# Update on the Spectral Shortwave Quality Measurement Experiment (SW QME) at the Southern Great Plains ACRF

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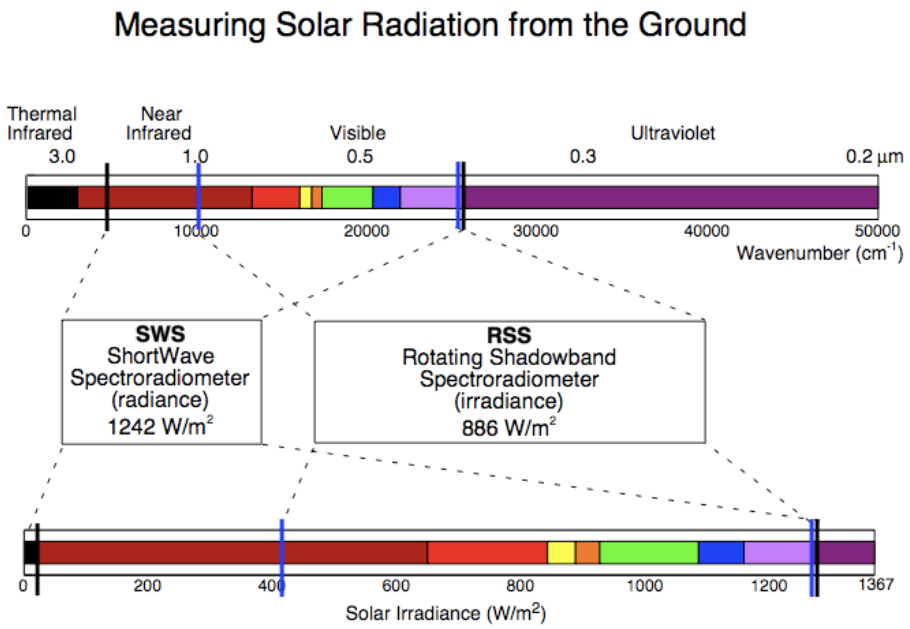
# The Shortwave QME Paradigm

Critical evaluation of all components of closure study in the shortwave…..

- Radiometric measurement quality
- Accuracy of calculation (LBLRTM/CHARTS)
  - Line parameters (HITRAN)
  - MT_CKD continuum model
  - Extraterrestrial spectrum
- Model inputs
  - Radiosonde, MWRRET
  - Spectral Surface Albedo
  - Aerosol Properties (ABE)
  - Cloud Properties (Microbase)



# Spectral Surface Albedo Algorithm

1. Based on the 6 MFR channel albedos, every surface classified as either:

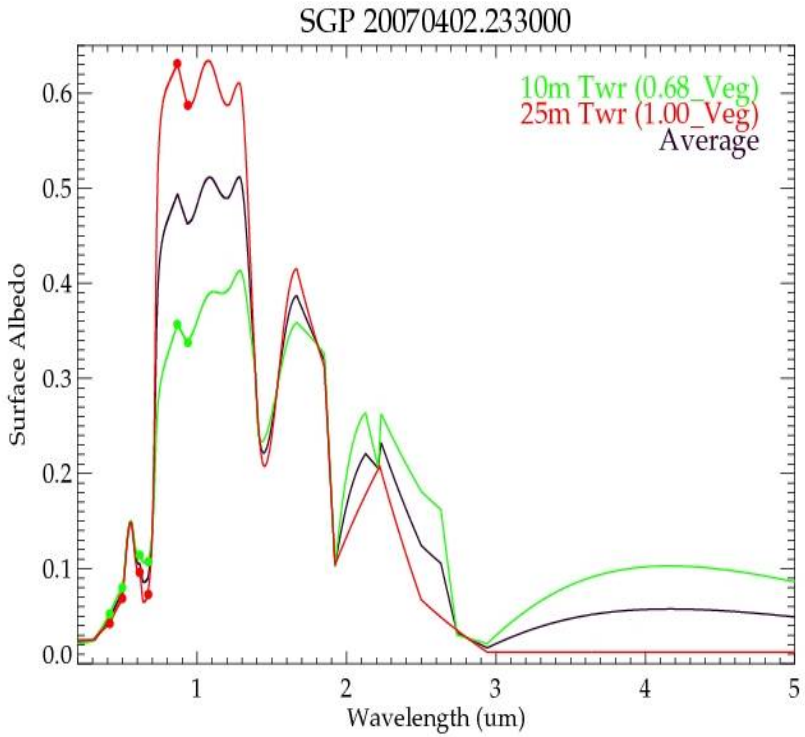
- Snow
- Brown Vegetation/Soil
- Green Vegetation
- Brown/Green Vegetation Combination

