

#88 Received 01/20/2015

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## **Formation and Behavior of Es Layers under Influence of AGWs Evolving in the Horizontal Shear Flow**

Abstract:

The formation of mid-latitude sporadic E (Es) layer under the influence of atmospheric gravity waves (AGWs), evolving in the background horizontal wind with horizontal linear shear (horizontal shear flow), is studied. AGWs can be excited in the horizontal shear flow and the components of the amplitudes of the velocity perturbations evolve in different manner.

These in-situ excited atmospheric waves, interacting with metallic ions through ion-neutral collisions and Lorentz forcing, influence the ion vertical motion and could lead to their convergence into thin horizontal layers. In order to investigate the formation of sporadic E a 2D numerical calculations are applied and temporal evolution of multi-layered sporadic E is demonstrated.

It is found that the formed Es ions/electron density depends on the direction of background wind and its shear parameter value. The increasing of the shear parameter value of the cyclonic type shear, increases density converged charged particles.

We have shown that the ion/electron density of Es layers also depends on the horizontal and vertical amplitudes of velocity perturbations AGWs mode and spatial location of the layers is determined by the vertical wavelength of atmospheric gravity waves.