Fig. 2 — The ion density distribution with respect to local time over Indian region at an altitude of ~ 500 km during the medium solar activity period as measured by SROSS-C2 for three seasons.

positive variation with solar flux, however, still, it remains a least abundant constituent of plasma, among detectable ions.

3.3 High Solar Activity Period, 1999 (F10.7=154.5) to 2000 (F10.7=177.9)

An enhancement in the total ion density by more than one order of magnitude is observed from low to high solar activity periods with similar patterns of diurnal and seasonal variations and is clearly illustrated in Fig. 3. Values show a strong positive correlation with F10.7 as evident from the correlation coefficient, R^2=0.8778 and it is mostly influenced by O^+ ion. On an average basis, O^+ ion density varies between 10^{10}-10^{12} m^{-3} during high solar activity period for different seasons. Diurnal and seasonal variations are similar for all solar flux values. A perfect correlation with F10.7 is confirmed by R^2 value (R^2=0.9354).

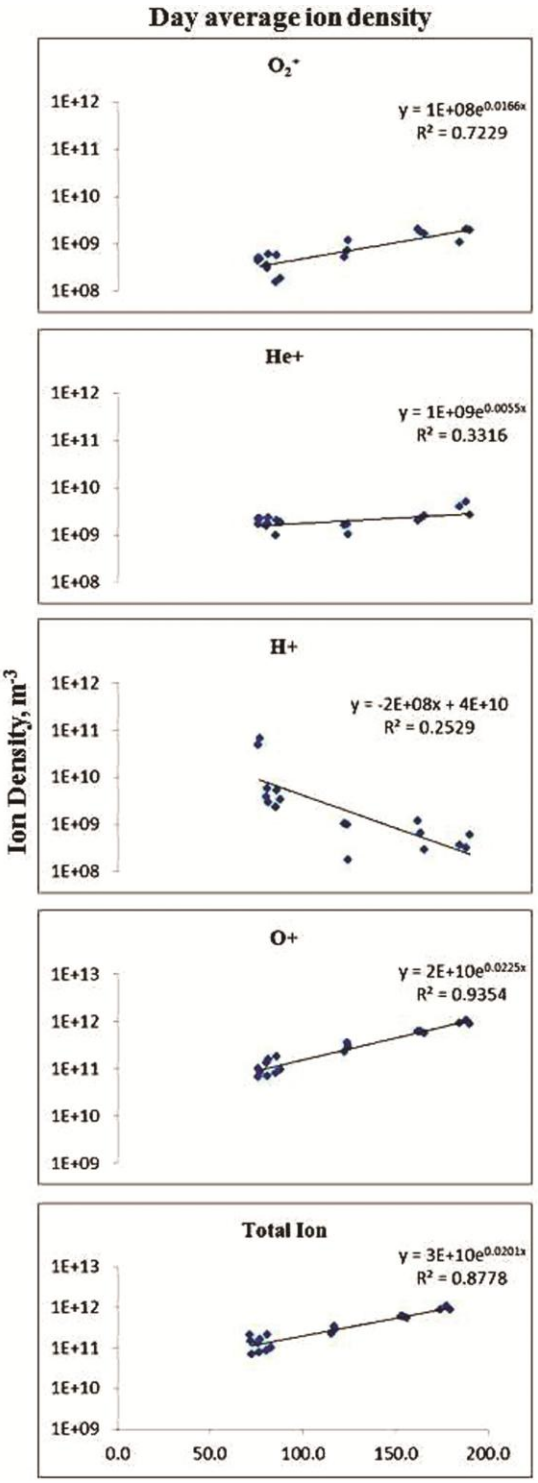

Fig. 3 — The variation of the day average ion densities with F10.7 over the Indian region at ~ 500 km altitude as measured by SROSS-C2.

H^+ ion density further depletes by one order of magnitude on moving from medium to high solar activity periods**.** During the high solar activity period, the peak in the H^+ ion densities is seen at night-time

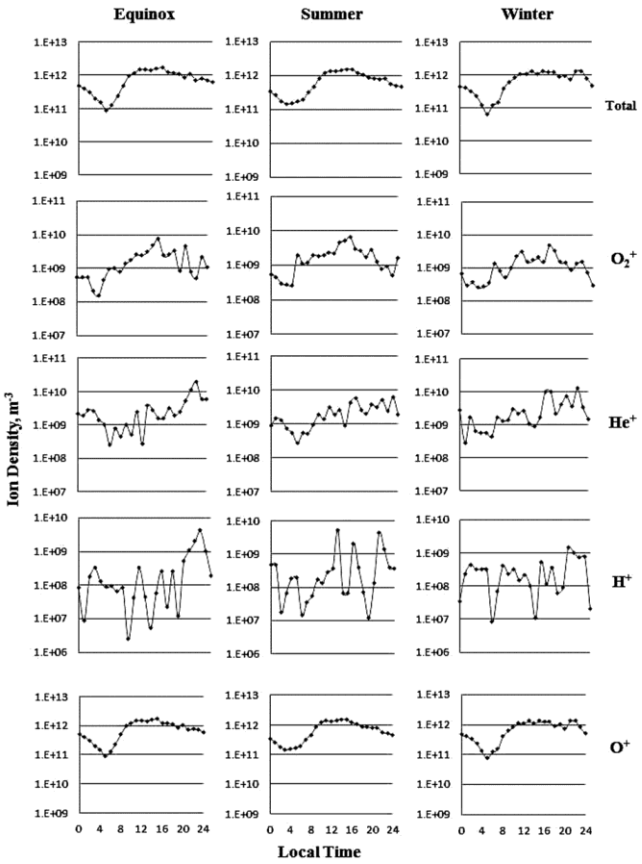

Fig. 4 — The ion density distribution with respect to local time over Indian region at an altitude of ~ 500 km during the high solar activity period as measured by SROSS-C2 for three seasons.

