theisen - May 2010



DQ Office

- Work to minimize the amount of unacceptable data collected
- Team of DQ Analysts that review data from most ARM instruments
 - Review an average of 175 years worth of data each year
- Process data every hour to produce
 - ~6500 Plots and movies/day
 - >300 QC summary metrics files/day

How to Access DQ Information

- Instrument Handbooks
- Embedded QC Flags (qc_ fields in netCDF file)
 - Automatically generated during data file creation
 - Not displayed or used for data filtering in ARM Data Discovery!
- Data Quality Reports (DQR)
 - Manually entered after data file creation
 - Displayed in ARM Data Discovery, and data marked as “incorrect” by DQRs are filtered by default
- What methods do you use?

Handbooks



ARM CLIMATE RESEARCH FACILITY

Home | People | Site Index | Search arm.gov

U.S. DEPARTMENT OF ENERGY Office of Science

About | Science | Campaigns | Sites | Instruments | Measurements | Data | News | Publications | Education

ARM.gov >> Instruments >> met

Instrument : Surface Meteorological Instrumentation (MET)

Instrument Categories
Surface Meteorology

General Overview

The ARM Surface Meteorology Systems (MET) uses mainly conventional in situ sensors to obtain 1-minute statistics of surface wind speed, wind direction, air temperature, relative humidity, barometric pressure, and rain-rate. Additional sensors may be added to or removed from the base set of sensors depending upon the deployment location, climate regime, or programmatic needs. In addition, sensor types may change depending upon the climate regime of the deployment. These changes/additions are noted in the Deployment Locations and History section of the instrument handbook.

Output Datastreams

>> met : ARM-standard Meteorological Instrumentation at Surface

Primary Measurements

The following measurements are those considered scientifically relevant.

- >> Atmospheric moisture
- >> Atmospheric pressure
- >> Atmospheric temperature
- >> Horizontal wind
- >> Precipitation
- >> Visibility

Locations



Documentation

>> MET : Handbook

ARM Data Discovery


 [Browse Data](#)

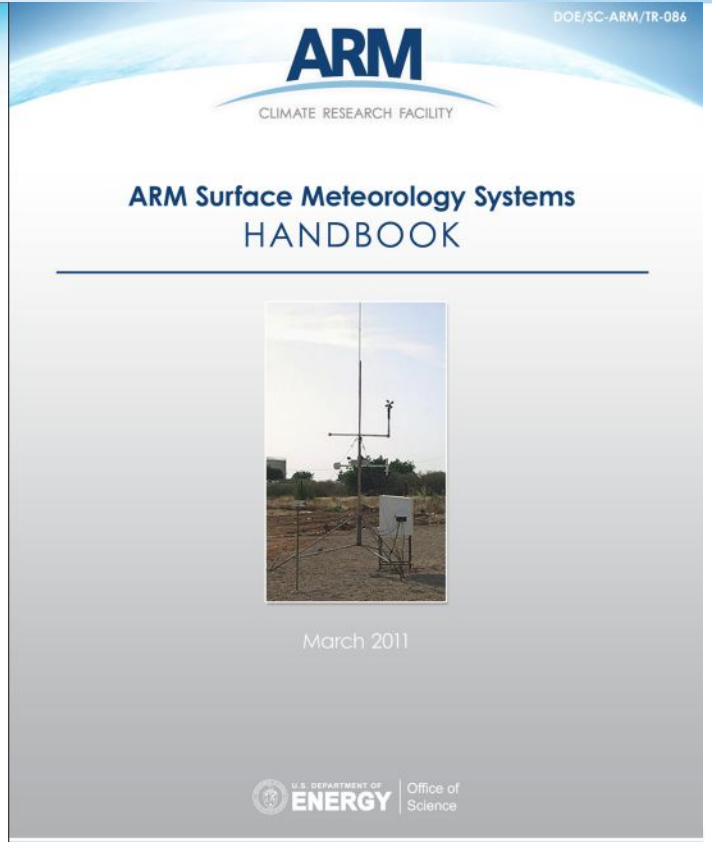
Comments?

We would love to hear from you!
Send us a note below or call us at 1-888-ARM-DATA.

