

THE ATMOSPHERIC COMPENSATION COMPONENT OF A LANDSAT SURFACE TEMPERATURE (LST) PRODUCT: ASSESSMENT OF ERRORS EXPECTED FOR A NORTH AMERICAN TEST PRODUCT.

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ABSTRACT:

The Landsat archive of thermal data (Landsats 4, 5 & 7) has gone through a rigorous calibration assessment and update. However, in order to be useful to most users the calibrated sensor reaching radiance must be corrected to surface temperatures by first compensating for atmospheric effects and then emissivity variations. The USGS is exploring the possibility of producing a LST product through a joint program with RIT (the atmospheric compensation component) and JPL (the emissivity compensation component). This paper addresses the atmospheric compensation component for an initial North American pilot study. In particular, the results of a comparison of retrieved water surface temperature (where emissivity is well known) and truth temperatures for over 800 sites are presented. The errors are broken down by cloud conditions with extremely good results for cloud-free conditions (errors less than 1K). The results of the error assessment for North America by cloud class are presented along with a discussion of potential quality data for a LST product. An initial assessment of the LST errors observed for Landsat 8 bands 10 and 11 are also presented. The next steps on this effort include testing of a global atmospheric compensation approach and full integration of the atmospheric and emissivity compensation tools into an operational LST product.