

The Storm Peak Lab Cloud Property Validation Experiment (StormVEx)

An ARM Climate Research Facility
AMF2 Maiden Deployment



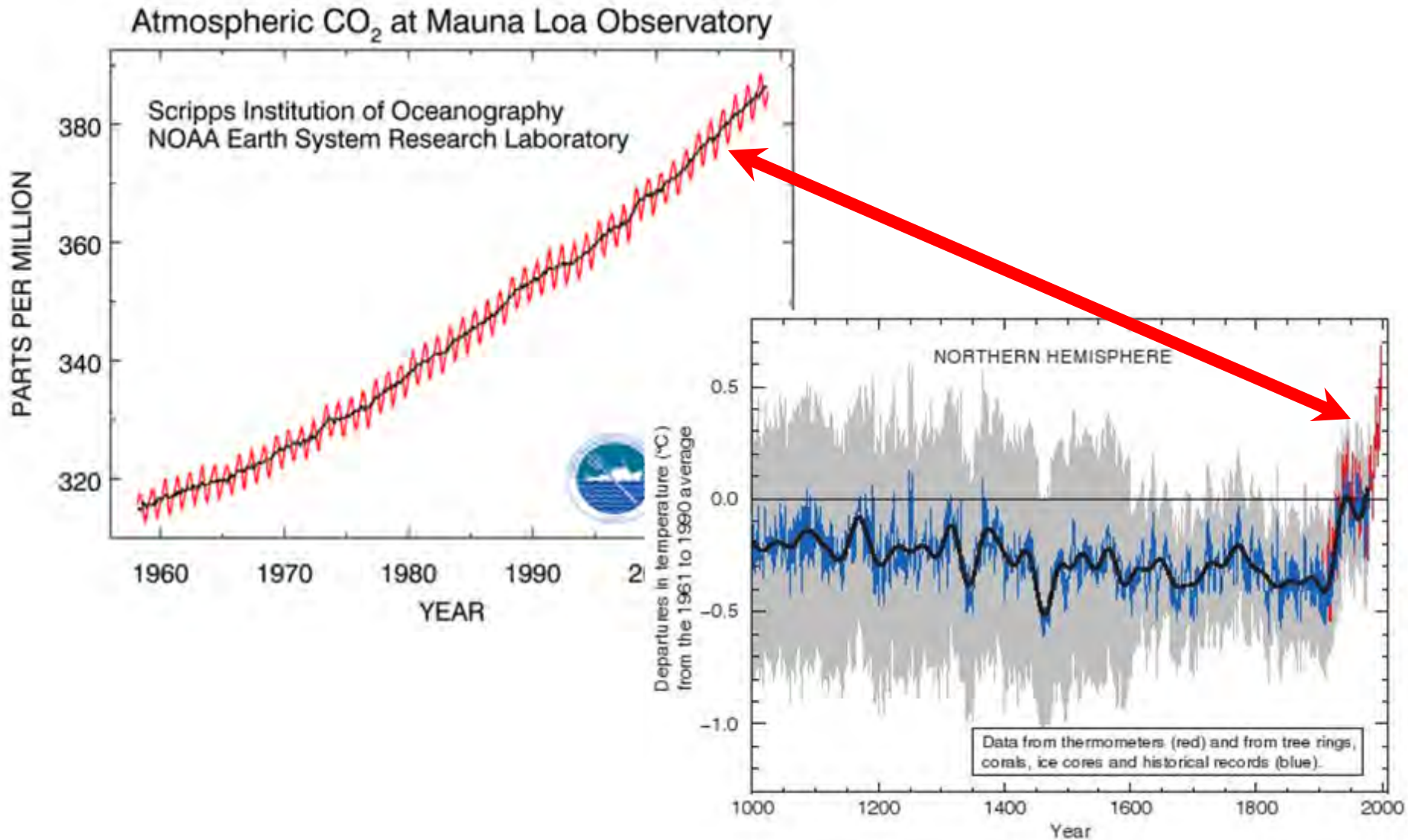
Project Team:

