



Shortwave Spectroradiometer (SWS)

On April 27, 2006 the Atmospheric Radiation Group installed the Shortwave Spectroradiometer (SWS) at the Department of Energy Atmospheric Radiation Measurement Climate Research Facility (ACRF) in north central Oklahoma. The development of the SWS is supported by a grant from the Department of Energy. It joins other ground instruments at the ACRF Southern Great Plains (SGP) site to observe cloud formation processes and their influence on radiative transfer. This contributes to advancing scientific knowledge of the Earth systems.

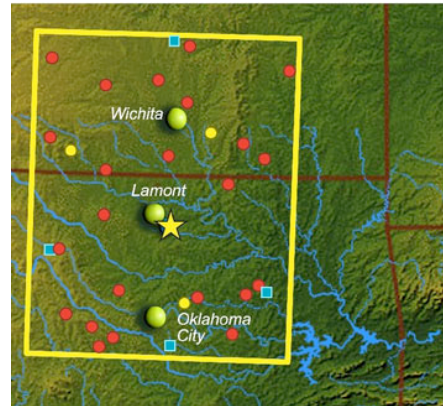
The Shortwave Spectroradiometer design came from our highly successful airborne Solar Spectral Flux Radiometer (SSFR). The SWS measures the absolute visible and near infrared spectral radiance (units of watts per meter square per nanometer per steradian) of the zenith directly above the instrument. It is a moderate resolution sensor comprised of two Zeiss spectrometers (MMS 1 NIR enhanced and NIR-PGS 2.2) for visible and near-infrared detection in the wavelength range 300 – 2200 nm. The sampling frequency is 1 Hz. The spectral resolution is 8 nm for the MMS 1 NIR and 12 nm for the NIR-PGS 2.2. The light collector has a narrow field of view (1.4°) collimator at the front end of a high-grade custom-made fiber optic bundle. Its operation is autonomous and capable of daily day-time measurement of at least 12 hours. Data uploading is done hourly via the internet to the archive at the Pacific Northwest National Lab (PNNL) in Richland, WA. SWS control and data monitoring can be done remotely from Ames.

The SWS measurements can be used to:

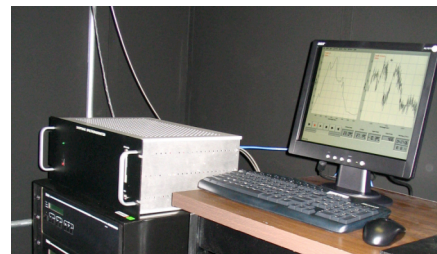
- Retrieve cloud optical depth, particle size and cloud water path.
- Test the cloud optical depth retrieval for overcast and broken cloud fields.
- Validation/comparison with SGP surface remote sensors and future cloud intensive operational period (IOP) campaigns.
- Multivariate analysis to derive information content in hyper spectral data sets and to improve cloud retrieval algorithm development.
- Compare with radiative transfer models for testing and validating retrieval procedures.

Peter Pilewskie (formerly with NASA Ames) of the University of Colorado in Boulder is the instrument mentor.

<http://www.armgov/instruments/instrument.php?id=sws>



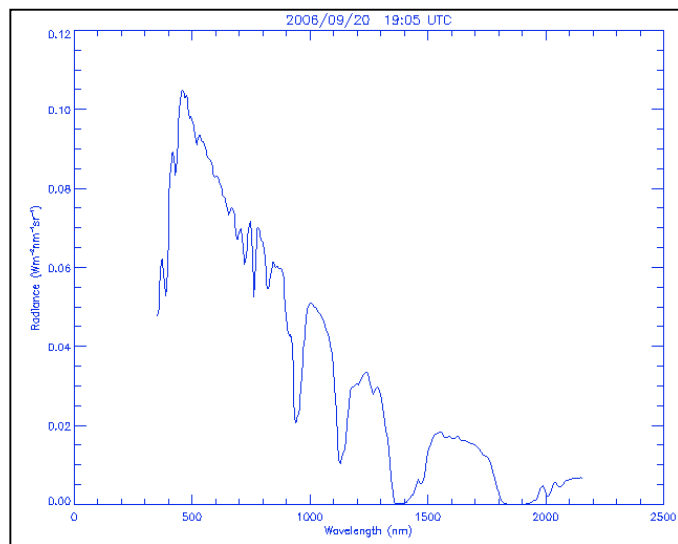
Light Collector on Top of Optical Trailer



