

Possible disturbing mechanism of ionosphere before large earthquakes

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Electric field seems to be a main driver which disturbs ionosphere prior to large earthquake. The problem is where and how the electric field is generated. First part of this paper, we present data observed with US satellite, Dynamic Explorer 2 (DE-2) which is used to discuss our idea on the generation of electric field. We propose here that electric field is originally dynamo field which appears around 100 km. It only enhances around the epicenter region. That is, during daytime the eastward electric field is enhanced, while during night time, westward electric field is enhanced. As a result of enhanced eastward/westward electric field, plasma density over the geomagnetic equator increases both day and night time. During day time, plasma is lifted to higher altitude, causing plasma density increase because of its less recombination with neutral particles. At the same time, magnetic flux tube is filled by the plasma. During night time plasma which is lifted up during daytime is pushed down. This process causes increase of plasma density around F region and topside ionosphere. In high latitude, night time enhancement of F region plasma density is more clearly observed because plasma which is stored in the large magnetic flux tube is continuously supplied. Although the mechanism of the enhanced dynamo field is not so clear, we suggest that internal gravity wave of small amplitude which is generated before large earthquake nonlinearly interacts with planetary scale wave, and is amplified. The internal gravity thus amplified enhances the dynamo electric field and /or neutral density at dynamo region as well as F region.

Keywords: Satellite , Earthquake, Electric field