Statistical study of the growth rates of Medium-Scale TID observed with GPS-TEC

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We think two mechanism, E-F coupling and Perkins Instability, will relate to growth for nighttime-MSTID in mid-latitude [Tsunoda and Cosgrove., 2001 ; Perkins., 1973]. Linear growth rate of perturbation intensity of Pedersen conductivity expected from E-F coupling is around 15 minutes [Yokoyama et al., 2009], which is far shorter than one expected from Perkins Instability [Fukao and Kelley, 1991 ; Miller et al., 1997 ; Shiokawa et al., 2003]. However, Es layers spatial and temporal scale is less than 100km and 15min [Maeda et al., 2013 ; S.Saito et al., 2007].They are diffrent drom MSTID’s ones, which are 200-400 km and around 2hours [Otsuka et al., 2011].To decide which instability is responsible for growth of nighttime MSTID, the growth rate of MSTID was observationally determined with ground-based GPS network data.

We statistically investigated the growth rate of nighttime-MSTID in Japan in 2014 observed with GPS-TEC. The growth rate of nighttime -MSTID observed was 1.0 - 6.0 × 10-4 s-1 during 1800LT-2400LT in summer.Linear growth rate of Perkins instability in summer was 1.0 - 6.0 × 10-4 s-1 during 1800LT - 2400LT, so they were less than one of the E-F coupling instability.In presentation, we talk the detail about the relation between growth rates and two mechanisms, also growth rate and solar activity.