

Reflectance Tables

All reflectance data in this data base is referenced back to a pressed barium sulfate tablet that is used as the reflectance calibration standard in the LARS Indoor Laboratory. The instrument used in the indoor laboratory is the Exotech 20C spectroradiometer system. The reflectance table that is used for this pressed barium sulfate tablet is that in Table I of a 1968 Gram and Luckey paper.

Truck-mounted systems used painted barium sulfate panels as the reflectance reference surface in the field. The painted barium sulfate panels were calibrated against the pressed barium sulfate tablet in the indoor laboratory.

The helicopter-mounted systems used a gray canvas panel as the reflectance reference surface in the field. The gray canvas panel was calibrated against the painted barium sulfate panels in the field.

As one can see, all reflectance data in the laboratory has a reference back to the pressed barium sulfate tablet either directly, indoor laboratory data; via painted barium sulfate panels, truck-mounted data; or via a gray canvas panel, helicopter-mounted data.

The reflectance calibration table that is used to process a respective observation of data is listed as the 5th item in the 'F01' line of the data set.

There are three groups of reflectance tables, one each for helicopter-mounted spectrometer data, other spectrometer data and multiband radiometer data:

- Data in the table ReflectanceTable206.txt is for spectrometer system data with wavelength format of .4 to 2.4 um by .01 um bands
- Data in the table ReflectanceTableMulti.txt are for the helicopter-mounted Spectrometer system data or Multiband radiometer system data

Angular Properties of the Reflectance Reference Panels

The data for reflectance reference panels in the tables for the spectrometer system data were collected with an illumination zenith angle of 10 degrees.

Beginning with the 1982 multiband radiometer data, the reflectance calibration took into account the non-labertian characteristics of the reflectance reference panels. Measurements of the angular properties of the painted barium sulfate panels were made using a Bidirectional Reflectance Factor Reflectometer, DeWitt and Robinson, 1976, in our indoor laboratory. These measurements were used to create a function for each multiband radiometer band. This function was based on a 3rd or 4th polynomial based

on powers of the cosine of the illumination zenith angle. These functions are given in the reflectance tables for the multiband radiometer system data beginning with table 15.

Angular measurements of some reference panels were made beginning in 1977 for a gray canvas panel and a painted barium sulfate panel for illumination zenith angles from 10 to 55 degrees. Beginning in 1984 the angular measurements were made from illumination zenith angle from 10 to 80 degrees.

Spectralon Reflectance Reference Panels

Beginning in the late 1980's, spectralon became a very common reflectance reference standard for both indoor and outdoor measurements. The reflectance of our pressed barium sulfate tablet was compared to a spectralon standard that we received from Labsphere many times during 1989 and 1990. The reflectance of the pressed barium sulfate tablet as measured against the spectralon is not the same as that used in the 1967 Applied Optics paper. Users of the data base may want to consider adjusting the reflectance calibration of the data if they wish to compare it against data calibrated against spectralon reference surfaces. To do this one needs to divide the data by the pressed barium sulfate reflectance table (Table 2 in Spectrometer System Data Reflectance Tables) and multiplying by the pressed barium sulfate spectralon-based reflectance (Table 15 in Spectrometer System Data Reflectance Tables).

References

DeWitt, D.P. and B.F. Robinson, "Description and Evaluation of a Bidirectional Reflectance Factor Reflectometer", LARS Technical Note 091576, 1976.

Gram, F. and G.W. Luckey, "Optical Sphere Paint and a Working Standard of Reflectance", Applied Optics, Vol. 7, No. 11, pp. 2289-2294, November 1968.

Robinson B.F. and L.L. Biehl, "Calibration procedures for measurements of reflectance factor in remote sensing field research", SPIE Vol. 196, Measurement of Optical Radiations, 1979.