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TIMS OBSERVATIONS OF SURFACE EMISSIVITY IN HAPEX-SAHEL

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1. INTRODUCTION

The Thermal Infrared Multispectral Scanner (TIMS) was flown on the NASA C-130 aircraft for a series of 12 flights during HAPEX-Sahel at altitudes ranging from 0.25 to 6 km (0.6 to 15 m resolution). TIMS provides coverage of the 8 to 12 micrometer thermal infrared band in 6 contiguous channels. Thus it is possible to observe the spectral behavior of the surface emissivity over this wavelength interval.

2. DISCUSSION

A high resolution image, 1.5 m, of the west central site on 2 September 1992 was processed and the spectral behaviors of the millet and fallow grassland sites were determined. There was a 4 to 5 K difference in the brightness temperature over the 6 channels when significant bare soil was visible. Channels 1 to 3 (8.2 to 9.6 micrometers) were 4-5 K cooler than the longer wavelength channels which is characteristic of soils rich in quartz. These differences in brightness were converted to emissivity differences using both the emissivity normalization and alpha residuals methods. Both methods yielded about the same difference in emissivity over the 6 channels, i.e. 0.09. However the alpha residuals methods yielded higher absolute values. As expected for a group of vegetated pixels, there was little difference in emissivity, less than 0.02 over the 6 channels, and the average was about 0.99. The extracted vegetation temperature was close to the air temperature, while for the bare soil it was at least 10 K higher.

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