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地震に関連する VLF 波を用いた下部電離層擾乱および GPS による地表変位の観測
Simultaneous observations of subionospheric VLF perturbations and surface displacements for major earthquakes over Japan

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Ionospheric anomalies at the low latitude were reported before major seismic activities by using VLF transmitter signals. Although possible generation mechanisms of the precursory perturbations have been proposed such as anomalous electric field and atmospheric waves originated from the ground, the experimental evidence indicating the coupling between the lithospheric activities and overlaying ionosphere before seismic events were rare. In this paper we analyze the VLF transmitter amplitude data from our VLF observation network to identify the ionospheric perturbations together with frequency dependent filtered surface displacement data from GPS network for different earthquakes in Japan. As a result, both ionospheric perturbations and surface displacements are observed about one week before for some of the shallow earthquakes, which may indicate the coupling between the precursory ground movement and relevant ionospheric perturbations.
Keywords: VLF transmitter signals, ionospheric perturbation, surface displacement, GPS, earthquake