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Detection of thermal anomaly associated with Earthquake from MODIS data

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It is a critical issue to mitigate of disasters including earthquake. And it is required to develop of technique to monitor and predict major earthquakes. Therefore, the purpose of this study is to develop an adequate algorithm to detect LST (Land Surface Temperature) anomalies related to earthquakes using MODIS (Moderate Resolution Imaging Spectroradiometer) infrared sensor onboard Terra/Arqua satellite.

We investigate spatial-time changes in LST in the statistical way. In order to detect only hotspots related to earthquakes without faints, the developed algorithm investigates the difference temperature behavior between a target point and spatial average, and we get spatial difference of brightness temperature(delta-T). In order to evaluate the temporal singularity of delta-T, we calculate the following equation.

$R=(delta-T(x,y,t)-ave(x,y))/sigma(x,y)$

where ave(x,y) is multi year plus minus 15 days moving average. And sigma(x,y) is multi year plus minus 15 days moving standard deviation.

We detect LST anomaly 8 days before L'Aquila earthquake. And it continued for several hours. This result represents that it has potential for monitoring/predicting major earthquakes to develop algorithms to detect thermal anomalies using MODIS data.

Keywords: MODIS, Earthquake, L'Aquila, thermal anomaly