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Ionospheric post-seismic perturbations following the Tokachi-Oki earthquake from high rate GPS japanese data : wave source and propagation

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Ionospheric perturbations following the Tokachi-Oki earthquake (East of Hokkaido island) have been sensed by the high rate continuous GPS Network of Japan. The strong motions have produced infrasonic waves propagating into the ionosphere and generating electronic density perturbations. The electronic content along GPS satellite to GPS receiver rays is extracted from the raw data. The attenuation of infrasonic waves by the atmosphere is demonstrated on these signals. Then, the GPS data have been inverted to reconstruct 3D tomographic images of the electronic density perturbations. The ionospheric waves far from the source are propagating horizontally at the speed of seismic surface waves and vertically at the speed of sound in the atmosphere. Close to the source, the signal has been analysed and modeled in order to constraint the source location and the source mechanism. These studies demonstrate the interest of post-seismic ionospheric perturbations to retreive the long period strong motions that are not avalaible inland due to the saturation of seismometers, and in the ocean due to the low number of ocean bottom seismometers.