- **Jay Mace (PI), University of Utah**
- **Sergey Matrosov, CIRES, University of Colorado and NOAA/ESRL**
- **Matthew Shupe, CIRES, University of Colorado and NOAA/ESRL**
- **Paul Lawson, Stratton Park Engineering Corporation**
- **Gannet Hallar, Desert Research Institute**
- **Ian McCubbin, Desert Research Institute**
- **Roger Marchand, University of Washington**

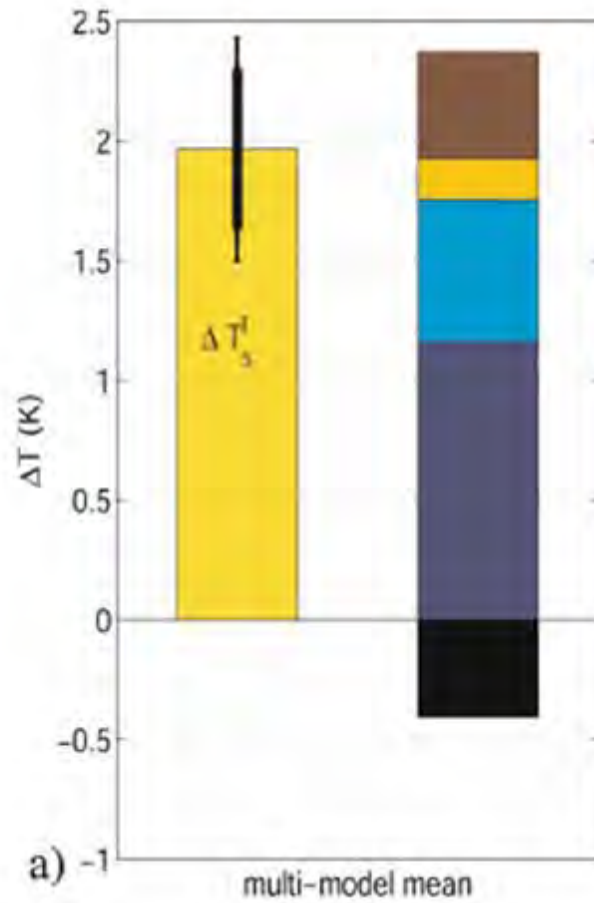


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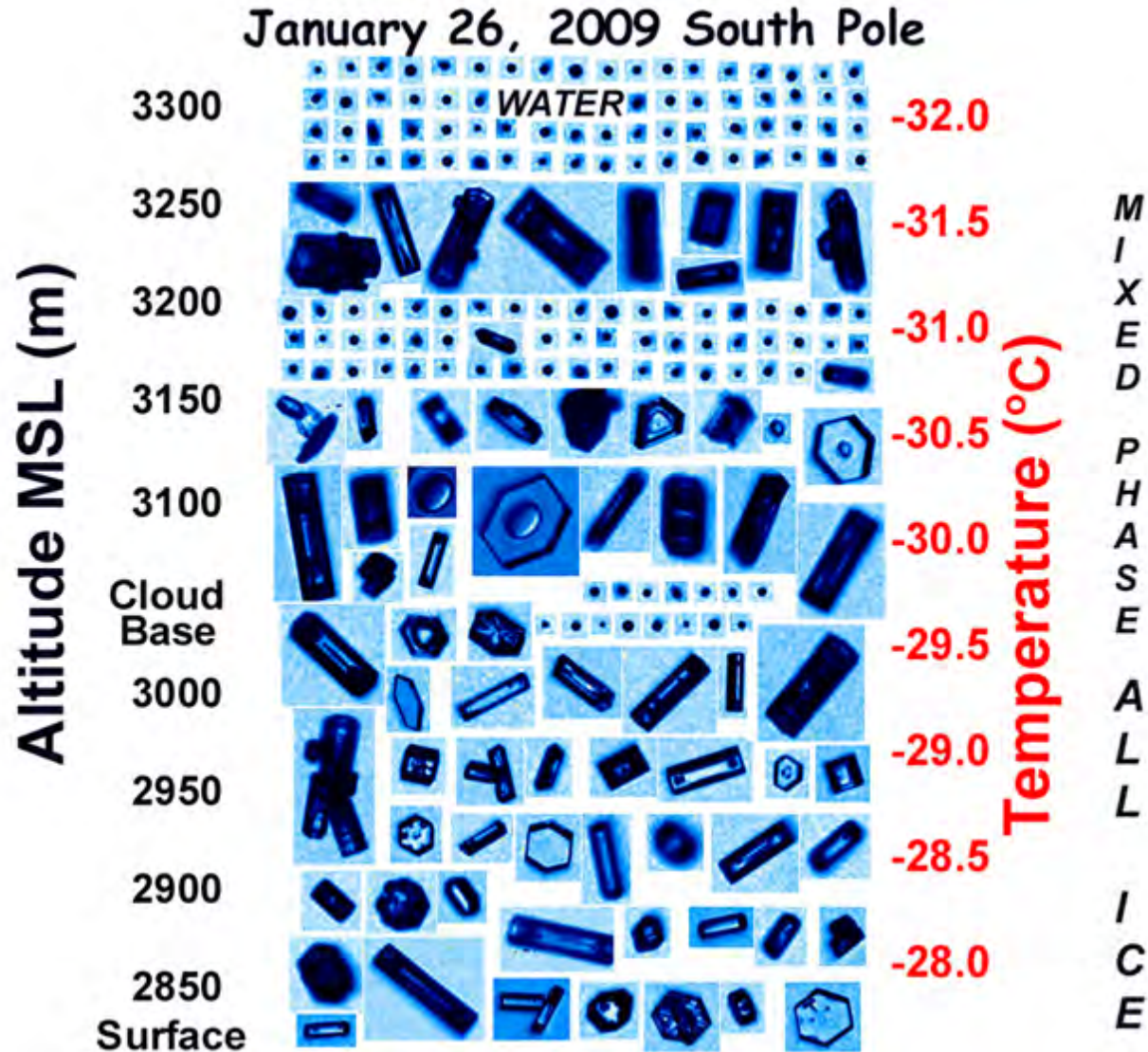


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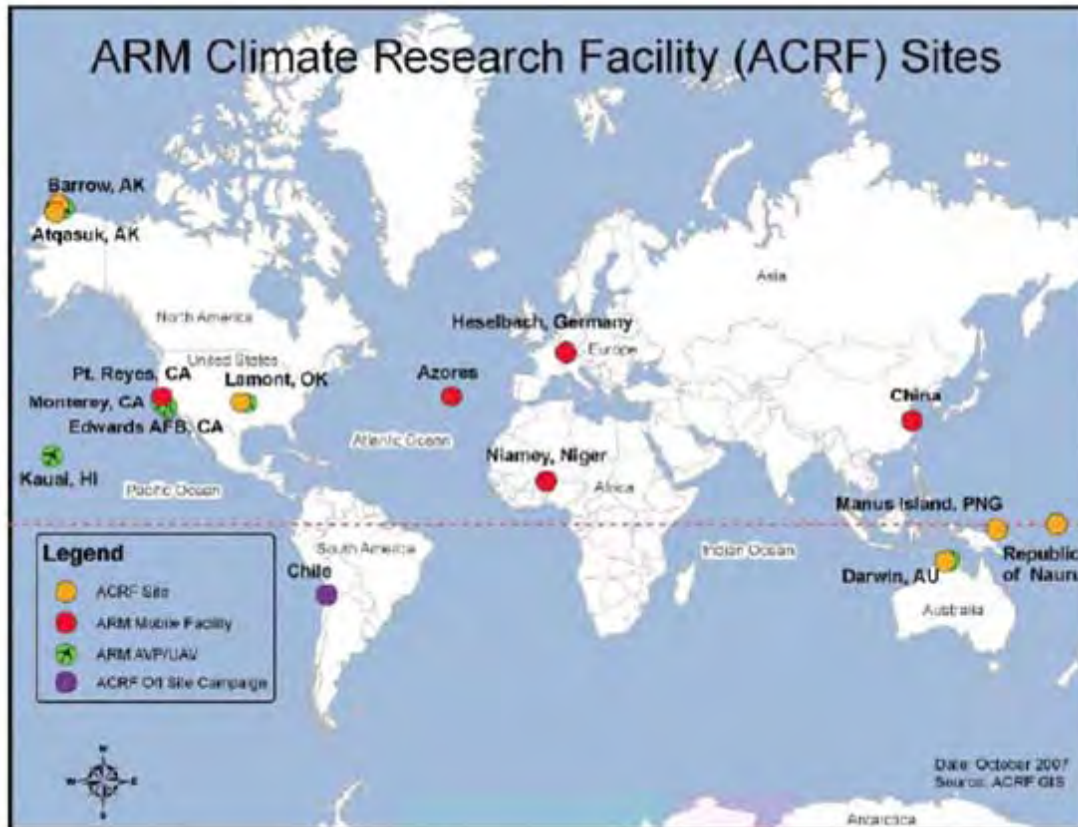
Why all the uncertainty with clouds?