which also vary with season. Daytime (10:00-14:00 hrs LT) H^+ ion density is found to be four order of magnitude lesser than corresponding O^+ ion density for this period, although this difference is slightly low for corresponding night-time values of H^+ and O^+ densities. It can be concluded as; H^+ ion density at late night hours is relatively higher than daytime values for medium to high solar activity period during all seasons.

The day's lowest He^+ ion density during high solar activity occurs around local sunrise (5:00-7:00 hrs LT). Daytime values are found higher than nighttime values. The night-time ion density is relatively more influenced by F10.7 than the daytime values[20], however, the daytime ion density is hardly affected by F10.7. He^+ ion density does not show a significant variation with solar flux but shows a weak positive correlation with it (R^2=0.3316) (Fig. 4). During the low solar activity period, day average H^+ density is found to be higher than that of He^+, but from moderate to high solar activity period day average He^+ ion density surpasses H^+ concentration in the

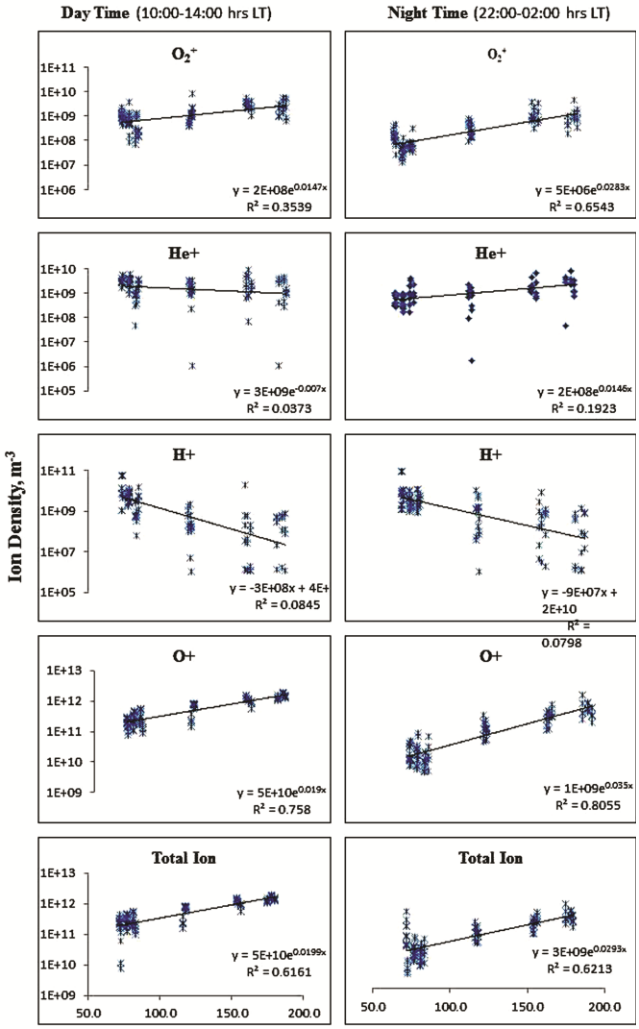

Fig. 5 — Variation of daytime (10:00-14:00 hrs LT) and night-time (22:00-02:00 hrs LT) averaged ion density with F10.7 over Indian region at ~500 km altitude, as measured by SROSS-C2.

same geographical region. Su[21], found the dominance of light ions H^+ and He^+ at 600 km topside ionosphere during moderate to high solar activity at night hours with more events with high H^+ density than He^+. The diurnal and seasonal behaviour of O_2^+ are independent of solar activity. An increase in O_2^+ density by one order of magnitude is witnessed on moving from low to high solar flux periods; and hence a positive correlation with F10.7 is seen (R^2 = 0.7229) in Fig. 4.

4 Conclusion

The topside ionosphere composition at an average altitude of ~500 km and its variation for variable solar activity period over Indian subcontinent region has been studied with dataset obtained from *in situ* measurements made by separate electron and ion RPA aboard Indian satellite SROSS C2. It has been found that total ion density is directly affected by solar activity and hovers by 2 order of magnitude on moving from low to high solar activity periods. O^+ is the main contributor to total ion density. A perfect correlation of O^+ ion density with F10.7 (Fig. 4) is confirmed with R^2 = 0.9354. H^+, He^+ and O_2^+ are other important constituent ions of plasma at this altitude. A negative correlation of H^+ density with F10.7 is from the dataset. He^+ ion density shows a weak positive correlation with solar flux (R^2=0.3316). Nighttime He^+ ion density is relatively more affected with F10.7 than daytime values. A positive correlation of O_2^+ with F10.7 (R^2=0.7229) is made obvious from the study. Nighttime ion density is found to be marginally affected more than daytime with F10.7

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