Predicted Accuracy and validation of the AVIRIS Radiometric Calibration Standard

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Overview

- Why absolution radiometric calibration?
- Radiometric calibration standard requirements
- Accuracy of the AVIRIS lamp/panel standard
- Calibration Validation of the standard
- Discussion

Radiometric Standards

- As part of the Hyperion laboratory characterization the AVIRIS radiometric standard was used.
- At this time the AVIRIS radiometric standard was compared to the Landsat Transfer Radiometer (LXR standard.
- The AVIRIS radiometric standard agreed at the 98 and 99 percent level with the LXR.

Calibration Equation

$$L(\lambda_c(c,s), x(c,s)) = [S(c,s) - S_{dark}(c,s)]G(c,s)$$

$\lambda_c(c,s)$ is the center wavelength for each detector

$x(c,s)$ is the pointing vector or lat/lon

$S(c,s)$ is the sensor raw data

$S_{dark}(c,s)$ is the dark level correction term

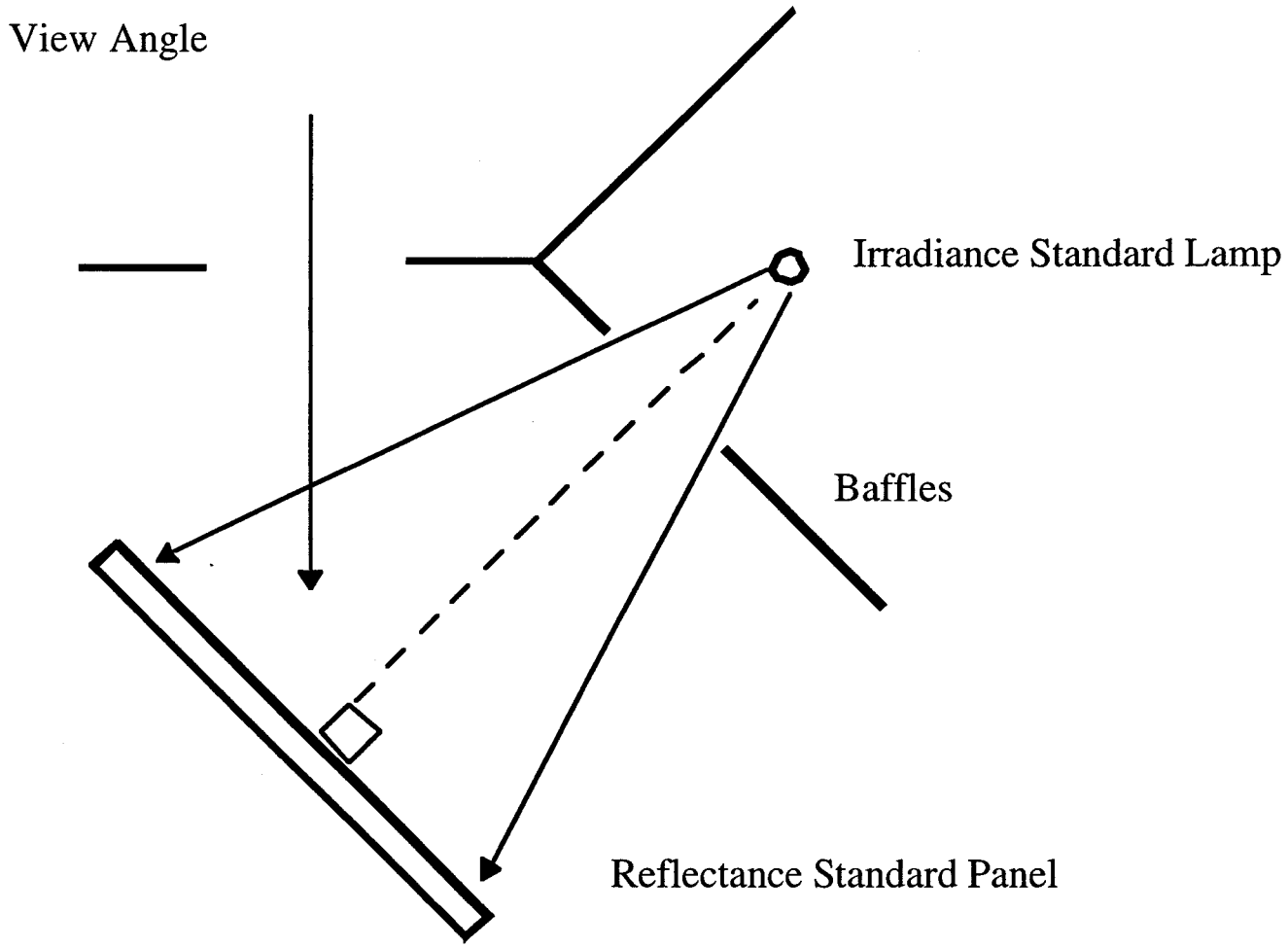
$G(c,s)$ is the radiometric gain factor

You also need:

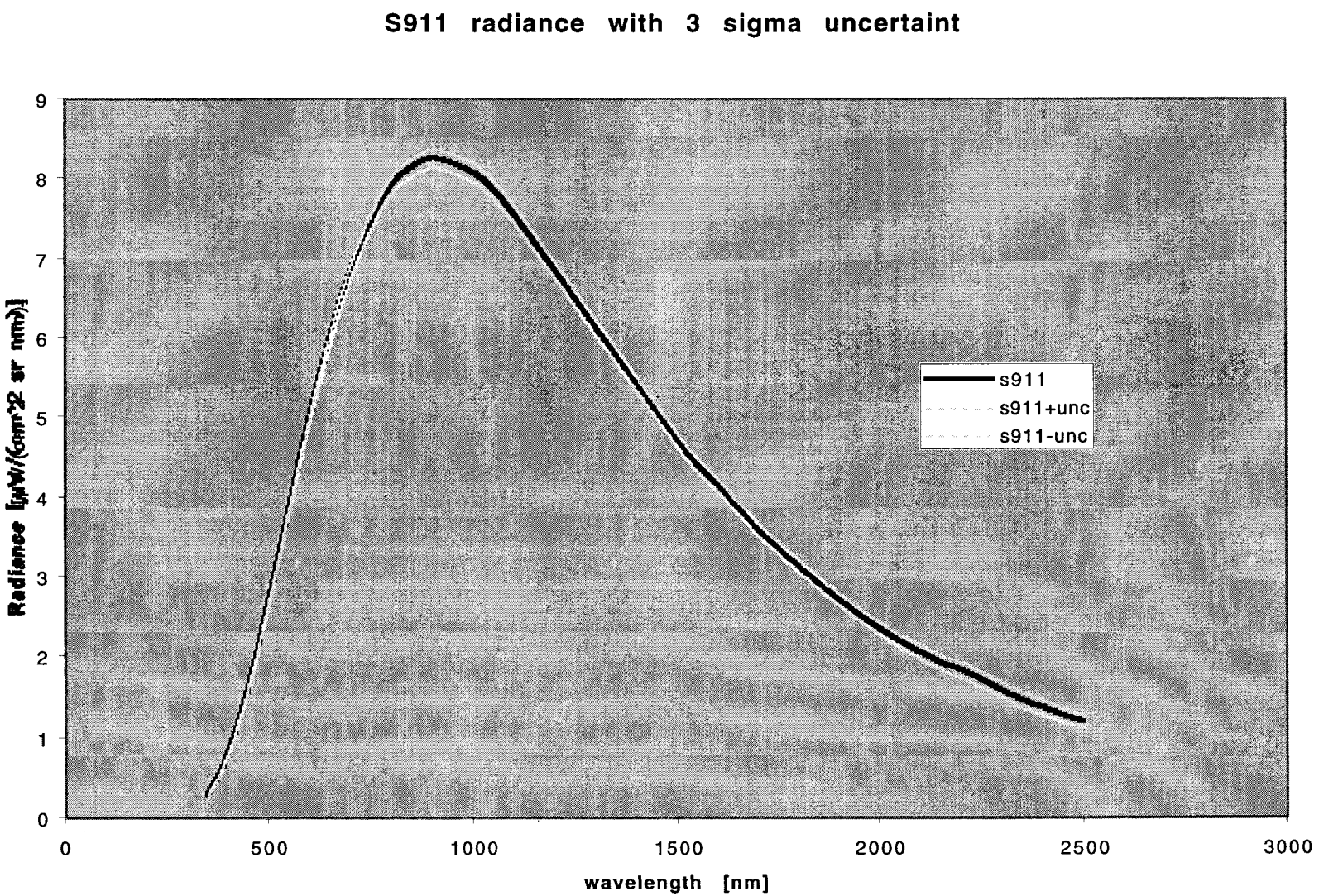
$\Delta\lambda(c,s)$, the spectral resolution

$\Delta x(c,s)$, the spatial resolution (relates to MTF)

