

Precursor Ionization Anomaly (PIA) caused by earthquake electric field- with and without natural eastward electric field

OYAMA, Koichiro^{1*} ; KAKINAMI, Yoshihiro²

¹Plasma and Space Science Center, National Cheng Kung University, Taiwan, ²School of Systems Engineering, Kochi University of Technology

In the low/midlatitude ionosphere, feature which is similar to Equator Ionization anomaly (EIA) is produced about 5 days before large earthquake (Oyama et al., 2010). The phenomenon was found by using the data obtained by US satellite DE-2, which was in orbit during 1981-1982. We named this phenomenon Precursor Ionization Anomaly (PIA). To find the PIA, satellite altitude should be below 400 Km. PIA seems to show different feature depending on the magnitude of electric field associated with earthquake, distance from the magnetic equator, and the height of the ionosphere to be studied. Depending on the magnitude of the earthquake electric field, and the height to be measured, the electron density shows the minimum or the peak. PIA is also influenced by natural electric field. When EIA exists, two minima of the electron density appear; one is caused by natural eastward E field, another by earthquake electric field. sometimes three minima appear. Here we present two cases: 1. PIA under the existence of natural eastward electric field. 2. PIA without/or weak natural eastward electric field. We stress here that constellation of small satellites will provide a breakthrough for precursor study of large earthquake.

Keywords: Earthquake, electric field, plasma density, fountain effect