# AWG Review of VAP Priorities for SunSet Committee

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# Several AWG VAP Families

- MFRSR and NIMFR AOD Family
- AOS and IAP Family
- The Raman Lidar Family
- The Aerosol "Best-Estimate" product
- MPL Family

# MFRSR and NIMFR AOD Family

- Complete traceability of all corrections
  - Offsets compensation
  - Gain and nominal calibration
  - Cosine correction to direct and diffuse
  - Refraction corrected solar positions
  - Airmass corrected for spherical atmosphere
- Autonomous Langley retrieval of "Io" values
- Robust smoothing and filtering of Io values
- Retrieval of OD, subtraction of Rayleigh and O3
- Multi-pass cloud screen

# AOS and IAP Family

AOS at SGP, NSA, AMF, IAP at SGP only

- Corrections to STP, size truncation corrections for scattering, scattering correction for absorption
- aerosol optical properties reported
  – Aerosol total scattering, RGB, 1 and 10 um
  – Aerosol backscattering, RGB, 1 and 10 um
  – Aerosol light absorption, RGB, 1 and 10 um
- Aerosol Intensive properties computed
  – Angstrom exponents
  – Single scattering albedo
  – Backscatter fraction
  – Asymmetry parameter
  – Sub-micron scattering fraction
  – hygroscopicity

# Raman Lidar Family

- Glue Analog and CTS signals
- Merge NFOV and WFOV
- RL ASR
- RL ext
- RL MR
- RL dep
- RL prof BE

# Aerosol "Best-Estimate" product

- Uses preceding families to yield:
- Column AOD and angstrom exponent
- Ext prof via RL climatology vs AOD
- SSA prof via humidified AOS properties
- Asymmetry parameter g via AOS props.

Yields robust time series of best-estimate *available*, not best-estimate *possible*.

Represents baseline for extension with conditional remote sensing retrievals.
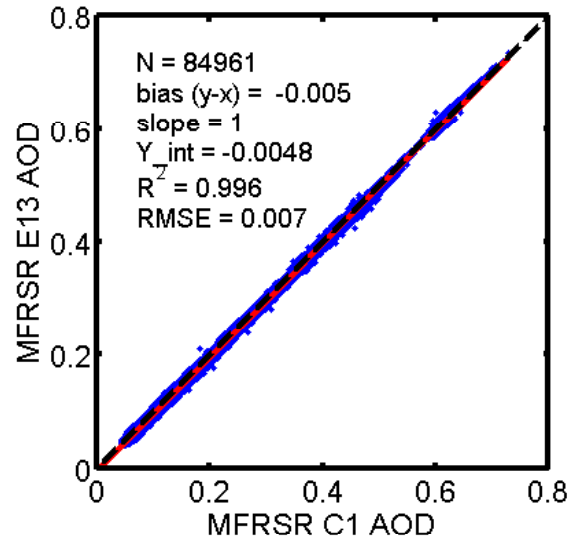
# MPL Family

- MPL "normalized profiles"
  - Detector non-linearity correction
  - Detector afterpulse correction
  - Background subtraction
  - Energy monitor normalization
  - Range-squared correction
  - Overlap correction

- Two cloud masks (sensitive and robust) define up to 5 cloud bases.

- MPL aerosol extinction and Sa (ext/bscat)

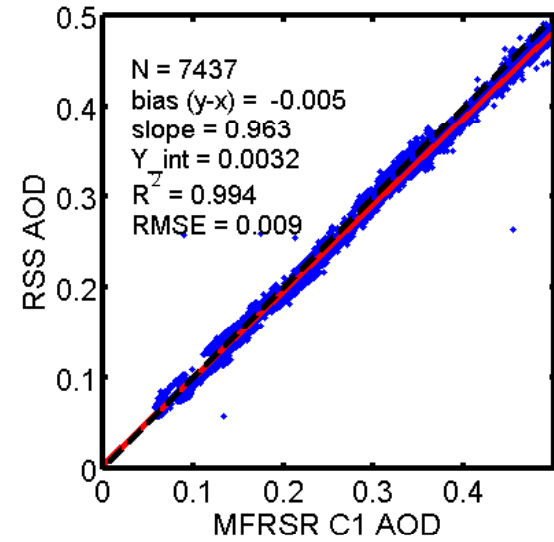- MPL pol and improved MPL cloud detection?

# New VAP efforts?

- Column aerosol BE as input to SW QME using all available sources
  - AOD, Angstrom, SSA, and g,…
- RSS Langley and AOD
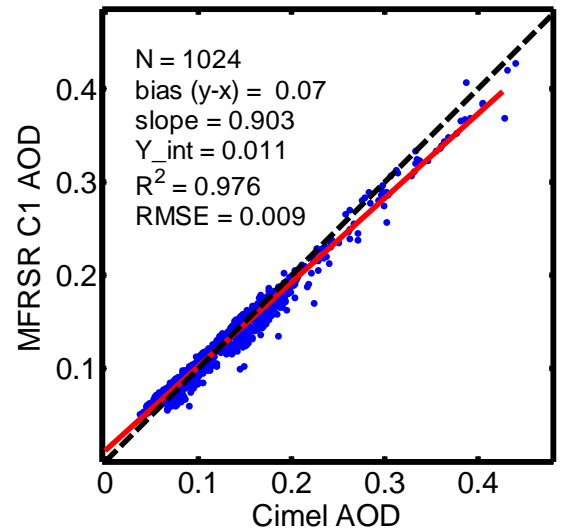- CCN processing
- TDMA processing
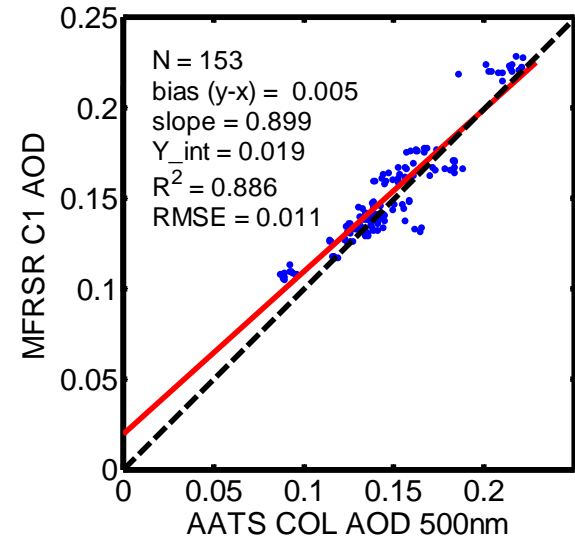- XDC back trajectories

