Geo-Space observation of atmospheric environmental effects associated with 2011 Fukushima nuclear accident

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Our approach of using multiple geo-space observation is based on the LAIC (Lithosphere- Atmosphere- Ionosphere Coupling) model and the gained experience during similar analysis of Three-Mile Island and Chernobyl accidents. We do collect a unique dataset of geophysical data for the period around the time of the most active phase of Fukushima explosions (from 12 March till 31 March, 71-90 DOY). We analyzed following data sets: (i) ground temperature and relative humidity data from the JMA network of Japan, (ii) satellite meteorological data and assimilative models to obtain the integrated water vapor chemical potential; (iii) the infrared emission on the top of atmosphere measured by NOAA and GEOS satellites estimated as Outgoing Longwave Radiation; and (iv) multiple ionospheric measurements , including ground based ionosondes, GPS vTEC from GEONET network, COSMIC/FORMOSAT constellation occultation data, JASON satellite TEC measurements, and tomography reconstruction technique to obtain 3D distribution of electron concentration around the Fukushima power plant.
As a result we were able to detect the anomalies in different geophysical parameters representing the dynamics of the Fukushima nuclear accident development and the effects on the atmospheric environment. Their temporal evolution demonstrates the synergy in different atmospheric anomalies development what implies the existence of the common physical mechanism described by the LAIC model.