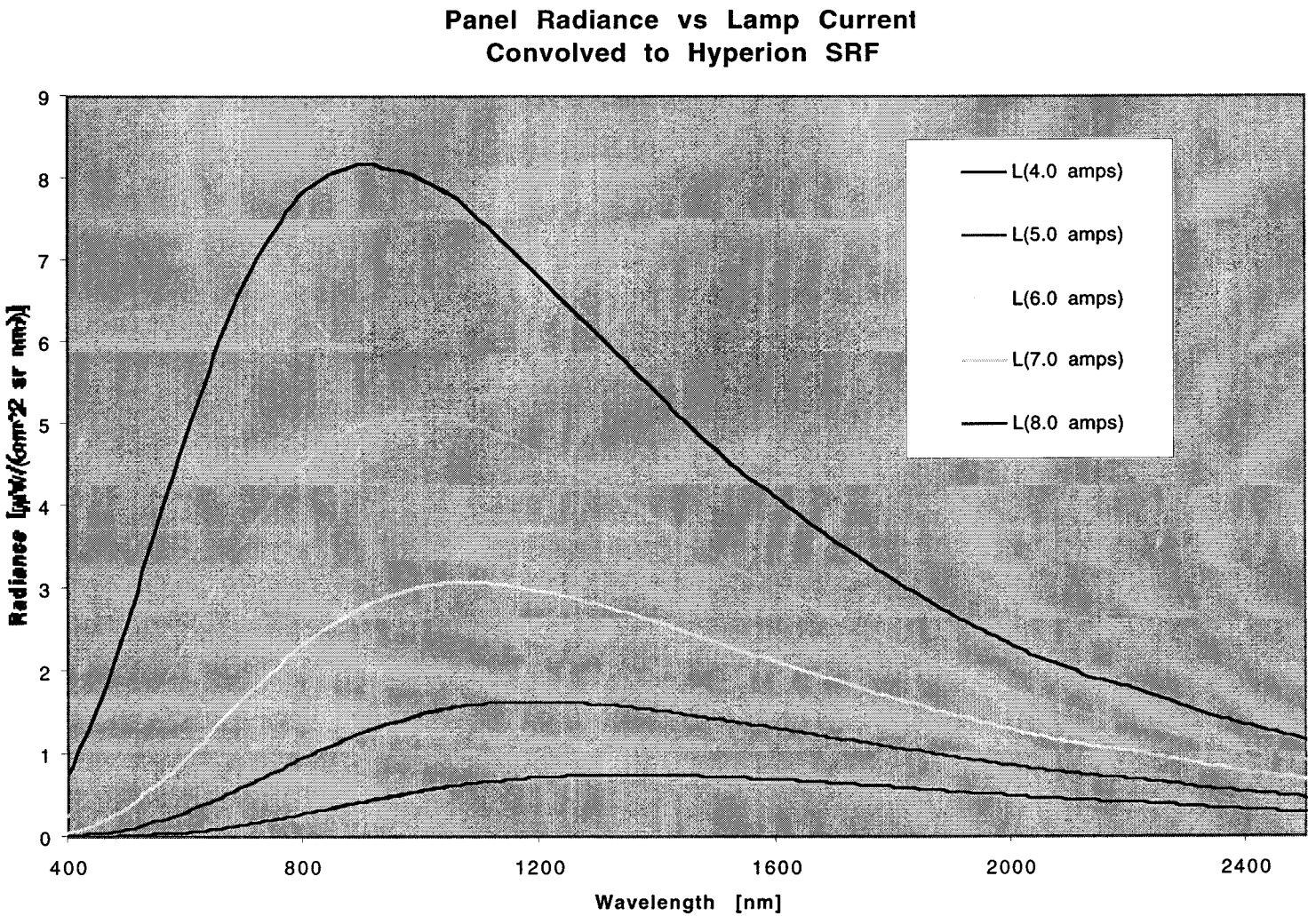
Radiance Source



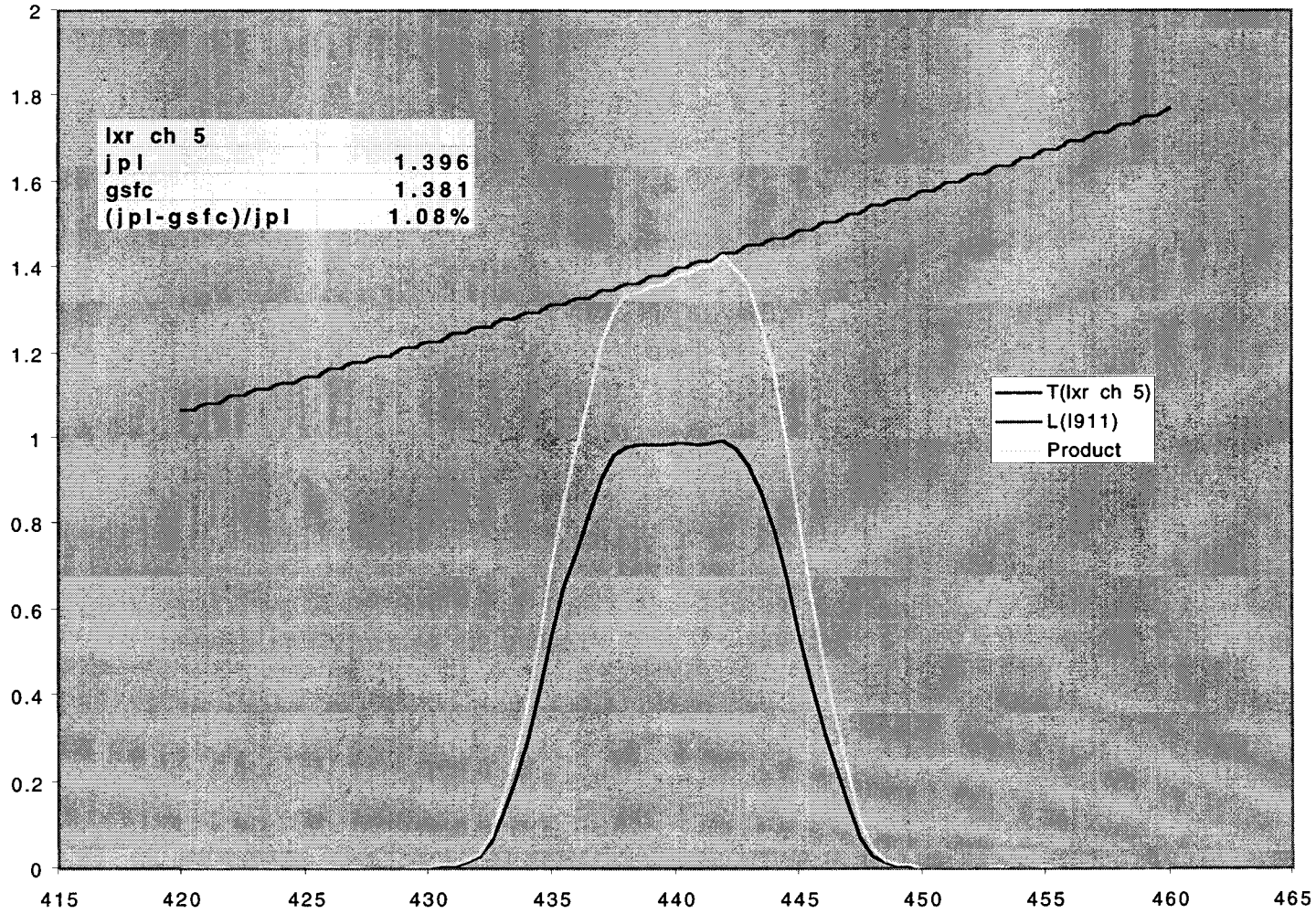
AVIRIS Radiometric Standard



