Electron density variations during a high solar activity storm at different phases at various altitudes

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ABSTRACT:

It is a well known fact that during magnetic storms there are changes observed in the ionosphere. The study of these changes is important since these changes reflect on the underlying processes operative during these storms. Moreover these changes are different in different phases of the storm i.e. whether it is storm commencement, main phase or recovery phase. In the present paper we have studied the electron density variations at various heights during different phases of a high solar activity storm. We have made use of the Incoherent Scatter (I.S.) Radar data at Arecibo (18.3^{O}N, 66.7^{O}W) obtained from the CEDAR dada base of National Centre for Atmospheric Research, Boulder, Colorado. This I.S. radar gives electron densities from about 150 km. to about 687 km. altitude at an interval of 37 km. The storm studied in the present work started on 1^{St} August 1991 at 00:20 hrs.UT and continued upto 20 hrs. UT on 4th August. It is a moderately severe storm. The corresponding quiet time chosen in this study is 31st July and 5th August. The average F10.7 flux for Aug. 1991 is 215 and the Kp sum for these storm days is varies from 30 to 39 with the maximum on 2nd August. The preliminary studies carried out showed some interesting results. It is observed that as compared to quiet time, there is a consistent increase at all heights from 150 to 687 km. at 23 hrs. UT (~19 hrs. LT) on 1st Aug. 1991. At around 0615 hts UT (~ 02 hrs. LT) there is a increase at 342 km. but there after there a decrease all throughout upto 687 km both on 1st and 2nd Aug as compared to quiet time. The results during early morning hours showed a different behaviour. On 2nd Aug. at 0915 hrs. UT (~ 05 hrs. LT) a decrease is observed upto about 500 km followed by an increase thereafter upto 687 km though the results on 3rd Aug around the similar time did not show much appreciable change as compared to quiet time. The work is in progress to analyse the data at other times also on different days and then to look for the associated data of electron and ion temperatures and velocities (also given in I.S. data alongwith the electron densities) to arrive at the expected processes responsible for these observed changes.