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The Seismo-Generated Electric Field Probed by the Ionospheric Ion Velocity

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The ion density, ion temperature, and the ion velocity probed by IPEI (ionospheric Plasma and Electrodynamics Instrument) onboard ROCSAT (i.e. FORMOSAT-1), and the global ionospheric map (GIM) of the total electron content (TEC) derived from measurements of ground-based GPS receivers are employed to study seismo-ionospheric precursors (SIPs) of the 31 March 2002 M6.8 Earthquake in Taiwan. The GIM TEC and ROCSAT/IPEI ion density significantly decrease specifically over the epicenter area 1-5 days before the earthquake, which suggests that the associated SIPs have observed. The ROCSAT/IPEI ion temperature reveals no significant changes before and after the earthquake, while the latitude-time-TEC plots extracted from the GIMs along the Taiwan longitude illustrate that the equatorial ionization anomaly significantly weakens and moves equatorward, which indicates that the daily dynamo electric field has been disturbed and cancelled by possible seismo-generated electric field on 2 days before (29 March) the earthquake. Here, for the first time a vector parameter of ion velocity is employed to study SIPs. It is found that ROCSAT/IPEI ion velocity becomes significantly downward, which confirms that a westward electric field of about 0.91mV/m generated during the earthquake preparation period being essential 1-5 days before the earthquake.

Liu, J. Y., and C. K. Chao (2016), An observing system simulation experiment for FORMOSAT-5/AIP detecting seismo-ionospheric precursors, Terrestrial Atmospheric and Oceanic Sciences, DOI: 10.3319/TAO.2016.07.18.01(EOF5).