ARM Aerosol Measurements Introduction: Background and Motivation

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Outline of this Session

- Background and motivation for this session
- The 2017 Aerosol Measurements and Science Group (AMSG) Workshop
- The ARM Measurement Plan
- Aerosol measurement needs
- Discussion

Aerosol Observing System (AOS)

Each AOS includes: CO, CCN, CPC, HTDMA, Nephelometer (Ambient), PSAP, UHSAS, Weather Sensor

Additional instruments are available across the AOS to varying degrees:

Instrument	AMF2 AOS	AMF3 AOS	ENA AOS	AMF1 AOS	SGP AOS
ACSM/Q - Aerosol Chemical Speciation Monitor - Quadrapole					
ACSM/TOF - Aerosol Chemical Speciation Monitor-Time of Flight					
Aethalometer					
APS - Aerodynamic Particle Sizer					
CAPS - Cavity Attenuated Phase Shift Monitor					
µCPC - Ultra-Fine Condensation Particle Counter					
GHG - Green House Gases (CO2, CH4))					
n-SMPS - Nano Scanning Mobilty Particle Sizer					
Neph, Dry - Nephelometer, Dry RH Scanned	Broken				
O3 - Ozone					
SMPS - Scanning Mobility Particle Sizer					
SO2 - Sulfur Dioxide					
TAP - Tricolor Absorption Photometer					

Mobile Aerosol Observing System (MAOS)

ARM CLIMATE RESEARCH FACILITY

AOS +

- Particle Into Liquid Sampler (PILS)
- Proton Transfer Reaction Mass Spectrometer (PTR-MS)
- Single Particle Soot Photometer (SP2)
- NO_x
- SO_2

AOS/MAOS Instruments Cost

Cost \ Effort	Low Effort	Moderate Effort	High Effort
< $25,000	CAPS, CPC, O3, PSAP, SO2, TAP, Aethelometer		
$25,000 - $50,000			
$50,000 - $100,000	CO, SMPS, CCN100, UHSAS, APS		
$100,000-$200,000	CCN200	NOx, ACSM, f(RH), HTDMA	SP2
>$200,000			PILS, PTRMS

Concerns

- Have heard some concerns about some of the ARM measurements
- Seeing more use of complex guest instruments or (relatively) simple ARM instruments than the intermediate complexity ARM instruments

For example: Looking at downloaded files from 2014-2016, there are three aerosol-related datastreams in the top 50:

- MFRSRAOD1MICH @ #8 (1,045,638)
- NOAAAOS @ #23 (298,378)
- NOAAAOAVG @ #39 (171,357)

Download statistics

Rank	Datastream	# Files	Rank	Datastream	# Files
1	MET	2,753,125	39	NOAAAOSAVG	171,357
2	SWATS	2,559,172	54	AOS	119,934
3	30EBBR	2,409,748	60	AOSACSM	89,138
4	SONDEWNPN	2,258,801	61	AIP1OGREN	89,010
5	30EBBR	2,228,801	63	AOSCPC	85,112
6	SIRS	1,055,536	64	AOSCCN100	83,732
7	30ECOR	1,027,586	65	TDMASIZE	83,603
8	MFRSRAOD1MICH	1,045,638	69	AIPAVG1OGREN	79,681
9	PBLHTSONDE1MCFARL	968,623	79	AOSCCN	65,219
10	LSSONDE	777,472	80	NDROPMFRSR	63,505
11	QCRAD		81	NOAAAOSCCN100	61,165
12	WACRSPECCMASKCO		83	AOSCCNAVG	58,923
13	MWRLOS		90	TDMAAPSSIZE	52,572
14	WACRSPECCMASKXPOL		101	TDMAHYG	43,266
15	MWRRET1LILJCLOU	399,505	109	AOSNEPHDRY	41,542
16	MERGESONDE1MACE		111	AOSMET	40,323
17	KAZRSPECMASKGECPOL		114	AIPFITRH1OGREN	37,150
18	SKYRAD60S		115	AOSCPCF	36,916
19	CSAPRRHI		120	AOSPSAP3W	34,172
20	GNDRAD60s	318,514	123	RLCCNPROF1GHAN	32,978
21	VCEIL25K		128	NIMFRAOD1MICH	28,994
22	RLPROF		155	AOSNOX	17,940
23	NOAAAOS	298,378	160	AOSSMPS	17,525
24	ARSCL1CLOTH		165	AOSNEPHWET	17,097
25	30MPLCMASK1ZWANG	276,186	170	AOSCLAP3W	16,182
26	1SMOS		173	AOSCO	15,642
27	CEIL		188	AOSUHSAS	12,928
28	RADFLUX1LONG		192	AOSOZONE	11,641
29	SWATSPCP		194	AOSPASS3W	11,519
30	5EBBR	243,925	195	AOSCPCU	11,399
31	30CO2FLX60M		204	AOSAETH	9,994
32	30CO2FLX4MMET		220	AOSSO2	7,869
33	CSAPRSUR		225	AEROSOLBE1TURN	7,607
34	15SWFANALSIRS1LONG		227	TDMACCMCOLL	7,296
35	THWAPS	186,700	265	CSPHOTAOT	4,529
36	DLPPI		278	AOSHTDMA	3,998
37	MFRSR		283	AOSCCN1COL	3,649
38	DLFPT				

Questions

- Is there a problem here?
- Are there issues with the measurements or how we are delivering them?
- Are we not making the right measurements?
- Is there not interest in the measurements at the particular location where we are making them?

AMSG Workshop

- What are the impediments to using ARM measurements to advance aerosol science?