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TEMPORAL CORRELATABILITY OF DIGITAL THERMAL INFRARED SCANNER DATA

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A southeast California test area was scanned on four day and three night passes between January and June to obtain NOAA-3 satellite VHRR thermal IR digital data. The data was temperature converted, atmospheric corrected and geometrically registered to a UTM standard projection for use in day/day, day/night and night/night comparisons. Point-by-point differencing and crosscorrelation algorithms were utilized to determine the effect of diurnal, seasonal and meteorological factors on the site's thermal signature.

From the correlation coefficients determined by differencing (presumably perfectly registered) the data sets were neither highly correlated nor statistically independent of each other. A lower degree of correlation was observed when a "thermally-unrepresentative" reference pattern was utilized. When a synthetic reference set (average of the patterns) was substituted, the resulting degree of correlation improved significantly. The distributions of differences were quasi-symmetrical in nature with most points centered near the average ΔT, with a few points generally near zero ΔT. A substantial portion of any "seasonal effect" present between the thermal IR data sets examined here was eliminated by removing the average temperature component present.

An abnormal directional surface or atmospheric temperature gradient can affect the thermal signature of a test site. In fact, the correlation between data sets imaged under significantly different meteorological conditions was found to be considerably less than the maximum possible. The perturbation component between reference and test sets may be difficult to predict if it is caused by material and meteorological factors, because of their locally varying nature.