

Variation of GPS total electron content after accident of Fukushima I nuclear power plant damaged by tsunamis

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Recently, pre-seismic ionospheric disturbances have been often reported. One of proposed speculations which produce the disturbance is that atmospheric conductivity is enhanced by pre-seismic radon emission. The speculation is based on the report that plasma density at the F2-peak was enhanced after the nuclear accident at Three Mile Inland, which radioactive materials was vented. Unfortunately, radioactive materials have been also emitted from Fukushima I nuclear power plant damaged by tsunamis generated by the M9.0 off the Pacific coast of Tohoku earthquake. The radioactive ray is stronger in the Fukushima accident than in the Three Mile Inland accident. Therefore, the Fukushima accident is good opportunity to verify the speculation. In this paper, we investigate total electron content (TEC) before and after the Fukushima accident using a ground-based receiving network of GPS Earth Observation Network (GEONET) in Japan. Both small enhancement and disturbance of TEC were observed over the nuclear power plant after the radiation was suddenly enhanced on March 14 of 2011. However, similar signatures were not detected in the other sudden radiation enhancements. Moreover, enhancement and disturbance did not last for more than an hour over the nuclear power plant. Therefore, the results indicate difficulty that radioactive materials disturb the ionosphere even when such circumstance exists.

Keywords: seismo-electromagnetics, ionospheric disturbance, accident of Fukushima I nuclear power plant, Tohoku earthquake, total electron content