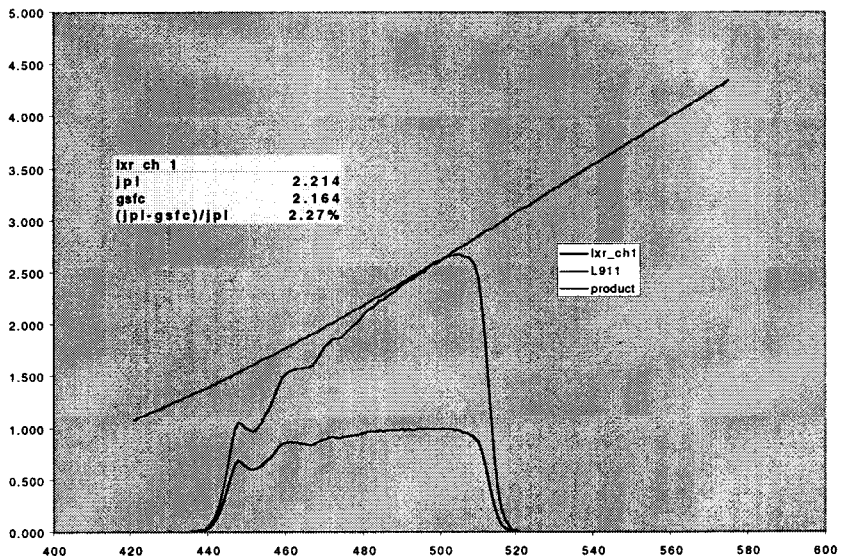
AVIRIS Radiometric Standard provides a range of intensities