Courtesy: Paul Lawson

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Solution: Measure the properties of clouds and their effects...



...Then, turn the measurement into cloud properties....

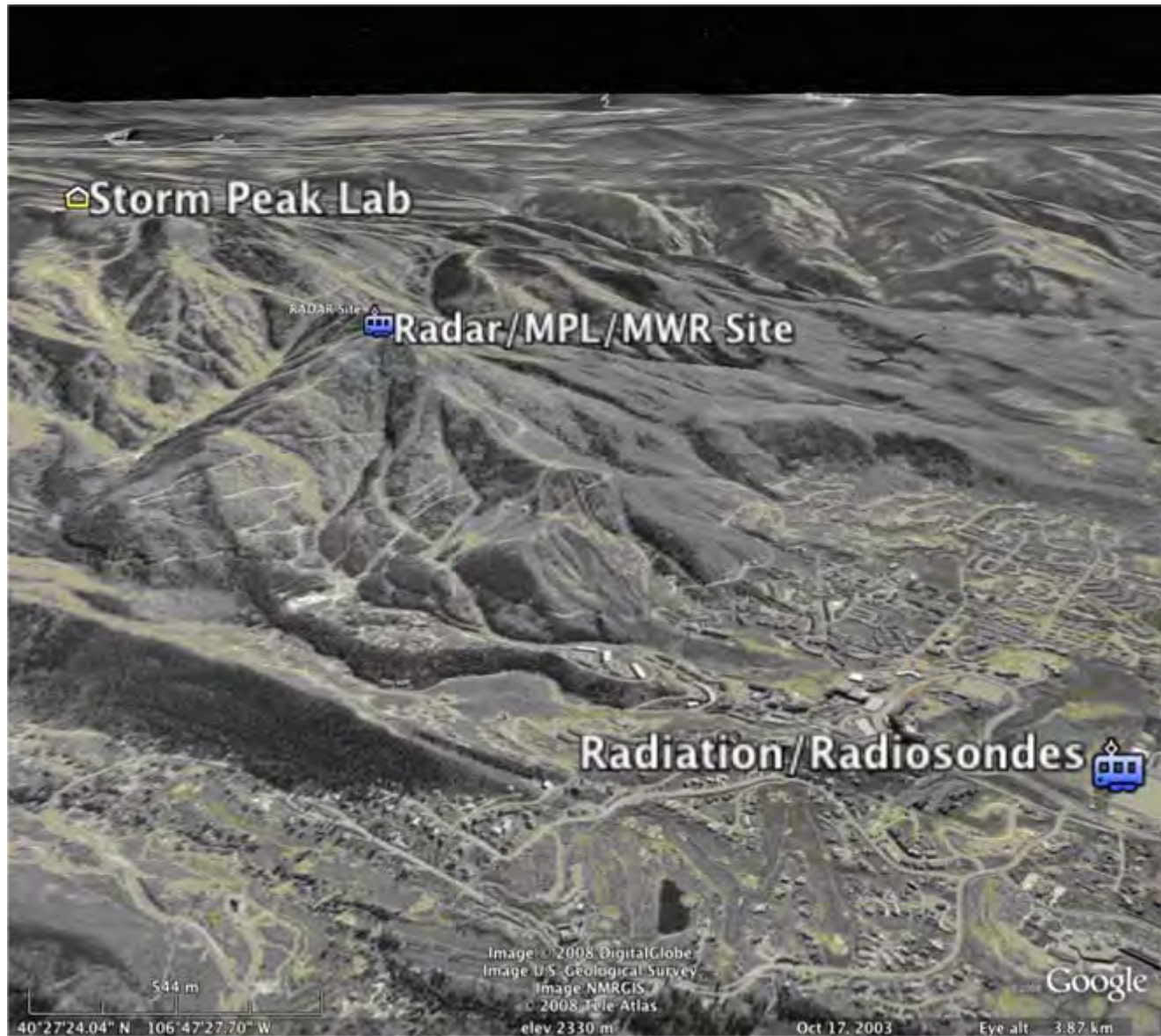
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AMF2	Measurement	Location	Operation Plans	Calibration History/plans	Level 1 Data Availability	Level 2 Plans
SWACR Spectra	Z(Vd) ???point fft Co and cross polarization spectra (45 degrees) ??	Thunderhead	Scanning Strategy (Action item for Sergey) 24/7	Corner Reflector and Rain, Will disdrometers exist?, intercomparison	Possible download. Likely.	
SWACR Moments	Reflectivity Velocity Spectrum Width	Thunderhead	Scanning Strategy 24/7			
MPL Backscatter	Attenuated Backscatter (co and cross pol)	Thunderhead	Operate 24/7	Overlap will be done at SPL...	VAP MPLNOR	Optical depth/extinction retrievals –
AERI	IR Spectral Radiance	Thunderhead	24/7, Rapid Scan critical	Established	No issues/spectra	