**AOD at 500 nm, MFRSR C1 vs MFRSR E13**

N = 84961
bias (y-x) = -0.005
slope = 1
Y_int = -0.0048
$R^2$ = 0.996
RMSE = 0.007

**AOD at 500 nm, MFRSR C1 vs RSS**

N = 7437
bias (y-x) = -0.005
slope = 0.963
Y_int = 0.0032
$R^2$ = 0.994
RMSE = 0.009

**AOD at 500 nm, Cimel vs MFRSR C1**

N = 1024
bias (y-x) = 0.07
slope = 0.903
Y_int = 0.011
$R^2$ = 0.976
RMSE = 0.009

**AOD at 500 nm, AATS vs MFRSR C1**

N = 153
bias (y-x) = 0.005
slope = 0.899
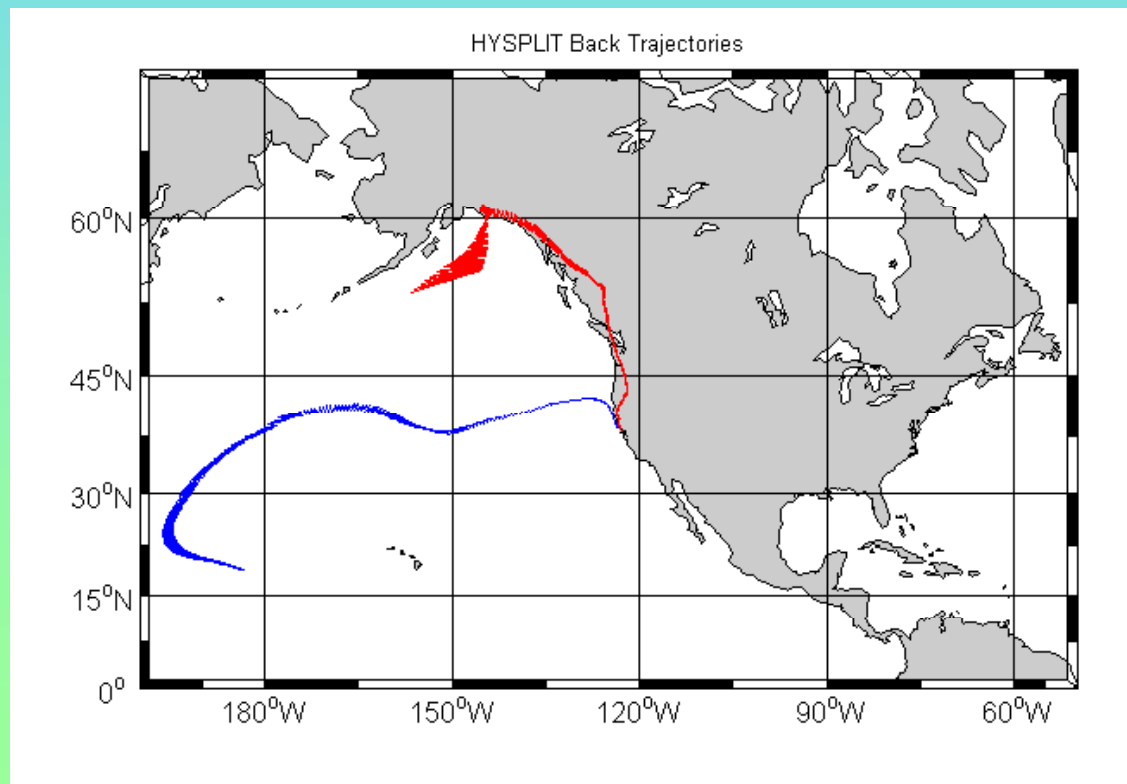Y_int = 0.019
$R^2$ = 0.886
RMSE = 0.011

# Back Trajectories

ARL HYSPLIT4 feasibility run at XDC

T, P, rh, rain rate, theta, terrain alt, bnd layer depth

Sample run for all ARM sites with 5 levels, 6 hour intervals, 10 day trajectories: 1.5 hours processing.  We can do it.  Should we?



HYSPLIT Back Trajectories

| Product | Rating | | Hi | Comments |
|---|---|---|---|---|
| | | med | lo | |
| MFRSR AOD | | | | |
| AOS extensive | | | | |
| AOS intensive | | | | |
| IAP extensive | | | | |
| IAP intensive | | | | |
| RL ASR | | | | |
| RL Ext | | | | |
| RL MR | | | | |
| RL dep | | | | |
| RL Prof BE | | | | |
| ABE – baseline | | | | |
| ABE - conditional | | | | |
| MPL nor | | | | |
| MPL ext | | | | |
| MPL pol | | | | |
| MPL | | | | |

| Product | Rating Hi med lo | Comments |
|---|---|---|
| Col. Aerosol BE Aod, ang, ssa, g | | |
| RSS Langley and AOD | | |
| CCN processing | | |
| TDMA processing | | |
| XDC back-trac | | |