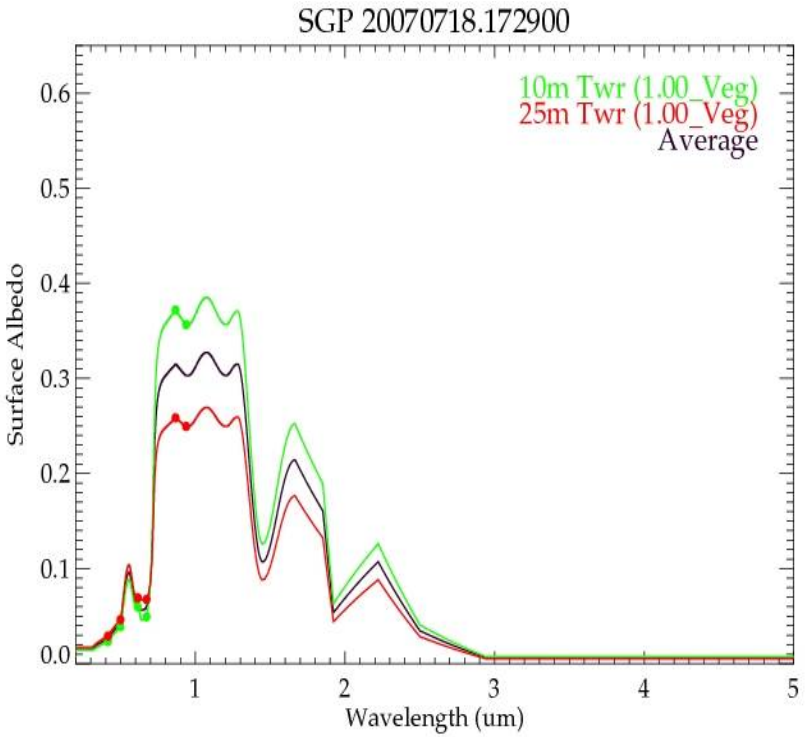
2. Surface classification + MFR channel albedos used to create full spectral albedo on 10 $cm^{-1}$ grid

