Geophysical Research Abstracts, Vol. 8, 08031, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08031

Seismo-electromagnetic effects in the near-Earth space

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The lithosphere-ionosphere-magnetosphere coupling mechanisms related to seismic activity can cause changes in tropospheric conductivity as well as perturbations and instabilities in the upper atmosphere, electric and magnetic field fluctuations in the ionosphere-magnetosphere transition zone and variations of temperature and density of the ionic and electronic components in the ionospheric plasma. To reconcile the perturbations detected on board of Low Earth Orbit satellites not only with Sun or atmospheric effects but also with seismic activity, a propagation model of seismo-induced EM emission is needed. The propagation of seismo-electromagnetic emissions from the earthquake preparation focal area through layered lithospheric and atmospheric media (with assigned vertical conductivity profiles) up to the near Earth space is discussed. The seismo-electromagnetic source is modelled as constituted by electric or magnetic oscillating dipoles with several orientations. Between the magnetospheric disturbances due to the seismic activity a possible influence of seismo- electromagnetic emissions on the inner radiation belt has been suggested by a few space experiments. In particular, seismic EM emissions may cause charged particle fluxes precipitation from the lower boundary of the Van Allen belt. A temporal correlation between earthquakes and anomalous bursts of charged trapped particles precipitating from the lower boundary of the inner Van Allen radiation belt is critically investigated. Results seem to confirm previous observations and a short-term seismic precursor is observed in the histogram of the time difference between the time occurrence of earthquakes and that of particle burst events.