

## Study of solar cycle variation and its impact on critical frequency of F2 layer

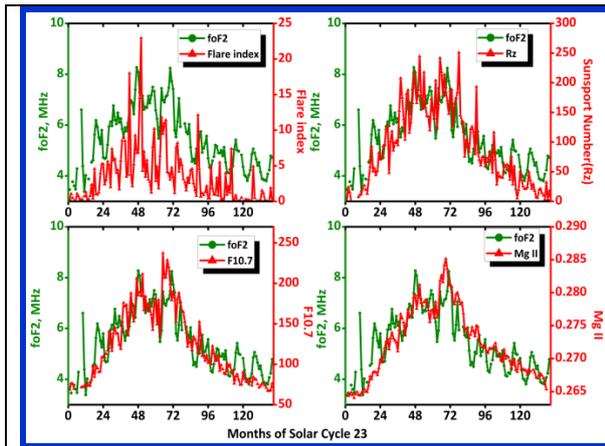
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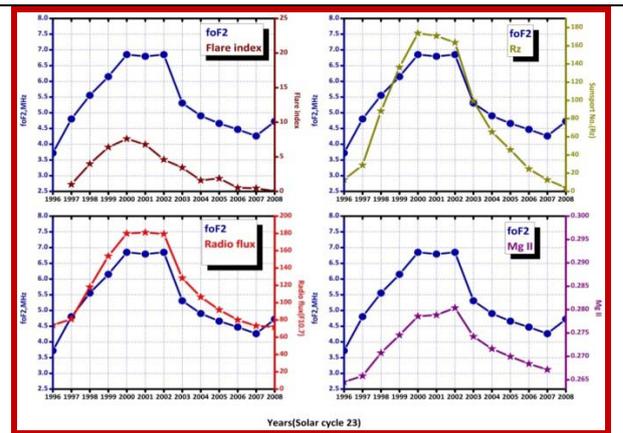
The period of approximately 11 year cycle of solar activity is characterized by the rise and fall in the numbers and surface area of sunspots. We observed a number of other solar activity indices, including the 10.7 cm radio flux, solar Mg II core to wing ratio, relative sunspot number Rz and solar flare index geomagnetic activity that vary in association with the sunspots for solar cycles 23 (1996–2008). This paper presents an analysis of the F-region variability of the ionospheric F2 layer critical frequency (foF2) at Australian mid latitude ionosonde station, Hobart (42.88° S and 147.32° E) during the period 1996 – 2008 of solar cycle 23. The diurnal, monthly, and yearly characteristics of ionospheric F-region parameter foF2 have been studied in detail. We also compared the dependence of foF2 on solar activity indices by using a correlation analysis, and showed a significant linear relationship between the foF2 values and Solar indices. The foF2 variation is strongly influenced by solar activity with about an 11-year solar cycle from the solar maximum to solar minimum.

Table 1. Correlation of foF2 with solar indices during different phases of solar cycle 23.

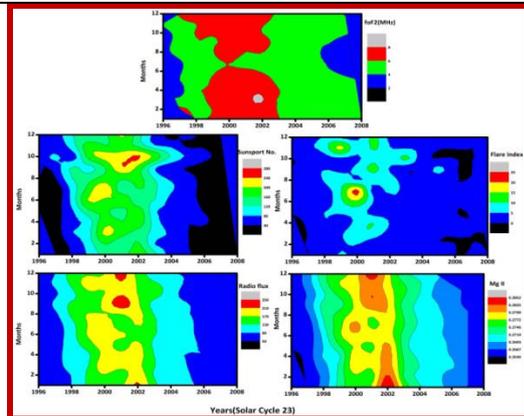
Geomagnetic Indices Vs Fof2	Correlation
Flare Index-foF2	0.85
Rz-foF2	0.92
F10.7-foF2	0.93
Mg II c/w-foF2	0.88



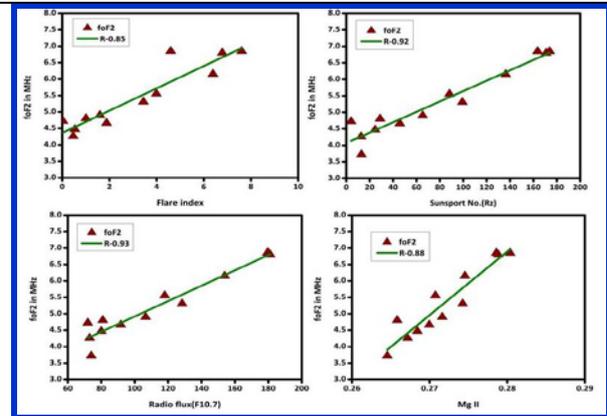
**Figure – 1:** Monthly variation of solar indices with critical frequency foF2 during Solar Cycle 23.



**Figure–2:** Annual variation of solar indices with critical frequency foF2 during Solar Cycle 23.



**Figure-3:** Behavior of critical frequency foF2 and solar indices during the solar cycle 23.



**Figure – 4:** Scatter and Correlation of foF2 with Flare index, sunspot number (Rz), Radio flux (F10.7) and Mg II core to wing ratio during the solar cycle 23.

## References

- [1] Adler N O et al 1997., Solar cycle length variation: its relation with ionospheric parameters, Journal of Atmospheric and Solar-Terrestrial Physics, Vol. 59, No. 2, pp. 159-162. [2] Bruevich E.A. et al 2011., Changed Relation Between Radio Flux F10.7 And Some Solar Activity Indices During Cycles 21 – 23, Solar and Stellar Astrophysics (astro-ph.SR). [3] Bilitza D. 2000 The importance of EUV indices for the international reference ionosphere. *Phys Chem Earth (C)*, 25: 515–521 [4] Sethi N. K., Goel et al 2002 Solar cycle variations of foF2 from IGY to 1990, *Ann. Geophys.*, 20, 1677 – 1685.