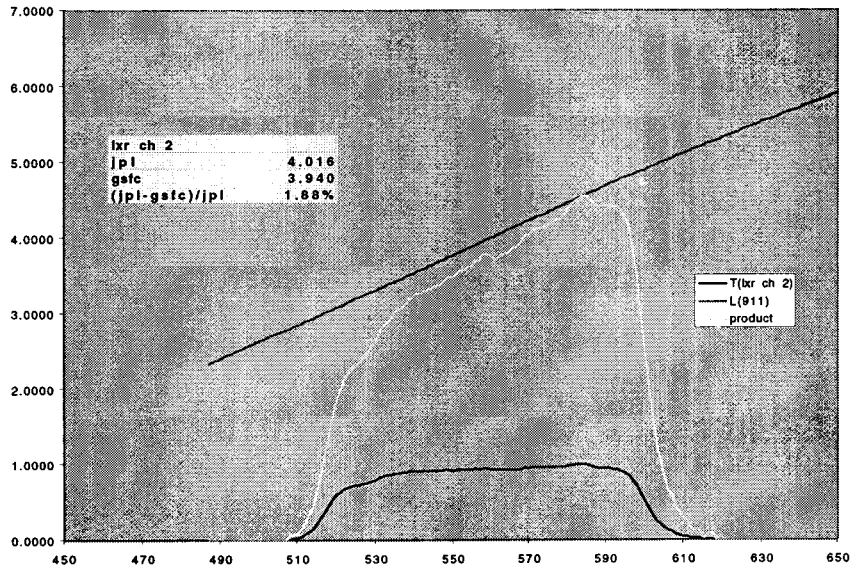


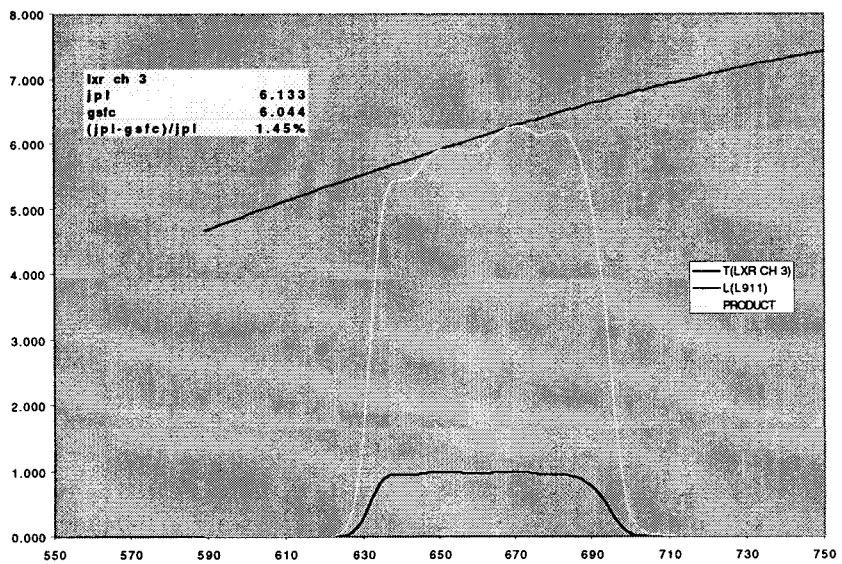
AVIRIS and LXR Agreement

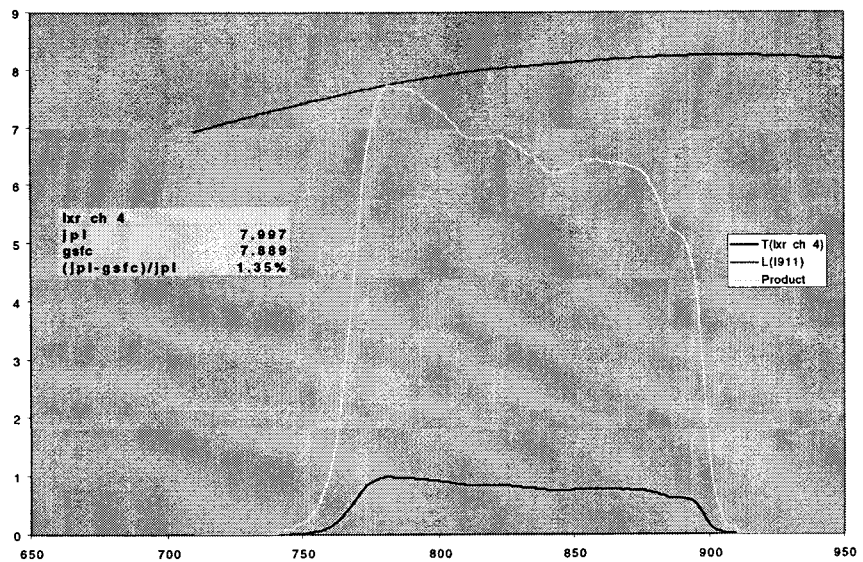


AVIRIS and LXR Agreement continued







