

Simulation of ionospheric variation during the solar eclipse of July 22, 2009

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It has been suggested that the ionosphere is significantly affected by a solar eclipse. Previous observations have indicated that decrease of solar EUV and X-ray radiations during solar eclipses reduces electron densities of the ionosphere locally and temporarily. Furthermore, some studies reported that decrease of neutral temperatures drives neutral winds and atmospheric waves, which also affects the ionosphere. However, no convincing results on the effects of solar eclipse on the ionosphere have been obtained. The solar eclipse on July 22, 2009 occurred near Japan where there are a number of observation facilities of the ionosphere and the atmosphere. Unfortunately, a magnetic storm occurred during the solar eclipse and sporadic E layers complicated the ionospheric variations.

We have studied the ionospheric variations during the solar eclipse using an ionospheric model, which is capable of including the effect of the magnetic storm and neutral atmosphere variations. The result indicates that the electron density is significantly decreased near Japan during the solar eclipse, which is caused by a decrease of EUV. The effect of atmospheric waves generated by cooling of the atmosphere on the ionosphere appears to be insignificant.

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