Microwave Radiometer	23, 31, 90 GHz	Thunderhead	Scanning strategy (Rich action)	Tip Calibration routine	Normally available	Retrievals- MWR Ret - VAP
MFRSR	Spectral Flux	Thunderhead	24/7	Langley Calibration (who?) Cal exercise	Normally available	VAP – Connor/Qilong
Long’s Radiometer	IR and solar flux					

AMF2	Measurement	Location	Operation Plans	Calibration History/plans	Level 1 Data Availability	Level 2 Plans
915 Profiler	Z(Vd), V, W	Valley Floor	Mode/beams operation. High vs low modes #fft Scanning strategy? Order?	Disdrometer at the valley floor for calibration.	Z(Vd)	winds
Vaisala Ceilometer	Profiles of backscatter	Valley Floor	24/7	n/a	backscatter	Cloud base, mixing height,
Skyrad, Groundrad	Solar and IR Fluxes	Valley Floor	24/7	ARM bore cal process		Best estimate VAP needs to be run
Total Sky Imager	Sky Images	Valley Floor	Daylight	n/a	Imagery?	movies? Cloud fraction – VAP??
BBSS	P, T, Rh, Wind Profiles	Valley Floor	2 per day always. 4 per day sometimes. Occasionally more?		Routine	None
ECOR		Valley Floor				

