# **ARM Data Quality Office Update 2008**

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## 1. Plotting Tools

Interactive data plotting via
NCVweb allows data quality



### 3. ACRF and the Oklahoma Mesonet

 A comparison between relatively sparse and dense networks was performed using temperature and

Correlation Between 30-mi Against Distance from a Centr	n Air Temperatures (corrected to sea-level) al Site for All Available Observations 2004-2006
	Oklahoma Sites vs E27 LSF Line from OK Sites
0.98	Oklahoma ARM Sites vs E27

analysts to select a specific time period and multiple variables to be displayed on a single plot. This is helpful for identifying trends and particular detail otherwise undetectable by looking at daily plots (Fig. 1).

The Plot Browser (Fig. 2) allows users and data quality analysts to access an archive of plots. Up to 30 days of multiple instrument plots can be viewed at once. Users can select their preferred viewing method, including thumbnails, and also can apply filters to narrow down the amount of viewing

Fig. 1. NCVweb interactive data plotting tool found at dq.arm.gov.



relative humidity observations recorded by ARM SGP Climate Research Facility SMOS and Oklahoma Mesonet (OKM) sensors for the time period 2004-2006.

The Pearson correlation coefficient (ρ) and root-mean square difference (RMSD) were computed using these variables from both ARM/ARM and ARM/OKM station pairs.

 ρ and RMSD were plotted against the distance between stations for the sparser Kansas domain and two dense Oklahoma domains.
Figs. 5 and 6 show plots of ρ versus distance for the dense Oklahoma domain centered at E27



Fig. 5. ρ, calculated from temperature observations at ARM and OKM sites, versus those at E27 during 2004-2006, plotted as a function of distance from E27.



#### information desired.

Fig. 2. Plot Browser display of multiple days of radiometer plots.

(results from the sparse Kansas domain are overlaid for reference).

Fig. 6.  $\rho$ , calculated from relative humidity observations at ARM and OKM sites, versus those at E27 during 2004-2006, plotted as a function of distance from E27.

### 2. Creation and Use of Long Time-Series

 The Data Quality Office is developing tools to facilitate analysis of long time series data to better detect data issues not detectable through daily One example analysis. has involved extracting a slice of all NSA Barrow MMCR mode 3 2000m, reflectivity at represented by the red horizontal lines in Fig. 3.

Fig. 4 shows a 2000m
horizontal slice of general

4

years of

over

reflectivity



Fig. 3. MMCR general mode reflectivity from NSA Barrow.

### 4. Assessment Guidance Database

 The DQ Wiki page is a valuable guidance resource for data quality analysts. Each instrument has its own page, containing examples of known problems or issues (Fig. 7 shows part of the SMOS page).

 These help when a problem arises and an analyst must issue a Data Quality Problem Report (Fig. 8), as he/she is then better able to identify a problem cause. This in turn reduces troubleshooting time and leads to quicker problem resolution.

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#### Typical Problems

Problem Date Kange:

#### tamples of past problems: Wind Typical Problems, Pressure Typical Problems, Temp RH Typical Problems, Precip Typical oblems

The most typical problem in the SMOS data occurs with the relative humidity data. At all sites, except E13, the temperature/relative humidity probe is housed in a naturally aspirated radiation shield. This leads to readings in excess of the 104% maximum in cases where there is low wind speeds and high humidity or during heavy rain events with high winds. During times of high humidity and low wind speeds wetting of the protective filter can occur due to condensation. This will cause the probe to report values in excess of 104% until such time that wind speeds increase and dry the filter. The same is true when heavy rain and high winds cause precipitation to be blown onto the filter wetting it. After time, the filter will dry out and readings will return to normal. Data inspectors will need to be diligent though, as the RH sensors drift high over time and readings in excess of the 104% maximum become the rule instead of the exception; this indicates a sensor problem and not an environmental problem. At site E13

Fig. 7. DQ V	Viki guidance excerpt	for the SGP SMOS.
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ality Problem Report (DQPR): 1918	
3/4/2008 <b>DQPR Originator:</b> DQO - Stephen Mullens GP - E13: Lamont, OK (Extended) : MFRSR	
3/4/2008 <b>DQPR Originator:</b> DQO - Stephen Mullens GP - E13: Lamont, OK (Extended) : MFRSR	

Barrow data. Note how the reflectivity changes, minimum indicating possible hardware issues. This plot also shows how the range of reflectivity values changed over time, have indicating a distinct change in the ability of the radar to detect clouds.



Fig. 4. 2000 m slice of general mode reflectivity from 2004-2007.

 Instrument mentors contribute to the Wiki page, enhancing its value for DQO analysts. Each page was developed with the help of the relevant Instrument Handbook and interaction with the mentor. The Wiki is a living document that allows us to document new issues that arise through routine data analysis.

#### Start Date (MM/DD/YYYY) 02/24/2008 Time 00 V 00 VGMT End Date (MM/DD/YYYY) 02/25/2008 Time 00 🕶 00 💌 GMT Submit above DQ Time changes QA Code: Questionable Data QA Reason(s): Instrument problem roblem Description: Beginning on 2/24, instrument shows extreme variability in radiation readings, despite cloudy conditions. This is typically an indication of a shading issue. The MFRSR does not compare well with the C1 MFRSR or the Lamont, OK NIMFR. Interestingly this issue is not a daily reoccuring theme and looks better by 2/29. See the following plot for an example of the data of interest: http://dq.arm.gov/PLOTS/SGP/sgpmfrsr/20080224/sgpmfrsrE13.b1.mfrsr.20080224.png DOPR HISTORY: Entry Date/Time (GMT) Please also see following plot for comparison with co-located MFRSR and NIMFR. 03/04/2008 03:09 DQO/DQO-SSG - Kenneth Kehoe http://plot.dmf.arm.gov/PLOTS/SGP/comparison/20080224/sgpC1.dir\_norm\_mfrsr\_comp.20080224.png rrent QA Code Selected: Questionable Data 💌 urrent QA Reason(s) Selected istrument noise probl Current DQPR Status: Open Update Qa Code Update Qa Reason Update Status Reject DQPR Enter a comment:

Fig. 8. Sample Data Quality Problem Report.