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CALIBRATION OF LANDSAT-5 TM SENSOR USING ARM DATA

R. N. Halthore, A. Cialella[1], B. L. Markham[1],
J. Seiferth[1], and W. Gao[2]
Brookhaven National Laboratory
Department of Applied Science
Environmental Chemistry Division
Upton, NY 11973-5000

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[1] NASA Goddard Space Flight Center
[2] Argonne National Laboratory

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ABSTRACT

ARM SGP site provides continuous measurements of many of the shortwave and thermal radiation components of the Earth-atmospheric system. During Intensive Operations Periods (IOPs) the frequency, quantity and quality of data acquisition are all increased. One such IOP, called LANDSAT IOP, was held in September of 1997. Coinciding with other IOPs (shortwave and water vapor) this period was remarkable for the coincidence of one of the clearest days with that of the LANDSAT overpass on September 27 1997 thus providing an opportunity to perform vicarious calibration of the LANDSAT Thematic Mapper [TM] sensor. A serious shortcoming of the measurements at the SGP site during this period was the absence of reliable surface bi-directional reflectance distribution function (BRDF) measurements or even reflectance measurements. However, surface reflectance from previously measured nadir measurements of surface radiance are used here to perform a reflectance based vicarious calibration. The presence of numerous small/ medium water bodies in the TM scene allows for an accurate estimate of at-sensor radiance. In the irradiance method, accurate measurement of the surface irradiance components at the SGP (in the shortwave and in the thermal IR) constrains radiative transfer models such as MODTRAN and 6S (shortwave) used here to estimate at-sensor radiance. Both methods will include necessary corrections to the aerosol optical thickness to close the irradiance. We will describe the results of both the methods and compare them to the calibration history of the TM sensor.