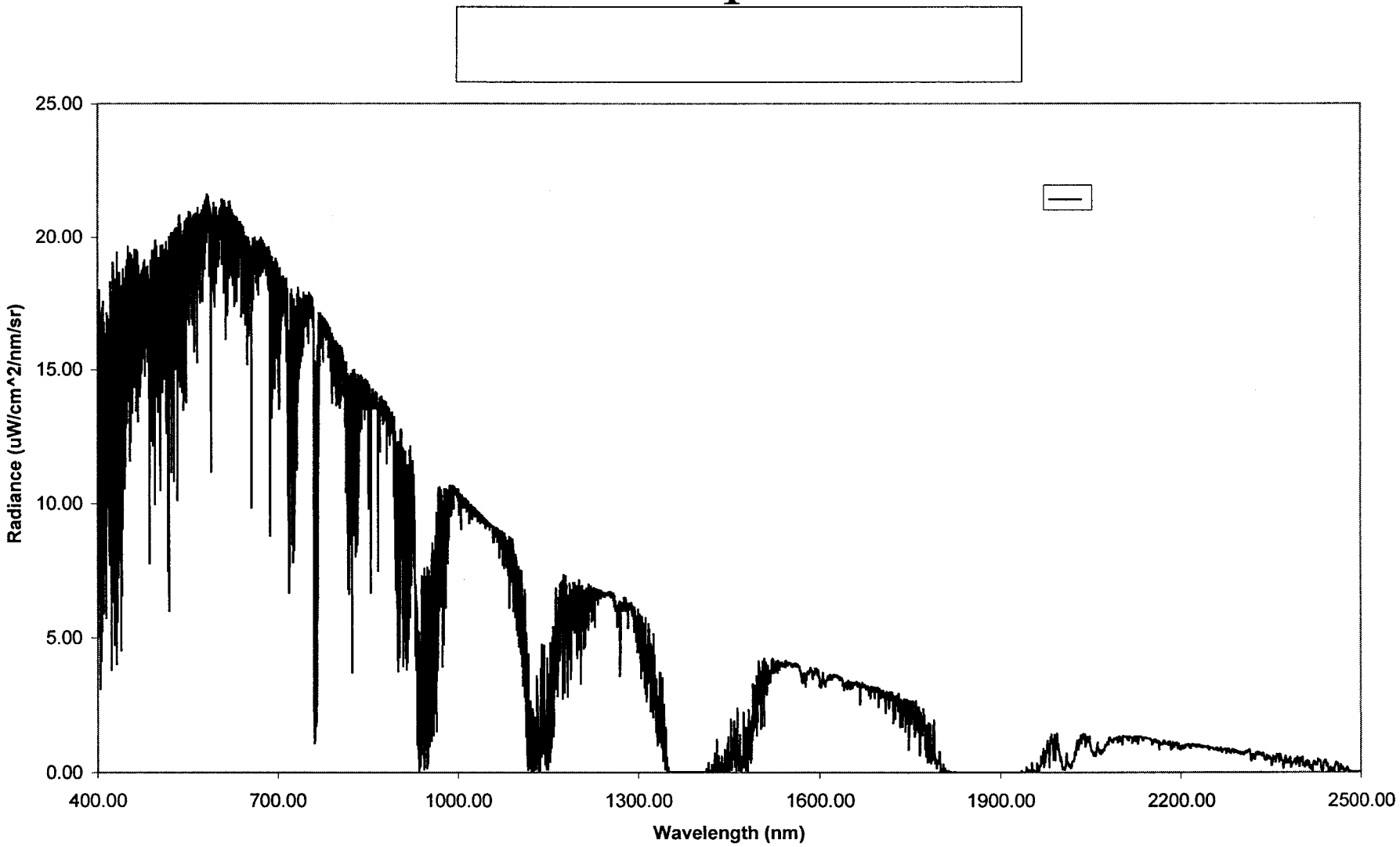


Comparison to low temperature cavity blackbody

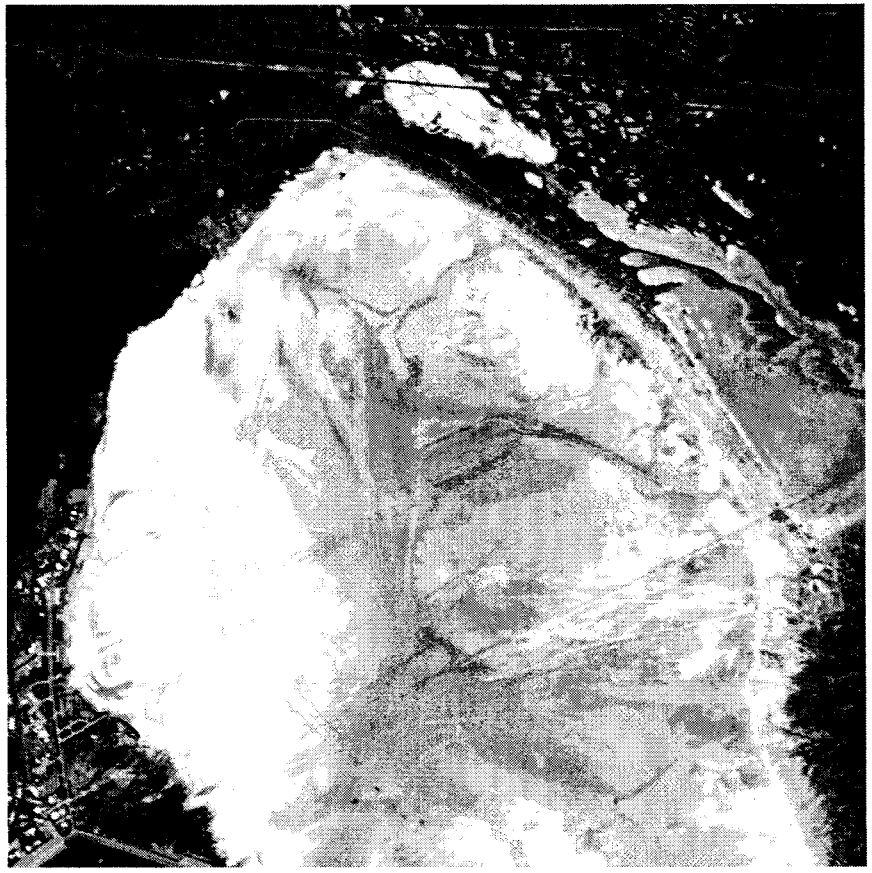
Comparison to high temperature cavity blackbody

