Afternoon/sunset enhancement of the total electron content caused by solar eclipses

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Enhancement of the total electron content (TEC) during the afternoon/sunset period, which is considered being caused by the 24 Oct 1995 solar eclipse, has been observed and discussed by previous literature (Liu et al., Adv. Space Res., 1999; Tsai and Liu, J. Geophys. Res., 1999). During the 21 May 2012 annular solar eclipse, TEC profiles were employed to investigate the ionospheric solar eclipse effects, and the afternoon/sunset enhancement has again been observed a few hours later this eclipse event, occurring more than 16 years after the previous reported event. To find out the enhancement is an occasional or frequent phenomena, we investigated 12 total/annular solar eclipse during 2001 - 2016, in which the maximum obscuration belts passed over equatorial region, by using global ionosphere maps (GIM) data provided by Center for Orbit Determination in Europe (CODE). The enhancement has been observed in the majority of selected eclipses. A detail statistics of the occurrence in different condition and the possible mechanism of the afternoon/sunset enhancement is discussed and concluded in the present study.

Keywords: solar eclipse, ionosphere, total electron content

