Climate fluctuations and seismic precursors assessment through time series geospatial and in-situ monitoring data

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Results of recent investigations suggest that climate change tends to exacerbate geo-disasters like as earthquake events. Earthquake science has entered a new era with the development of space-based technologies to measure surface geophysical parameters and deformation at the boundaries of tectonic plates and large faults. Different criteria can be used to select the remote sensed earthquake pre-signals for which there is an evidence for anomalies in the geophysical observables. Observations from Earth orbiting satellites are complementary to local and regional airborne observations, and to traditional in field measurements and ground-based sensor networks. Rock microfracturing in the Earth's crust preceding a seismic rupture may cause local surface deformation fields, rock dislocations, charged particle generation and motion, electrical conductivity changes, gas emission, fluid diffusion, electrokinetic, piezomagnetic and piezoelectric effects as well as climate fluctuations. Space-time anomalies of Earth’s emitted radiation (thermal infrared radiation linked to air and land surface temperature variations recorded from satellite months to weeks before the occurrence of earthquakes, radon in underground water, soil and near the ground air, etc.), ionospheric and electromagnetic anomalies are considered as earthquake precursors. At land surface, energy fluxes interact instantaneously with each other in accordance with the prevailing meteorological conditions and the specific thermal and radiative characteristics of the soil surface. This paper aims at investigating the seismic pre-signals like as air and land surface temperature, ionospheric TEC and geomagnetic parameters for some major earthquakes recorded in the world based on satellite data provided by NCEP/NCAR, NOAA, WDC Australian, Space Environment Information Service Japan, British Geological Survey and World Data Center for Geomagnetism, Kyoto and in-situ monitoring geophysical data. As test cases have been analyzed March 11 th 2011 Tohoku earthquake in Japan and some earthquakes recorded in Vrancea seismic region in Romania. Land surface and near-surface air temperature and sensible latent heat flux SLHF parameters were analyzed both on short-term and long-term intervals.