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LABORATORY AND FIELD PERFORMANCE EVALUATION OF A MODULAR MULTIBAND RADIOMETER FOR REMOTE SENSING FIELD RESEARCH

B.F. ROBINSON, V.C. VANDERBILT, L.L. BIEHL

Purdue University/Laboratory for
Applications of Remote Sensing
West Lafayette, Indiana

D.P. DeWITT

Purdue University/Department of
Mechanical Engineering
West Lafayette, Indiana

Abstract

To develop the full potential of multispectral data acquired from satellites, increased knowledge and understanding of the spectral characteristics of specific earth features is required. Knowledge of the relationships between the spectral characteristics and important parameters of earth surface features can best be obtained by carefully controlled studies over areas, fields, or plots where complete data describing the condition of targets is attainable and where frequent, timely spectral measurements can be obtained.

To meet the need for a standard instrument to acquire these spectral measurements, a multiband radiometer suitable for operation from helicopter, small plane, truck or tripod platforms has been developed. The standard unit is equipped with the seven Thematic Mapper spectral bands with an added band from 1.15 to 1.30 μm ; however, up to eight user specified spectral bands from 0.4 to 15 μm may be installed under clean field conditions. The radiometer, with available data acquisition systems, can be utilized by remote sensing field researchers to acquire the large numbers of accurate, calibrated spectral measurements needed.

The prototype of this instrument has been tested in the laboratory and field. Results of tests of the spectral responsivity of the detectors, the transmittance of the optical filters as a function of wavelength, the fields of view, and the system linearity, temperature stability, noise performance and dynamic range were evaluated. Minor modifications were made to the instrument and the results of final laboratory testing are reported.

All channels were stable in response to input flux changes, linear, adequately stable in response to ambient temperature changes, and all channels met or exceeded signal to noise ratio requirements. The optical coalignment field of view definition, and the spectral characteristics of the filters met or exceeded requirements.