

Computer simulation of Heki-TEC disturbance assuming surface charge polarization

Chihiro Yamanaka, Hiroyuki Furukawa#, Hitoshi Kondo* and Shigeki Sugiura*

Department of Earth and Space Science, Osaka University

#Institute for Laser Technology, *Genesis Research Institute, INC.

TEC (total electron content) disturbance in ionosphere before a large earthquake (Heki-TEC disturbance) is a revolutionary finding. It is interesting that the preceding times (ca. 40 min.) and the intensity of TEC anomalies seem to be related to the magnitude of following earthquakes^{1,2}. This implies that the seismic scales were scheduled in beforehand and the information was projected in advance in the ionosphere for the cases of large EQs (>M8) !

Heki-TEC disturbance requires a prompt propagation of influence about 40 min., therefore, most likely mechanism is the electromagnetic effect between surface and ionosphere but not some kinds of diffusion process. Charge separation at seismic (nucleation) zone is one of the interpretable model and we have performed computer simulation of Heki-TEC phenomena with a NEC SX-ACE³.

Although, several mechanism of charge separation are considerable, a simple model of monotonous increase of charge is adopted because most of Heki-TEC disturbance show TEC increase with time. Assuming horizontal surface charge polarization, the shifts of ionospheric plasma (ions) were obtained time evolutionary considering the induced field in ionosphere. Fig.1 shows a result assuming surface charges of 243 C for area of 575km² and event duration of 1000 s. Preliminary results shows a formally successful reproduction of Heki-TEC feature above seismic zone.

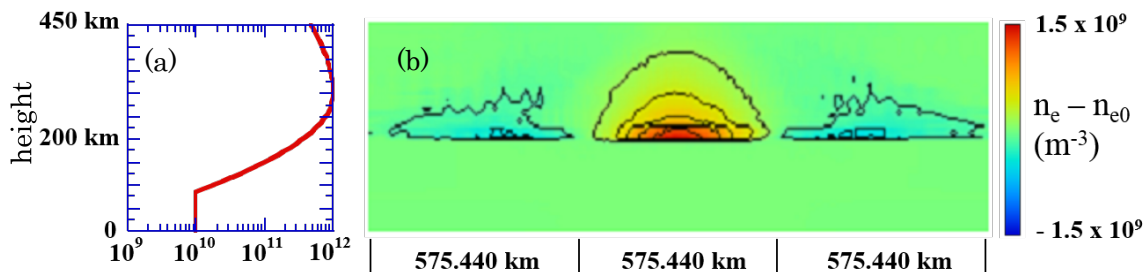


Fig. 1 (a) Initial electron density, (b) 2D contour indicating increase of electron density after 1000s. This is a flat earth model and the polarization was assumed at central surface area. Also geomagnetic field was assigned horizontally.

REFERENCES

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