Calibration Accuracy Assesment

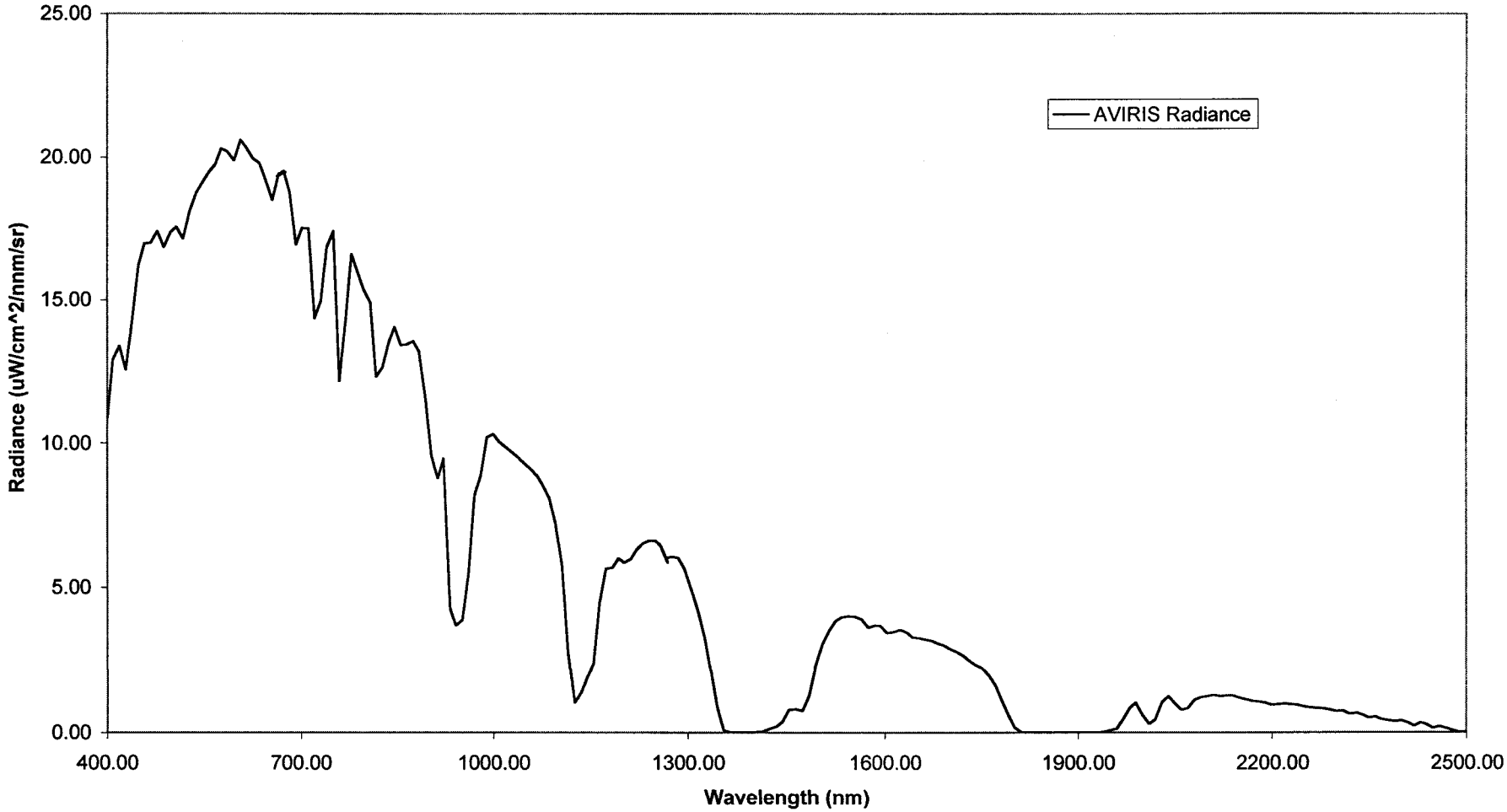
MODTRAN Constrained for AVIRIS atmosphere