Email Address

Comments


 SEND



DOE/SC-ARM/TR-086

ARM CLIMATE RESEARCH FACILITY

ARM Surface Meteorology Systems HANDBOOK



March 2011

U.S. DEPARTMENT OF ENERGY Office of Science

Embedded QC Flags

- Automatically generated during data file creation
- Not displayed or used for data filtering in ARM Data Discovery!
 - It is up to the data user to review these and filter data as warranted
- Why Bitpacked?
 - Stored in a single variable vs. the need for multiple accompanying variables
 - Tests are stored independently including the results of multiple tests
- [Example](#)

Data Quality Report (DQR)

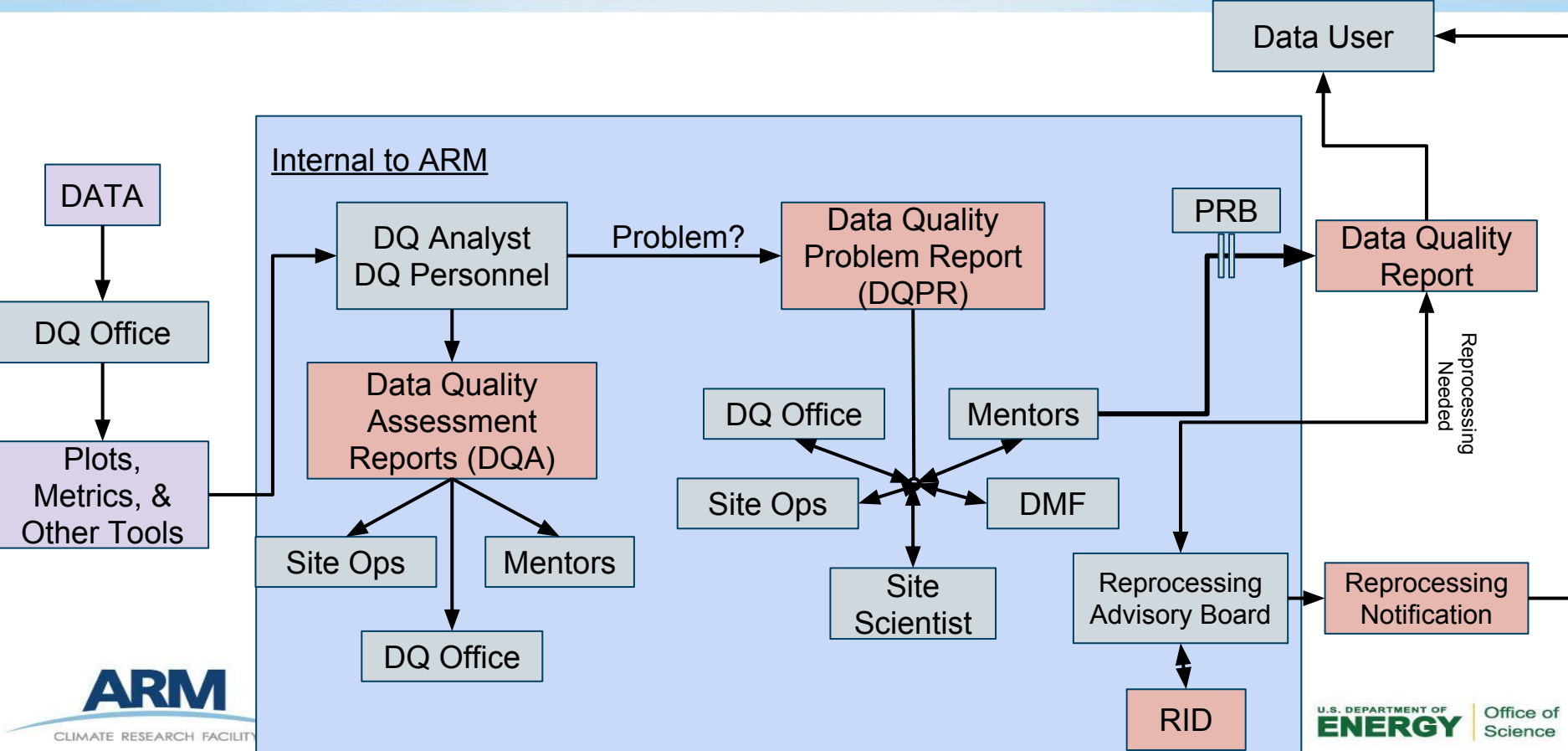
- Official mechanism to report problems or general information to the end-users

DQRID : D120928.1

Start Date	Start Time	End Date	End Time
09/08/2012	2052	09/16/2012	1439

Subject:	SGP/MET/E13 - Low logger voltage
DataStreams:	sgpmetE13.b1
Description:	Low logger voltage was reported. Low voltage may result in data spikes or dropouts.
Suggestions:	
Measurements:	<p>sgpmetE13.b1:</p> <ul style="list-style-type: none">• PWD 1 minute mean visibility(pwd_mean_vis_1min)• PWD 10 minute mean visibility(pwd_mean_vis_10min)• PWD cumulative liquid precipitation(pwd_cumul_rain) <p>more</p>

Data Quality Report (DQR)



Data Quality Report (DQR)

- Do you read DQRs?
- Did you know that they are categorized as: (ARM Data Discovery)
 - Incorrect (Data Unreliable; Filtered out by Default)
 - Suspect (Data Questionable)
 - Missing (Data Missing)
 - Does not affect quality (Data Note)

Overwhelmed yet?



