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Variations of total electron content in the ionosphere during the total solar eclipse on July 22, 2009

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The variations of the ionosphere caused by the solar eclipse on July 22, 2009 around India, southern China, western Pacific Ocean have been studied with TEC(Total Electron Content) data. In precedent studies, the depletion of TEC has been generally observed and some studies suggest that atmospheric gravity waves and/or bow wave are generated by solar eclipse (Altadill et al.,2001). In this study, GPS data observed by GEONET of the Geographical Survey Institute and by GPS receivers at Nakano island(29.8N,129.9E) and Suwanose island(29.6N,129.7E) have been used. The data rate of GEONET and GPS receivers is respectively 30 seconds and 0.05 seconds(20Hz). The results of analysis show that TEC clearly decreased during the eclipse. This is because local depletion of solar radiation by the solar eclipse restrained ionization in the F1 and E region and decreased electron density. Existence of secondary effects of the solar eclipse such as atmospheric gravity wave has been studied by a detailed analysis of the high-precision data observed in a sampling rate of 0.05 seconds.

Keywords: eclipse, ionosphere, atmospheric gravity wave