SPL Instruments	Measurement	Location	Operation Plans	Calibration History/plans	Level 1 Data Availability	Level 2 Plans
PIP	Raw data needed 100 microns to 6.5 mm.	SPL	Whenever particles are around	Cal by dmt prior.	Raw data will be provided	Processing in plans.
fssp	Psd 1-50 microns	SPL	Whenever particles are around	Calibrated by dmt	Raw data to be preserved	Size distributions
Ccn counter	Number per cm3 per ss%	SPL	24/7	DMT calibration	Available upon request	n/a
Smgs (scanning mobility particle sizer)	8-500nm size distribution	SPL	24/7	TSI calibration annually; Not mission critical		
APS (aerodynamic particle sizer)	500nm to 20 microns	SPL	24/7	TSI calibration annually; Not mission critical		
(U)Cpc (ultra)(condensation particle counter)	Aerosol concentration 10 and 3 nm cutoffs	SPL	24/7	TSI calibration annually; Not mission critical		
Trace gasses (ozone and co2)		SPL	24/7	Not mission critical		

SPEC	Measurement	Location	Operation Plans	Calibration History/plans	Level 1 Data Availability	Level 2 Plans
CPI	Particle Imagery	SPL				
Fast FSSP	1-50 micron PSD	SPL				
2D-S	10-3000 micron PSD	SPL				
HVPS	0.2-5 cm PSD	SPL				
Extinctionmeter	Extinction	SPL				
Nevzorov	Total water mass	SPL				
Rosemont icing probe		SPL				

Science Deliverables/Interests.

Mace:

- Science Interests: Developing inversion strategies (i.e. MCMC minimization of cost function) using Doppler spectra and moments combined with microwave Tb, IR radiance to derive cloud and precip PSD, air motion statistics.
- Primary focus: extended overcast events, snowfall
- Storm peak data use: Validation, development of realistic covariance matrices for inversion,

Shupe:

Matrosov:

Hallar:

Improved ground based measurements of IWC; Understanding boundary layer dynamics and relationship to aerosol nucleation.

Lawson:

Marchand:

Action Items/Issues:

Ask Pavlos/Jim Mead about the possibility of doing cross pol spectra with SWACR (Sergey)

Scanning strategy for SWACR – Sergey Leads

Scanning of MWR towards SPL is desired. Talk to who - Maria? Coordinated with SWACR is desired. Rich leads.

Cal exercise planned for mfrsr and mpl at SPL early October.

Chuck Long's radiometers? Jay

Disdrometer at the thunderhead and valley floor. Critical for calibration of 915. (Matt)

Beam Scanning strategies for the 915. (Rich)

BBSS – Budget Issues. GPS or no wind? Aerosol interests should contribute to this if interests exist. (Gannet)

Closed Louisville meeting regarding budgeting/deployment. (Brad)

Issues:

Who runs/maintains SPEC instruments when SPEC is not around? (Jay/Paul)

LWC measurement needed on SPL (Jay)

ARM Poster/Talk

Schedule needs to begin to be developed.

Need to decide on JPL radar location. (for discussion at STM)

King Air Proposal (Gannet)

Aerosol interaction (Ian/Gannet)

SPEC needs to visit SPL to review space limitations

Outside entities that would like to be involved in stormvex (i.e. anyone not directly associated with AMF2, JPL ACR, or SPEC, must go through ACRF the formal process to participate in stormvex. This entails filling out forms on ARM web site. All such requests will be reviewed by the stormvex steering committee. Participation will be on a strictly non-interference basis.

Discussion Topics for Breakout

Logistical Details ASAP

1. Ian McCubbin needs to submit plan to USFS
2. Details of Hospital Site needs to be clarified for meeting next week.
3. Chuck Long's Radiometers - Location

Schedule Details

- Science Team Member will be in Steamboat for duration during Campaign
- Using next winter as a "test" for Storm-VEx
 - a. Data Archive / quick-look Test
 - b. Cloud Probes Test

Discussion Topics for Breakout Continued...

1. Location of “stimulus” aerosol instruments for AMF2