DQR Webservice

- This does not have to be a manual process!



DQ Plotting

- Where does one go to find data plots and movies?
 - Archive - Thumbnail Viewer, NCVweb
 - DQ Office - Plotbrowser, NCVweb, DQ Explorer, DQ Zoom
 - Different from the Archive as we are focused on finding problems.
 - More comparison plots, diagnostics, movies, etc...
 - Don't see what you want? e-mail us.

dq.arm.gov

DQ Survey!

- Please go to dq.arm.gov and click the survey link at the top of the page to give feedback on the ARM DQ process.

ARM
CLIMATE RESEARCH FACILITY

CART | Home | People | Site Index | Search arm.gov

U.S. DEPARTMENT OF ENERGY
Office of Science

About | Science | Campaigns | Sites | Instruments | Measurements | Data | News | Publications | Education

ARM.gov » Data » Data Quality » Data Quality Office

***2016 PI Meeting: [Data Quality Survey](#)

***2016 PI Meeting: [Additional Information](#)

DQ Office Toolbox

DQ Explorer
DQ Explorer provides views of daily metrics summary tables of embedded QC flags and DQ Office tests. From these tables one can view the daily diagnostics plots that the DQ Analysts review. Note, not all plots produced by the DQ Office are in DQ Explorer.

DQ Plot Browser
DQ Plot Browser provides list and thumbnail views of all the plots produced by the DQ Office. Note, check the "comparison" datastream for additional plots of use.

NCVweb
NCVweb provides an interactive way to plot ARM data, with the added ability to view file headers, calculate statistics, and convert data to ASCII. Capabilities include 1D line plots, cross facility plots, and color contours or slices of 2D data

DQ Zoom ****NEW****
DQ Zoom provides an interactive way to interrogate data, with the ability to drag and highlight the plotting area to zoom in on particular areas of interest. Capabilities include time series line plots of data from 1D variables or 1D slices of 2D variables, automatic overlay of time periods impacted by known DQRs, and the ability to log and export selected time periods from each plot in a format suitable for automatic upload to the ARM DQR submission form.

DQ Wiki
DQ Wiki holds a wealth of information on all things DQ

Tools

- » DQ Explorer
- » DQ Plot Browser
- » Interactive Plotting Tools
- » NCVweb (1D, 2D)
- » DQ Zoom (1D)
- » DQ Wiki

Documentation

- » Embedded QC Flag
- » DQR Web Service

Reports

- » DQPR/DQR
- » DQR Web Service
- » DQA
- » Report Problems

Contacts

- » Randy Pepler
- » Ken Kehoe
- » Justin Monroe
- » Adam Theisen
- » Josh King
- » Sean Moore

ARM PI Meeting DQ Links!

- Everything you see/hear us talk about at this meeting including anything on our poster is available from our meeting summary site.

The screenshot shows the ARM Data Quality Office website. At the top, there is a navigation bar with links for 'About', 'Science', 'Campaigns', 'Sites', 'Instruments', 'Measurements', 'Data', 'News', 'Publications', and 'Education'. Below this is a search bar and a breadcrumb trail: 'ARM.gov >> Data >> Data Quality >> Data Quality Office'. The main content area features two red links: '***2016 PI Meeting: [Data Quality Survey](#)' and '***2016 PI Meeting: [Additional Information](#)', with the latter highlighted by a purple box. Below these links is the 'DQ Office Toolbox' section, which includes descriptions for 'DQ Explorer', 'DQ Plot Browser', 'NCVweb', 'DQ Zoom **NEW**', and 'DQ Wiki'. On the right side of the page, there are three vertical panels: 'Tools' (listing DQ Explorer, DQ Plot Browser, Interactive Plotting Tools, NCVweb (1D, 2D), DQ Zoom (1D), and DQ Wiki), 'Documentation' (listing Embedded QC Flag and DQR Web Service), and 'Reports' (listing DQPR/DQR, DQR Web Service, DQA, and Report Problems). A 'Contacts' panel lists staff members: Randy Pepler, Ken Kehoe, Justin Monroe, Adam Theisen, Josh King, and Sean Moore. Small thumbnail images of data plots are interspersed between the text blocks.

Questions?