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An Enhancive Phenomenon of Thermal Infrared Radiation Prior to Pakistan Earthquake

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A strong earthquake with magnitude 7.8 occurred in Northern Pakistan (73.6E, 34.4N) at 11:50:36(Beijing time), Oct.8, 2005. In order to study the relation between this earthquake and thermal infrared radiation (TIR), 24-day TIR images without cloud covered above epicentral area are chosen from 2-month thermal infrared images of band 32 (11.77-12.27um) of MODIS/Terra satellite before or after earthquake. The data of TIR in 3 inclusive half-ellipse annuluses (or) areas with epicenter as the center are analyzed, based on the distribution of Pakistan earthquake and aftershocks. The inner area (a) is a N-W-trending ellipse region with short radius 50km that just covers all epicenters, middle area (b) and outer area (c) located in the northern of area (a) with short radius of 75 and 150km, respectively. Meanwhile, 3 fault segments in or near the epicentral area are also investigated. The Result shows that thermal infrared radiation enhanced in the epicenter before Pakistan earthquake. It tails off with distance from the epicenter and disappears at 270km away. A similar enhancement of TIR was observed along seismogenic fault, but not at nonseismogenic fault in the neighborhood. In order to understand this phenomenon, two kinds of data are used for compare, namely MODIS/Terra Land Surface Temperature (LST) product and the incoming solar radiation of land surface. Annual variation of LST is retrieved from MODIS/Terra LST from 2000 to 2005 and is thought to be the normal background of TIR of land surface. TIR brightness temperature at epicenter is about 3K higher than the annual variation of LST at the same area and period. The incoming solar radiation of land surface degrades gradually as well as annual variation of LST in the epicenter area from September to November. Therefore, the enhancement of TIR is likely to be attributed to Pakistan earthquake.