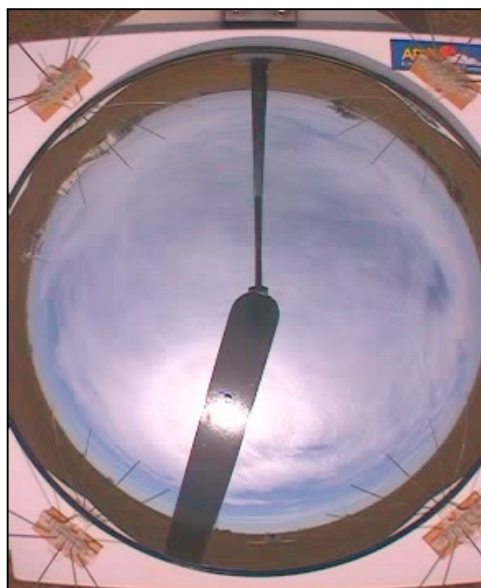
Shortwave Spectroradiometer in Operation

Shortwave Spectroradiometer (SWS)

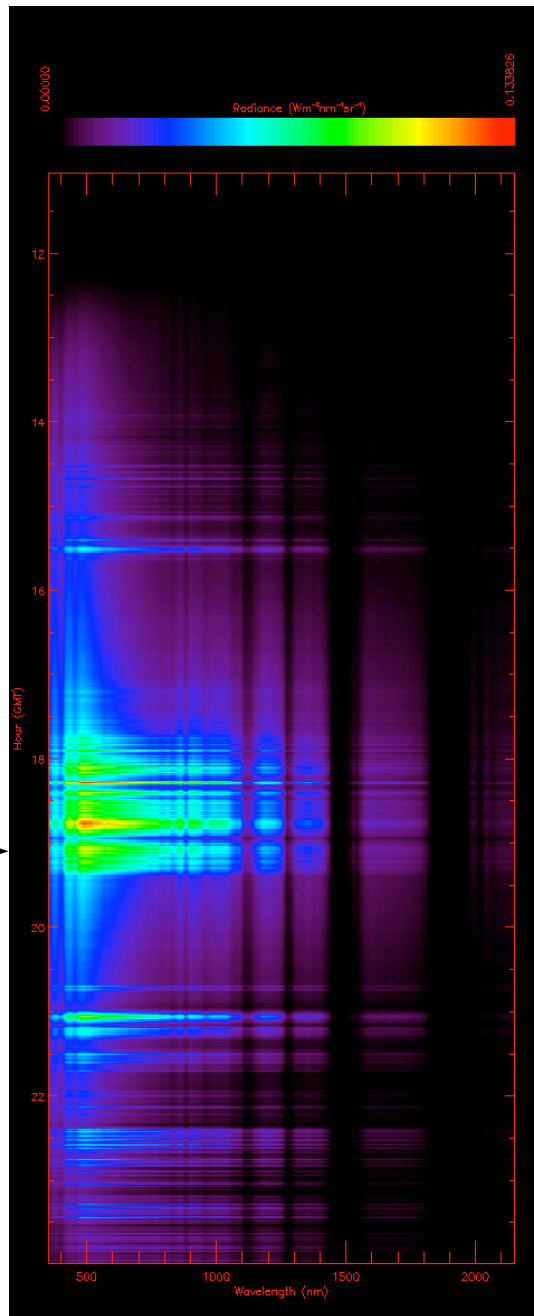
Shortwave Spectroradiometer comparison with
Total Sky Imager on 20 Sep 2006 under cirrus sky
condition



SWS Spectrum at 1905 UTC



Total Sky Imager



SWS Full-day Image

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