

A comprehensive study of the solar eclipse associated ionospheric effects over Ahmedabad

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Solar Eclipses are one of the most fascinating celestial events. These events do provide a unique opportunity to study variety of geophysical phenomenon in the terrestrial atmosphere. Since last five decades, regular Ionospheric observations are being made by operating an Ionosonde at Ahmedabad (23.1 oN, 72.6 oE), which is an important station near the northern crest of equatorial ionization anomaly. Special observational campaigns were conducted over Ahmedabad by operating Ionosonde during the seven Solar Eclipse events in the last five decades. First Ionospheric study of solar eclipse over Ahmedabad were made during solar eclipse event of 30 June 1954, thereafter solar eclipses during 14 December 1955, 19 April 1958, 16 February 1980, 24 October 1995 and 11 August 1999 and a very recent solar eclipse event on 03 October 2005 have also been studied. These solar eclipse events took place during different solar activity period and during different solar zenith angle. In view of great interest in the scientific community to study the changes in the various atmospheric parameters during the solar eclipse events, we have done a comprehensive study of the ionospheric effect associated with these solar eclipse events over Ahmedabad. Comparative study of the different ionospheric parameters reveals very interesting features. Changes in critical frequency of F2, F1 and E layers (foF2, foF1 and foE) and in maximum electron density of these layers have been studied. Maximum electron density of E-layer was modulated by about 38%, 20%, 40 %, 57% and 15 % and the F1 layer was changed by 47%, 9%, 57%, 69% and 25% during the eclipse events of 30 June 1954, 14 December 1955, 16 February 1980, 24 October 1995 and 11 August 1999 respectively. A study of changes in real and virtual height of E and F-layers, deviation of critical frequencies with magnitude of solar eclipse has also been made. During the Solar Eclipses of 11 August 1999 and 03 October 2005 a strong sporadic E layer (foEs > 5 MHz) has been observed. Detailed long -term study of ionospheric effects of solar eclipse over Ahmedabad will be presented and discussed.