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# IONOSPHERIC TOTAL ELECTRON CONTENT MEASUREMENTS FROM THE AUSTRALIAN ZONE

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Total electron content observations have been carried out at Melbourne since November 1970 using the geostationary satellite ATS-1. The Faraday rotation of the VHF signal has been monitored using the technique of Titheridge (1966).

Fig. 1 shows the location of the 400 Km subionospheric points for various stations in the Australian zone.

Many fluctuations in the electron content of the ionosphere were observed. These included nighttime enhancements, particularly during summer, predawn increases during winter, and periodic disturbances. The latter, from a visual observation of the records, were most prevalent in winter around midday, with periods around 30 minutes. This agrees with the reports of Titheridge (1968, 1971).

Fig. 2 shows a typical variation of TEC in winter ($180^{o}$ = $33.7 \times 10^{15}$ $em^{-2}$) during daytime.

Seasonal effects on the TEC are illustrated in Fig. 3. Typical variations during the summer, winter and equinoxes are shown. Large variations in TEC have been noted during March 1972.

Magnetic storms cause large increases and decreases in TEC. Fig. 4 shows the effect of a storm during November 1970. This period was disturbed; SC on 18/1225 and on 21/0626.

To investigate the latitude variation in TEC, a comparison of data from stations in the Australian zone was carried out for summer 1970-71 (see Fig. 1). Large variations were found in the data for stations on different latitudes. Figs. 5 and 6 show a comparison of the different stations. The TEC as measured from Macquarie Island often shows a double peak in the maximum value, one before midday and one around sunset

(~ 2000 LT). This is consistent with the results of Liszka (1967) who found similar peaks in TEC during summer at these latitudes using orbiting satellites. $N_mF_2$ deduced from ionograms at Campbell Island show similar peaks.

The TEC data from the lower latitude stations often shows an increase around 2000 - 2200 LT during summer. This is consistent with the results of Titheridge (1969). Similar enhancements are observed in the $N_mF_2$ deduced from ionograms from Canberra.

It is suggested that there is an association between the peak near sunset at higher latitudes and the increases observed at lower latitudes. The possible mechanism for the transport of ionization from the higher latitudes to lower latitudes are neutral winds. However before such a mechanism is investigated, detailed statistical analysis of the records is required.

It is interesting to note that at equatorial stations, frequent night-time peak structures are observed during equinoctial months. (Yeboah-Amankwah and Koster, 1972). They attributed these peaks to moving neutral plasma irregularities.

Acknowledgements:

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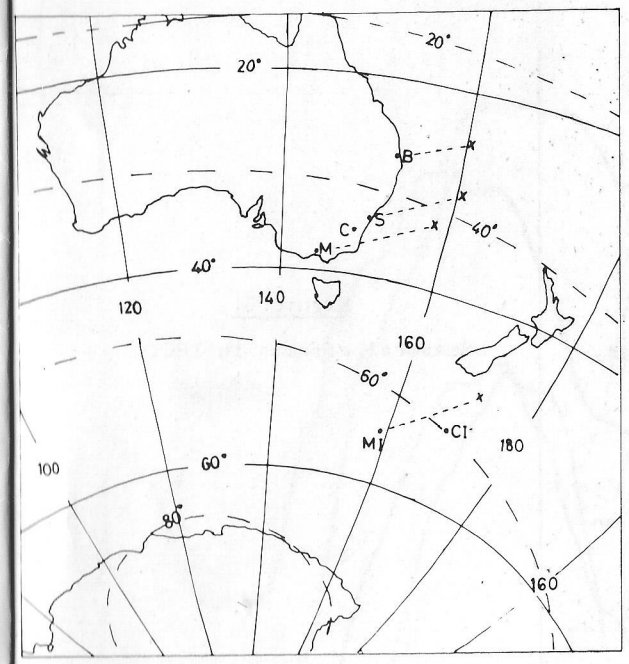


Figure 1.