- Function constrained to measurements

3. Combine 10m and 25m tower albedos for RT calculation

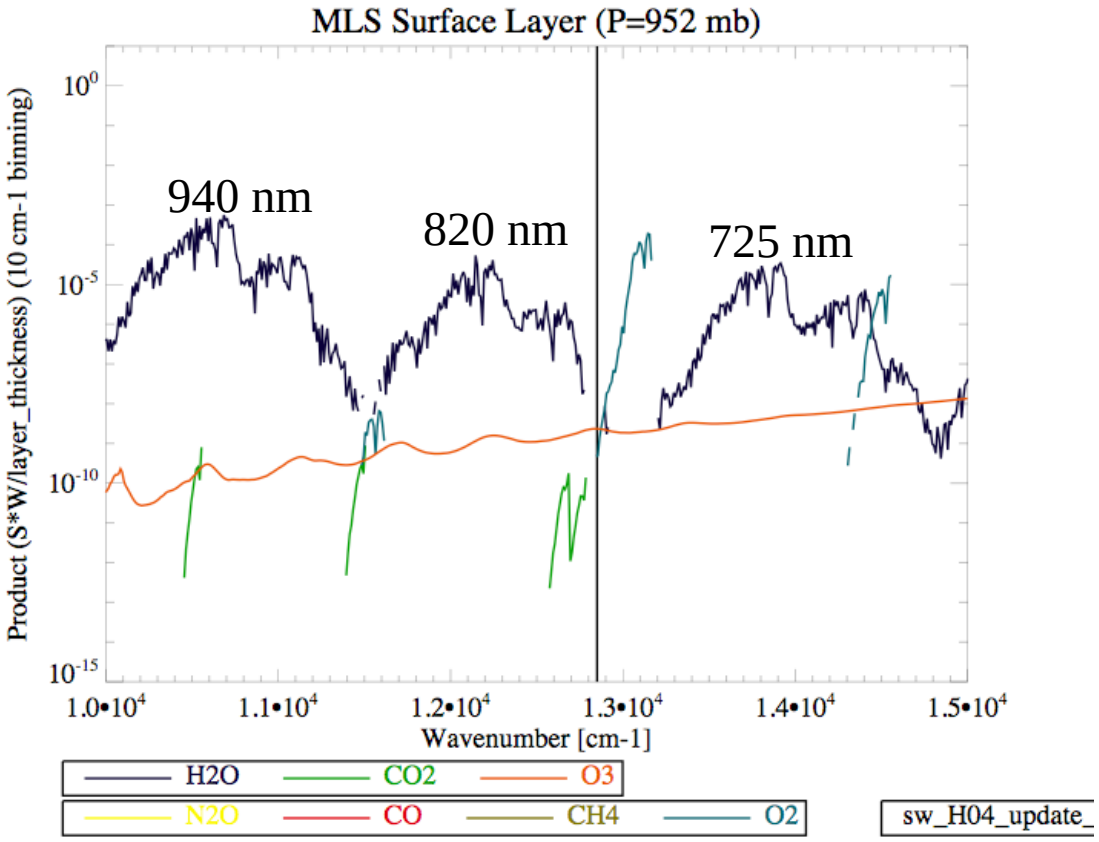
# Spectral Surface Albedo Examples



# QME Part I: Water Vapor

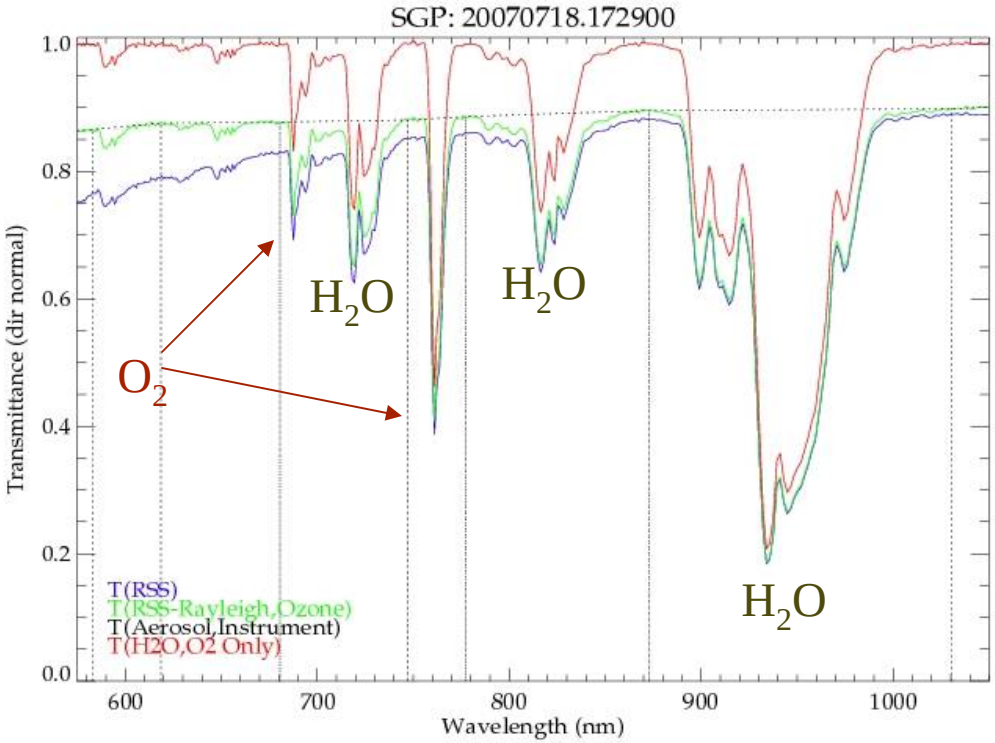
Motivation: Assess the accuracy and consistency of water vapor spectral parameters across water vapor bands measured by ARM SGP instruments.



# Rotating Shadowband Spectroradiometer

- 362-1076 nm (9400-27500 $cm^{-1}$)
  - 1040 Nominal Pixels
- Total, Diffuse, Direct Normal Irradiance [W /($m^2$ nm)]

- Normal irradiances used to perform Langley regression analyses ("$V_o$")
- Derive transmittance from irradiance and $V_o$



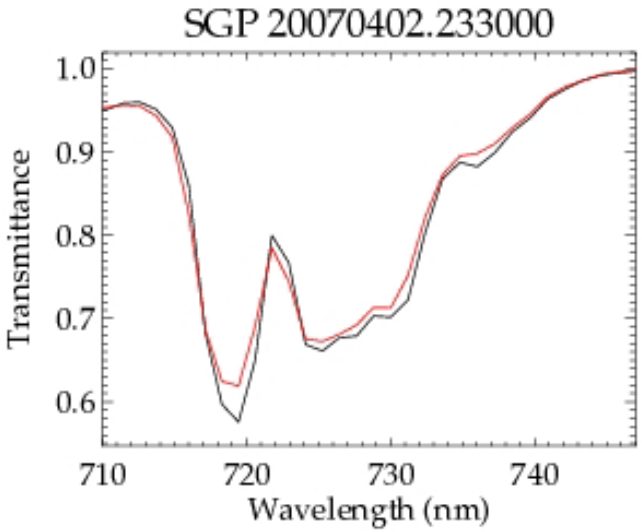
# 8 Cases Selected So Far….

