Geophysical Research Abstracts
Vol. 15, EGU2013-5050, 2013
EGU General Assembly 2013

Parameters of seismic source as deduced from 1Hz ionospheric GPS data: Ionospheric Seismology or Ionosphere as a natural indicator of numerous geophysical events

Elvira Astafyeva
Institut de Physique du Globe de Paris, Paris, France (astafyeva@ipgp.fr)

The Earth's ionosphere is known to be highly responsive to a large variety of geophysical phenomena coming from above (solar-driven variations, solar flares, magnetospheric events, etc) and from below (earthquakes, tsunamis, volcano eruptions, explosions). Therefore, study of ionospheric response to these events sheds light on the inter-planetary/ionosphere and lithosphere/atmosphere/ionosphere couplings. Apart from the pure scientific interests in ionospheric studies, knowledge on the storm-time and quiet-time ionospheric behavior is vitally important for all GNSS users, since the ionosphere changes the amplitude and phase of transionospheric radio signals. The purpose of the ERC Starting Grant project "SIREAL" is to perform a wide spectrum of ionosphere-related research, from ionospheric seismology to ionospheric storms and GNSS/GPS performance during extreme ionospheric and space weather events.

The main focus of the project is made on such rare and interdisciplinary subject as ionospheric seismology. Ionospheric seismology is a sufficiently new branch of geophysics, aiming to study ionospheric response to large earthquakes and to investigate the main properties of various ionospheric disturbances generated by quake-like events, including shallow earthquakes, tsunamis and volcano eruptions. Recent work by Astafyeva et al. (2011, Geophys. Res. Lett., L22104, DOI:10.1029/2011GL049623),showed that in some cases, use of high-precision GPS data can provide ionospheric images of seismic fault (its location and dimensions) about $\sim$7-8 min after an earthquake, which opens new opportunities for short-time tsunami warnings. On the example of the Tohoku-oki earthquake on 11 March 2011, here we will show first results of the ERC project, on how the use of 1 Hz ionospheric GPS measurements can provide information on seismic parameters.