

Influence of mid-latitude sporadic E layer mesoscale patches upon the F region plasma density

Sergey Shalimov[1]; Mamoru Yamamoto[2]

[1] Institute of Physics of the Earth; [2] RISH, Kyoto Univ.

Polarization electric fields of the Es patches on scales above about 10 km can map effectively between E and F region. We propose a model in which the electrical coupling between the band-like Es patch and F region depends on presence of field-aligned closure currents and orientation of ambient electric field relative to the band, and results in corresponding F region plasma density variations caused by E region polarization process. Specifically, we reconcile the discrepancy between the observed E region FAI drift Doppler velocity that indicates presence of large electric field and small value of the polarization field estimated from simultaneous airglow measurements in the F region (Otsuka et al., 2007). As a result for typical ambient electric field values strong (about 50%) depletion in F layer plasma density can be produced and attributed with the presence of the sporadic E patch's polarization electric field mapped up to the F region rather than F region polarization.