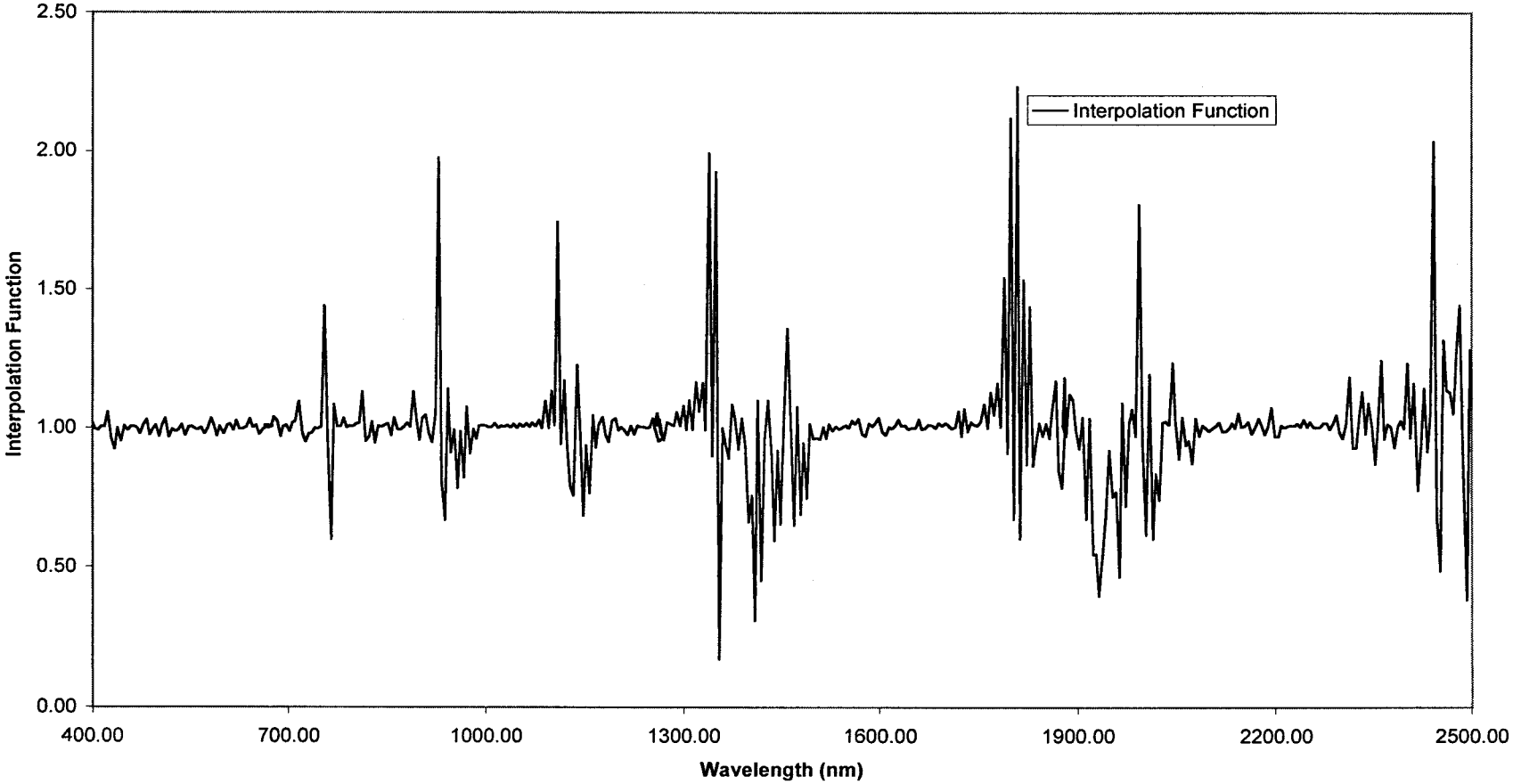
Rogers Dry Lake, CA



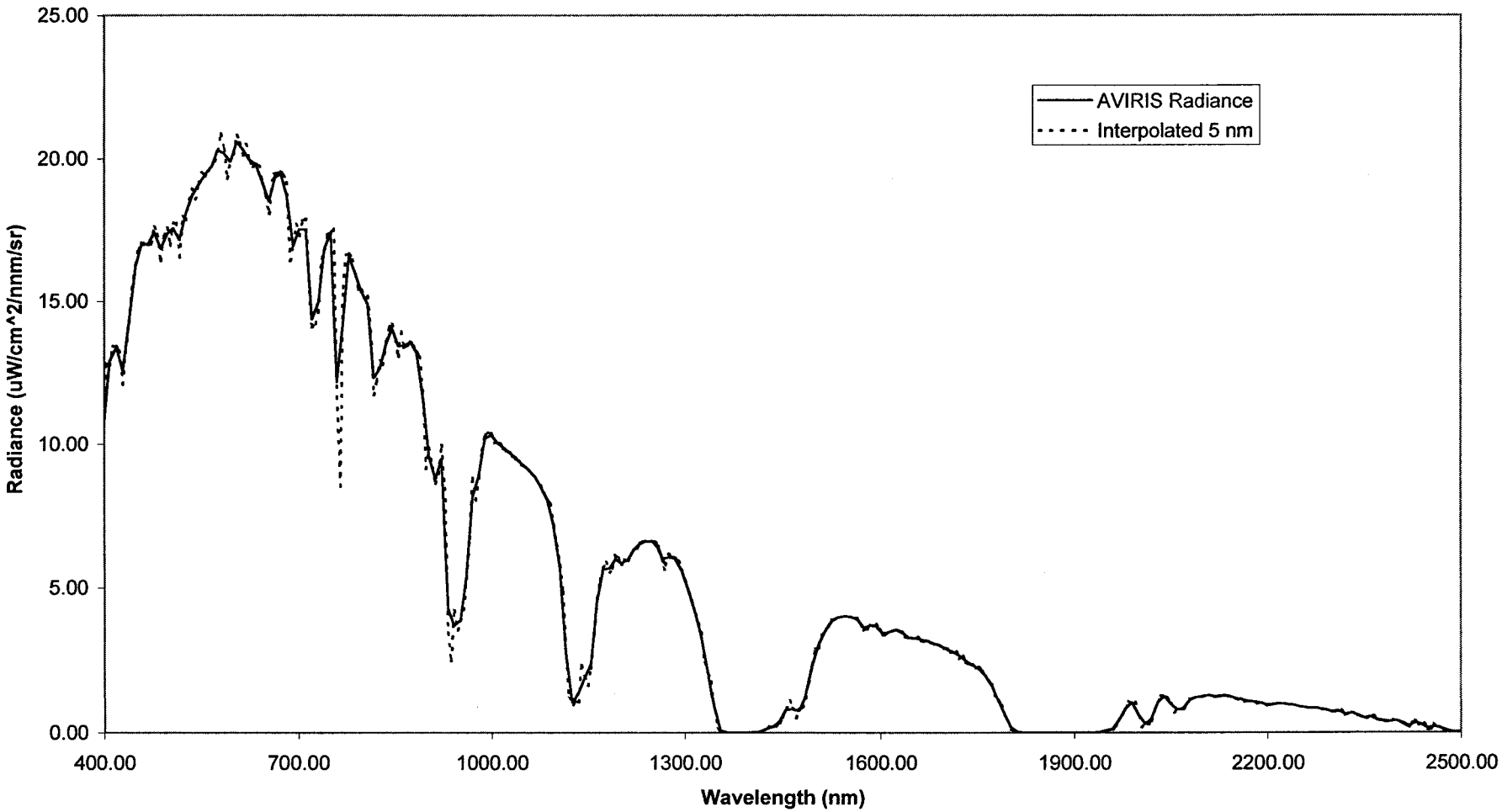
AVIRIS Measured Spectrum



Interpolation Function



AVIRIS Measured and Interpolated Spectrum



Calibration Validation Experiment

- Calibrate AVIRIS prior to flight
- Run an inflight calibration experiment at the dry lake target
- Calibrate AVIRIS after the flight

AVIRIS Underflight Analysis

- Calibrate the AVIRIS underflight data
- Interpolate the AVIRIS data to high spectral resolution
- Co register and compare the AVIRIS and Hyperion data
- Use AVIRIS spectral fitting algorithm to validate nominal spectral properties of Hyperion
- Report to Project the nominal spectral and radiometric calibration

Discussion

- Importance of absolute calibration
- Accuracy of AVIRIS radiometric standard
- Intercomparisons