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Various scenarios of coupling mechanisms between the major seismic activities on the ground and overlaying ionosphere have been proposed, experimental evidence has not been observed clearly. In this paper we analyze long-term data from ground movement and ionospheric anomalies in relation with major earthquakes occurred around Japan. In association with major earthquakes, anomalous surface displacements are observed by dens GPS network whilst lower ionospheric perturbations are identified by continuous measurement of VLF/LF transmitter signals. As a result, we found that the ionospheric anomalies are observed preferably associated with the thrust type earthquakes. GPS surface displacements tend to occur in association with any types of earthquakes.

Keywords: ionospheric perturbations, GPS surface displacement, lithosphere-atmosphere-ionosphere coupling, earthquake