AIR IONIZATION AS A CAUSE OF THERMAL AND IONOSPHERIC ANOMALIES BEFORE STRONG EARTHQUAKES

Pulinets Sergey, Dimitar Ouzounova, Alexandr Karelinboyz, Kirill Boyarchuk
Institute of Geophyscis, UNAM, Cidad Universitaria, Delegacion Coyoacan, Mexico City, Mexico

Abstract:

Recent developments of the Lithosphere-Atmosphere-Ionosphere (LAI) model together with experimental data obtained recently have clearly demonstrated the close relation between the thermal and ionospheric anomalies observed before strong earthquakes. They have the similar temporal and spatial scales, and maximum of the anomalies is reached almost simultaneously (within the one day interval). Active experiments with the air ionization have demonstrated that the role of the ionization is two-fold. It produces the air electrification (the large scale space charges and anomalous electric field), and simultaneously releases the latent heat due to water condensation on the new formed ions. The latent heat release leads to the change of the near ground air temperature; and the water condensation in turn leads to the changes of the air humidity. The anomalous electric field penetrating into the ionosphere causes the ion drift and formation of the large scale irregularities of the electron concentration. All these effects: large scale ionospheric irregularities, changes of the air humidity and temperature were registered experimentally before the several recent strong earthquakes: Hector Mine M7 earthquake (16 October 1999, USA), Colima M7.8 earthquake (22 January 2003, Mexico), Parkfield M6 earthquake (24 September 2004, USA).

In the case of earthquakes the air ionization is produce by radon emanating from the active tectonic faults. That is why the thermal anomalies observed from remote sensing satellites map the tectonic faults in the seismically active area. The space charge is distributed in all directions by the turbulence, and the ionospheric anomaly has more or less the circular character and its vertical projection to the ground indicates the area of the seismic activity. The model calculations reproduce well the observed variations of the air relative humidity and temperature.