# Latent heat flux and air temperature anomalies along an active fault zone associated with recent Iran earthquakes

ABSTRACT

Pre-earthquake physical and chemical interactions in the earth's ground may cause anomalies in latent heat flux, air and surface temperature. Earthquakes occur when the energy accumulated in rocks releases. Sometimes, the movements of the ground cause ruptures in the earth's surface and sometimes the two sides of an existing fault shift towards each other. In a structurally complex and inhomogeneous collision region such as the Iranian Plateau, seismicity is not the result of activity of a single fault but is due to energy discharge in fault zones hundreds of kilometers wide. Changes in latent heat flux and temperature, on and above the earth's surface can be detected with thermal infrared (TIR) sensors such as NOAA-AVHRR, Terra/Aqua-MODIS, etc. Spatio-temporal distributions of surface latent heat flux (SLHF) and air temperature before and after two recent earthquakes in Iran have been studied. Anomalous patterns of higher SLHF formed a few days before the earthquakes of 20 Dec 2010 (6M) and 27 Jan 2011(6.5M) occurred in Kerman province and disappeared after the main events. Data analyses revealed at least 2–4 °C rises in air temperature along the nearby fault zone, as well. These changes were also in accordance with the abnormal relative humidity over the region. Significant rises in SLHF and air temperature may lead us to understand the energy exchange mechanism during the earthquakes. These anomalies prior to impending earthquakes can be attributed to the thermodynamic, degassing and ionization processes which are believed to be activated by the accumulated stress in the ground, insensible movements of the tectonic blocks, and micro-fracturing in the rocks especially along area's active faults. Continuous monitoring of these potential precursors helps in differentiating earthquake related variations from seasonal changes and atmospheric effects.

**Keyword:** Earthquake; Heat flux; Air temperature; Remote sensing; Early warning