

FORMOSAT-5/AIP observe seismo-ionospheric precursors and ionospheric storms

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The mission of Advanced Ionospheric Probe (AIP) onboard FORMOSAT-5 (F5) is to detect seismo-ionospheric precursors (SIPs) and observe ionospheric weathers. F5/AIP plasma quantities in nighttime of 22:30 LT (local time) and the total electron content (TEC) of the global ionosphere map (GIM) are used to study SIPs of an M7.3 earthquake in the Iran-Iraq Border area on 12 November as well as two positive storms on 7 and 21-22 November 2017. The TEC and the F5/AIP ion density/temperature significantly increase over the epicenter area on 3-4 November (day 9-8 before the earthquake) and on the two storm days. The significant TEC increases appearing day 9-8 before the earthquake agrees with the temporal SIP characteristic that the TEC significant increases appear day 14-6 before 5.3 greater than M 5.5 earthquakes in the Iran-Iraq area. This agreement indicates that the temporal SIP of the earthquake has been detected. The significant TEC increases frequently appearing specifically over the epicenter area day 9-8 before the earthquake confirms the SIP being observed, while those frequently occurring at worldwide high-latitudes are signatures of the two positive storms. Significant TEC increase anomalies most frequently appearing in the Iran-Iraq area on 21-22 November (day 10-9 before) is coincidentally followed by an M6.1 earthquake on 1 December 2017, which again meets the temporal SIP characteristic. The F5/AIP ion velocity uncovers that the SIPs of the two earthquakes are caused by eastward seismo-generated electric fields, and the two positive storms are due to the prompt penetration electric fields.

Keywords: FORMOSAT-5, advanced ionospheric probe, total electron content, seismo-ionospheric precursor, ion velocity, plasma