

Ionospheric effects on the F region during the Sunrise for the annular solar eclipse over Taiwan on 21 May 2012

CHUO, Yu-jung^{1*}

¹Department of Information Technology, Ling Tung University

On 21 May (20:56, Universal Time; UT, on 20 May), 2012, an annular solar eclipse occurred, beginning at sunrise over southeast China and moving through Japan, sweeping across the northern Pacific Ocean, and completing its passage over the western United States at sunset on 20 May (02:49 UT, 21 May), 2012. We investigated the eclipse area in Taiwan, using an ionosonde and global positioning system (GPS) satellites measurements. The measurements of foF2, hmF2, bottomside scale height around the peak height (Hm), and slab thickness (B0) were collected at the ionosonde station at Chung-Li Observatory. In addition, we calculated the total electron content (TEC) to study the differences inside and outside the eclipse area, using 3 receivers located at Marzhu (denoted as MATZ), Hsinchu (TNML), and Henchun (HENC). The results showed that the foF2 values gradually decreased when the annularity began and reached a minimum level of approximately 2.0 MHz at 06:30 LT. The hmF2 immediately decreased and then increased during the annular eclipse period. The TEC variations also appeared to deplete in the path of the eclipse and opposite to the outside passing area. Further, the rate of change of the TEC values (dTEC/dt measured for 15 min) was examined to study the wave-like fluctuations. The scale height near the F2 layer peak height (Hm) also decreased and then increased during the eclipse period. To address the effects of the annular eclipse in the topside and bottomside ionosphere, this study provides a discussion of the variations between the topside and bottomside ionospheric parameters during the eclipse period.

Keywords: ionospheric physics, ionospheric disturbances, solar radiation effects