ARM Radiative Processes Working Group
Princeton, NJ, November 2008
Shortwave spectroscopy FG summary and science questions

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Instrument	What	Who
SWS	Status	Connor Flynn
RSS	360-1080nm diffuse and direct flux vs. RT models	Joe Michalsky
RSS	H_2O (940nm, 820nm,720nm) validation	Jennifer Delamere
SWS	Cloud boundary (λ_1- λ_2 vs. λ_1+ λ_2 diagrams)	Alexander Marshak
u-MFR	Spectral albedo	Sally McFarland
Brewer	UV flux, O_3	Peter Kiedron
RSS	Status	Peter Kiedron (Chuck's session)

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Continuous spectrum (contiguous spectral resolving elements)

SWS: radiance, FOV=1.2°, SRE≤512, (0.38-2.2μm), fwhm≈10nm

RSS: flux, FOV=2π, SRE≤1024, (0.36-1.08μm), fwhm(λ)

Discrete channels

MFRSR, Cimel, NIMFR, NFOV, upwelling MFR

RSS and SWS Status

Ater 4.5 years of work RSS is in overhaul.
Raw and processed data are in ARM archives.
Decent agreement with RT models.
Now the redeployment is estimated for Feb. 2009.
It will need new characterizations of stray light, resolution, wavelength-to-pixel assignment, radiometric stability.

SWS is relatively new.
Connor is its new mentor.
It had some stability issues.
No raw (only processed) data from early deployment.
Lack of extensive characterization (slit function, stray light, polarization dependence).
Mixed results when comparing with models.

RSS and SWS Applications

Spectroscopy questions

Mutual congruency questions

Retrieval tools and techniques

Trend questions (?-?)

RSS and SWS Applications

Spectroscopy Questions: **(HITRAN validation)**

H_2O, O_2, CO_2, O_3, O_2-O_2, H_2O-H_2O

H_2O (liquid, ice)

Gas X, minor species

Im(AOD)

eg.(1): H_2O vapor 940nm, 820nm, 720nm

eg.(2): O_2 A-band 760nm

eg.(3): continuum issues

RSS and SWS Applications

Mutual Congruency Questions: (so-called closure issues)

Model vs. Measurement

Method A vs. Method B

eg.(1) Diffuse(RT Model)≥Diffuse(Measurement)

eg.(2) $SSA_{RT\text{-}effective}$ vs. SSA_{AOS}

eg.(3) Lidar H_2O vs. MWR H_2O vs. HITRAN H_2O

RSS and SWS Applications

Retrieval Tools and Techniques:

Spectral AOD(λ), SSA(λ), SA(λ)

Cloud properties

Profiles: AOD(z)

eg.(1) continuous AOD(360nm-500nm) and AOD(1040nm)

eg.(2) SSA(λ) from DDR or radiance

eg.(3) SA(λ) in NIR where AOD is small (radiance)

eg.(4) cloud boundaries

eg.(5) ice-liquid-vapor (radiance)

New Instruments and Measurements

1.6μm MFR (NIR eigenvalue for SA)!

Upwelling SWS ?

UV spectroradiometer (Brewer)?

A-band?

Radiance Stokes vector (SWS modification) ?

4-STAR (10x resolution of RSS, SRE>50Cimel)?