Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

PEM29-P04 Room:Convention Hall Time:May 22 18:15-19:30

Observation of the wave-front structure of Es March 10, 2012 by VHF long-distance propagation

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We reported in the SGEPSS-2012 meeting that the development of the Es-structure observation system in wide area by receiving VHF(VOR/ILS,108˜118MHz) long-distance propagation signals as the Es wavefront structure moving in southward for the intense Es on March 10, 2012 around 12h JST[1]. We were analyzed the waveform data from 20 stations in the vicinity of the received field strength of Shanghai.We had derived the structure and movement of wide-area Es obtained by fitting a straight line to the peaks of field strength.

In the paper, we report the results of detailed analysis of the internal structure of the Es wavefront based on observed waveform.

At the first, we cut the data at 12 JST of two VOR station of higher S/N in the event to make a feature extraction by waveform correlation. In the same time, the presence of Es structure of more than 1000km has been confirmed with HFD, VHF band, Ionosonde, and the frontal Es has the moving speed of 92 m/s and the direction angle of 170 degree from north [2]. Since the duration of the Es front is 28 minutes, the entire width of the wave front could be confirmed with 163km. Since the entire wavefront is divided into two parts, it was found the presence of the entire half, 74 km structure. Further Analyzed the internal structure using cross-correlation, we were confirmed that Es has a width of about 14 km short wavefront structure ,since has a period of about 150 seconds It is similar to the value of the observations of Goodwin (1966) [3]. On the other hand, it was found that structure of peaks and troughs at intervals of 2 ˜ 3km, this can be interpreted as a small structure less than the diameter of the Fresnel zone that is moving from the north to south direction.

Detailed analysis of other Es horizontal structures will be presented at the meeting.

References

[1]Takuya Yamahata, Ichiro Tomizawa, and Mamoru Yamamoto: Development of Es-structure observation system in wide area by receiving VHF long-distance propagation signals, SGEPSS 2012 Fall Meeting,

[2] Ichiro Tomizawa, Takuya Yamahata, Atsushi Yamamoto: Observation of large-scale structure and movement characteristics of Es by means of VHF long-distance propagation, SGEPSS 2012 Fall Meeting,

[3]Goodwin: the dimensions of some horizontally-moving Es-region irregularities, Planet. Space Sci, vol.14, pp.758-771, 1966

Keywords: Es, VOR, ILS, VHF long-distance propagation, Sporadic E