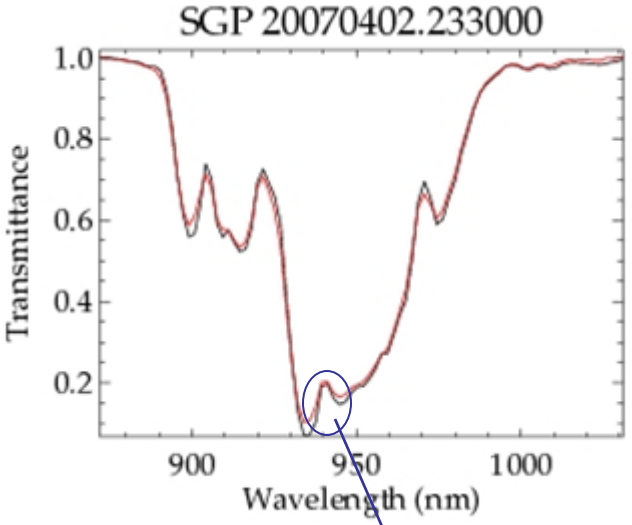
| Date (2007) | SZA | MWR (PWV) | (MWR/ Sonde) | AOD (1um) |
|---|---|---|---|---|
| 0401.1731 | 35 | 1.44 | 1.04 | 0.034 |
| 0402.1732 | 35 | 1.56 | 1.02 | 0.034 |
| 0402.2330 | 74 | 1.77 | 1.01 | 0.035 |
| 0415.1729 | 30 | 0.72 | 1.00 | 0.022 |
| 0415.2330 | 72 | 0.65 | 0.88 | 0.030 |
| 0714.2329 | 64 | 3.36 | 1.01 | 0.030 |
| 0715.1729 | 21 | 3.32 | 1.07 | 0.040 |
| 0717.2329 | 65 | 3.43 | 1.02 | 0.112 |
| 0718.1729 | 21 | 3.07 | 1.03 | 0.070 |

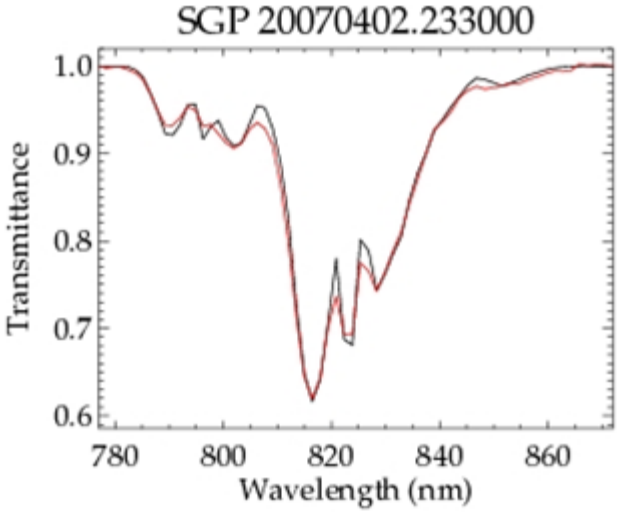
# First QME Effort - Water Vapor

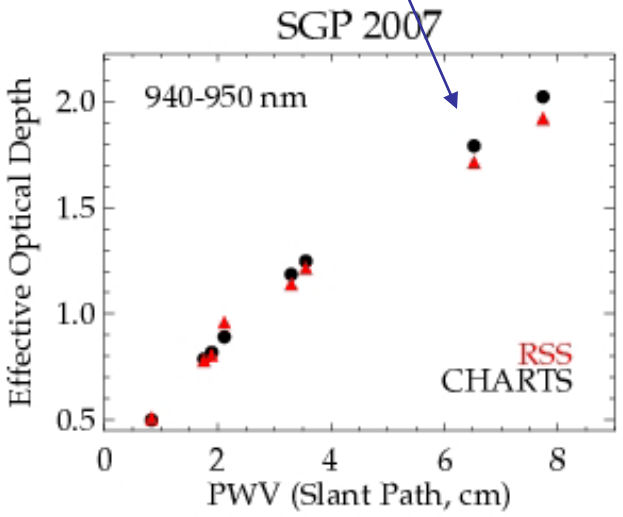
* 8 clear sky cases April/June 2007

Direct-Beam Comparison



# What's Next?

**Cloud-Free Cases**

➢ Examine spectral albedo algorithms developed for BBHRP, Surface Albedo VAP with SW QME cases.

➢Add aerosols to calculation for direct and diffuse comparison between RSS (transmittance/flux) and SWS (zenith radiance) measurements.

- Examine different sources of aerosol properties for model input
- Aerosol Best Estimate

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