

## Latitudinal Variations in TEC over Japan Observed by the NNSS Receiver Chain

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This paper describes latitudinal variations in TEC using an NNSS receiver chain comprised of four ground stations located in the northern part of Japan aligned in the North-South direction. Main consequences are summarized as follows. (1) In daylight hours-The TEC increases monotonously with decreasing latitude throughout a year, although the latitudinal gradient as well as the magnitude are different among seasons. Irregular structure having a scale of  $10^{**2}$ - $10^{**3}$  km appears only in winter season. (2) In night hours-There appears a hump structure at about 45 deg.N in spring, while the structure varies day by day in summer. Appearance of irregular structure is very significant both in summer and winter, while its activity becomes weaker in the equinox seasons.

We have so far carried out simultaneous differential-Doppler measurements of TEC using an NNSS receiver chain comprised of four ground stations, Kokubunji, Sendai, Ebetsu and Wakkanai, located in the northern part of Japan aligned in the North-South direction. For deriving TEC values, we employed, so called, "two-station method" that was originally proposed by Leitinger[1]. We improved it to a certain extent regarding the reference height of the ionosphere[2], [3], which was determined from observations but not a priori: least-squares minimization of the difference of vertically corrected TEC's from several possible pairs of ground stations. Thus, we are now able to deduce the TEC with higher reliability than ever.

This paper describes latitudinal variations in TEC along nearly 140 deg.E longitude over the northern part of Japan, spanning the middle latitude from about 27 to 54 deg.N (coverage of the NNSS chain). We concentrate our attention in this paper to the TEC features during geomagnetically quiet period when Kp index takes the values of 2 or less. We divide the data sets into four classes, corresponding to four seasons, in order to extract seasonal difference.

Main consequences derived from the present analyses are summarized as follows. (1) In daylight hours-The TEC increases monotonously with decreasing latitude throughout a year, although the latitudinal gradient as well as the magnitude are different among seasons. Irregular structure having a scale size of  $10^{**2}$ - $10^{**3}$  km appears only in winter season. (2) In night hours-There appears a hump structure at about 45 deg.N in spring, while the structure varies day by day in summer. Appearance of irregular structure is very significant both in summer and winter, while its activity becomes weaker in the equinox seasons. Physical implication of these results should be clarified in our future study.

### References

- [1] R. Leitinger et al., J. Geophys., vol.41, pp.201-213, 1975.
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