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GEOSTATISTICAL ANALYSIS OF SURFACE TEMPERATURE AND IN-SITU SOIL MOISTURE USING LST TIME-SERIES FROM MODIS

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Abstract. The objective of this analysis is to provide a quantitative estimate of the fluctuations of land surface temperature (LST) with varying near surface soil moisture (SM) on different land-cover (LC) types. The study area located in the Canterbury Plains in the South Island of New Zealand. Time series of LST from the MODerate resoluti Imaging Spectro-radiometer (MODIS) have been analysed statistically to study the relationship between the surface temperature and near-surface SM. In-situ measurements of the skin temperature and surface SM with a quasi-experimental design over multiple LC types are used for validation. Correlations between MODIS LST and in-situ SM as well as in-situ surface temperature and SM are calculated. The in-situ measurements and MODIS data are collected for various LC types. Pearson's r correlation coefficient and linear regression are used to fit the MODIS LST and surface skin temperature with near-surface SM. There was no significant correlation between time-series of MODIS LST and near-surface SM from the initial analysis, however, careful analysis of the data showed significant correlation between the two parameters. Night-time series of the in-situ surface temperature and SM from a 12 hour period over Irrigated Crop, Mixed-Grass, Forest, Barren and Open-Grass showed inverse correlations of -0.47, -0.68, -0.74, -0.88 and -0.88 respectively. These results indicated that the relationship between near-surface SM and LST in short-terms (12 to 24 hours) is strong, however, remotely sensed LST with higher temporal resolution is required to establish this relationship in such time-scales. This method can be used to study near-surface SM using more frequent LST observations from geostationary satellite over the study area.

[Conference Paper](#) (PDF, 2526 KB)

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