Aerosol Observing System Data Quality Monitoring at the ARM Data Quality Office: Current Capabilities and Future Prospects

J. King[1], K. Kehoe[1], J. Monroe[1], S. Moore[2], R. Peppler[1], A. Theisen[1]

[1]ARM Data Quality Office, CIMMS/University of Oklahoma | Norman, OK

[2]Orbital ATK Inc. | San Francisco, CA

Overview

Aerosol Observing System (AOS) Data Quality Monitoring at the DQ Office

Quick Facts:

- AOS: in situ, surface-based aerosol and trace gas measurements
- AOS DQ monitoring now fully integrated into DQ Office operations
  - Assessments began **May 2014**
- Weekly assessments of **40** distinct instrument classes (all ARM sites)
  - Covering **50** AOS datastreams
- AOS DQPRs issued since assessments began: **49**

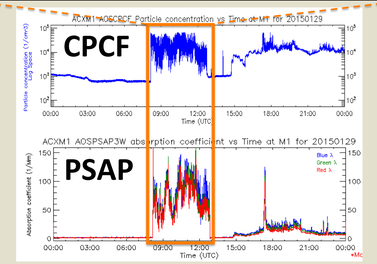


Image credits: ARM Climate Research Facility flickr

Who We Are

DQ Office Mission

Established in July 2000 to ensure the flow of data of **reasonable** and **known** quality for science end users

- Identify and report instrument problems to site operations and instrument mentors in a timely manner
- Develop and maintain automated diagnostic plotting and quality control flagging routines
- Employ student analysts to visually inspect all data

Data Quality Reporting Tools

DQ Assessments (**DQAs**)

Weekly reports of instrument status, highlighting abnormalities
Submitted by student DQ analysts to mentors and site operators

DQ Problem Reports (**DQPRs**)

Official form to track resolution of identified data quality problems
Parties: DQ Office, instrument mentors, site operators, site scientists

DQ Reports (**DQRs**)

Written statement of data quality provided to users in data orders
Typically submitted by instrument mentors

Current Capabilities

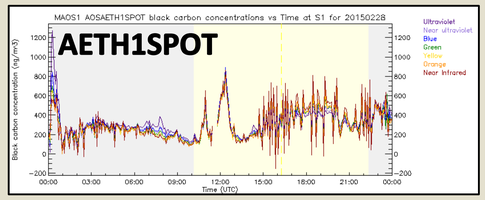
DQ Office Procedures

Pinpointing

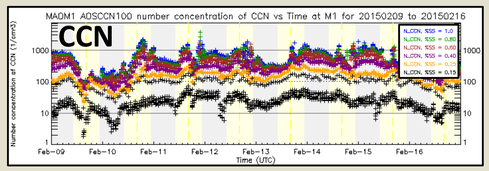
Context

Diagnostic plotting for routine monitoring

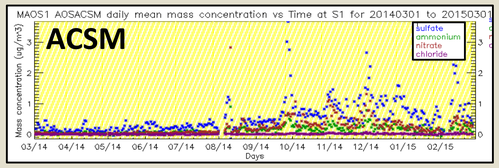
Daily



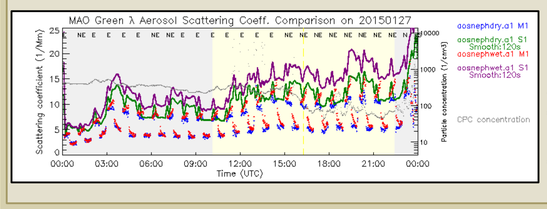
Weekly



Even ***yearly!***



Cross-instrument comparisons

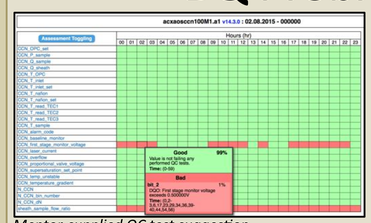


Providing context

How do these measurements compare with similar estimates from collocated sensors?

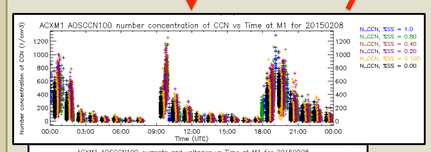
- More informed and holistic data quality assessments
- Improved instrument problem detection

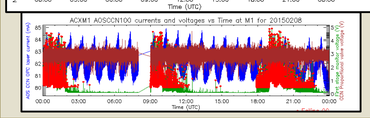
DQ Problem Resolution Process



Mentor-supplied QC test suggestion

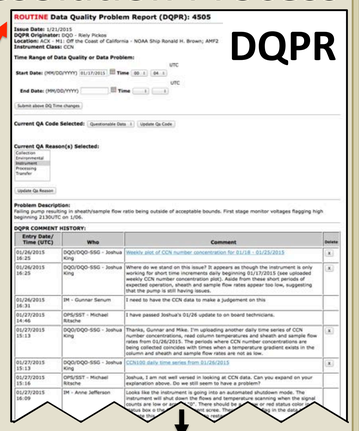
??





!!

!!



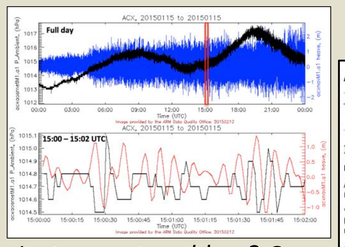
DQR

If mentor deems data are of insufficient quality

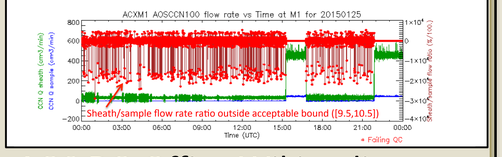
dq.arm.gov

Future Prospects

Enhancing the AOS Knowledge Base Within the DQ Office



Instrument problem? Or….



- Adding content to the AOS DQ Office Wikipedia pages
  - **Past instrument problems**
  - **Known site-specific data characteristics**
  - **AOS instrument theory**
- Holding an "**AOS Symposium**" for student analysts

ARM-wide AOS Initiatives

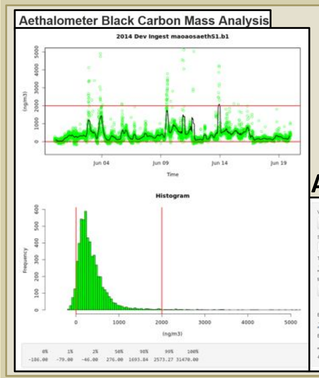
- Ongoing ARM-wide **harmonization** of AOS data processing routines
  - More **rapid, robust** identification of AOS instrument problems
    - Assisted by compliance with **ARM Standards**
  - Ideal forum for collaboration between **AOS instrument mentors, datastream developers, and ARM and DQ Office personnel** to improve AOS data quality monitoring

For further harmonization details, see:

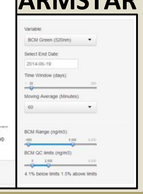
Flynn, C., et al.: ***AOS Harmonized Path: a Unified Processing Model for ARM AOS Data with Dual Goals of Rapid QA and Robust Science-quality Output***. Poster presented at: 2015 ARM/ASR Joint User Facility PI Meeting; 2015 Mar. 16-20; Vienna, VA.

- Collaborating within new **Aerosol Measurement Science Group**

Interactive Analysis Tool Development



ARMSTAR



Added utility for:

- Long-term data quality analyses
- Statistical investigation
- QC limit analysis

Interactive plotting efforts ongoing

Inquire within!