Location of 400 km sub-ionospheric point.
X subionospheric point.
---- invariant latitude.
—— geographic co-ordinates.
B Brisbane
C Canberra
CI Campbell Island
M Melbourne
MI Macquarie Island
S Sydney

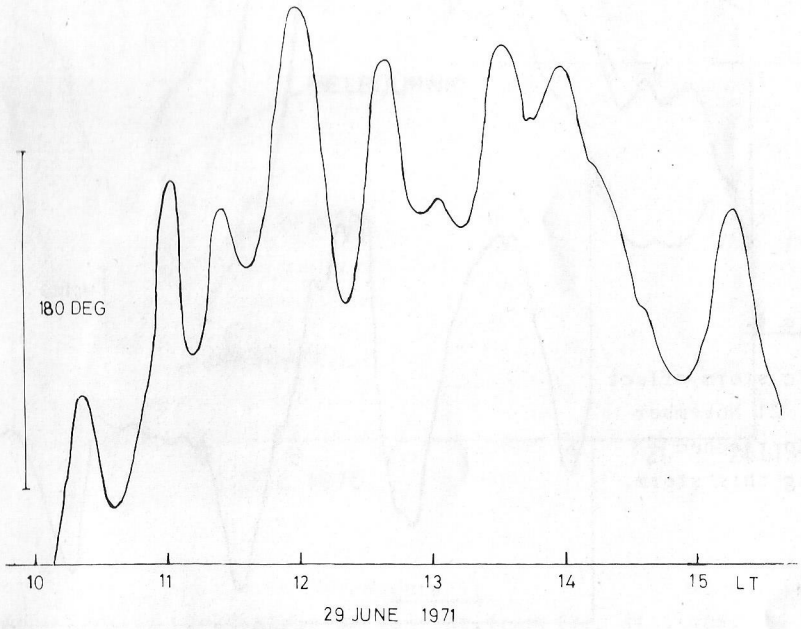


Figure 2.

Quasi period oscillations in TEC. $180^{\circ}$ = 33.7 x $10^{15}$ $em^{-2}$.

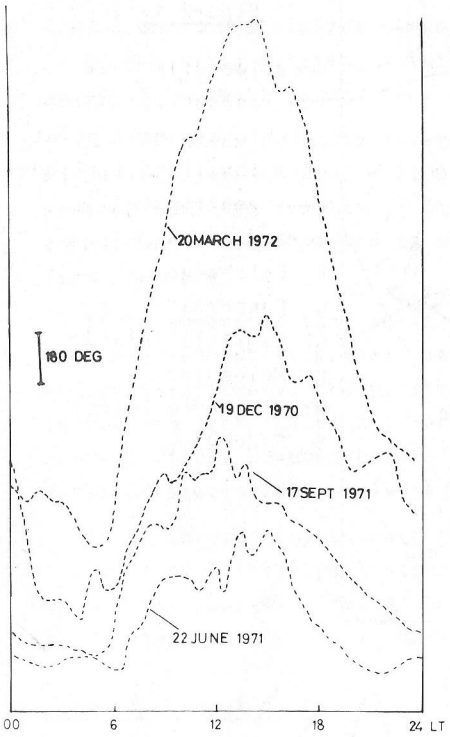


Figure 3.

Seasonal effects in TEC.

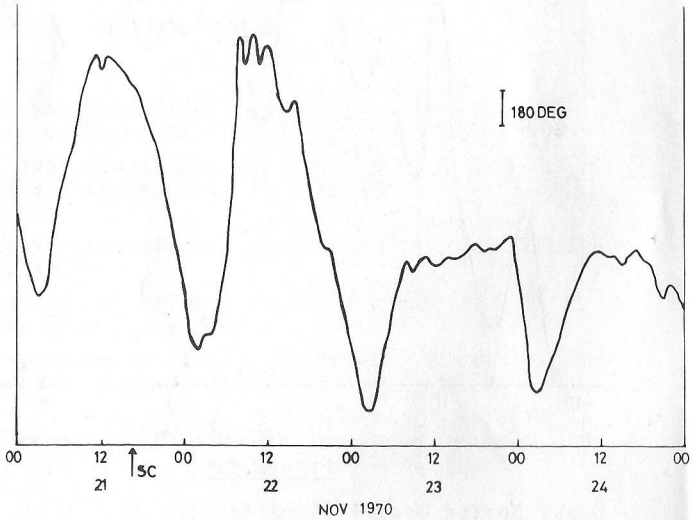


Figure 4.

Magnetic storm effect on TEC, 21 November 1970. Kp reached 6- during this storm.



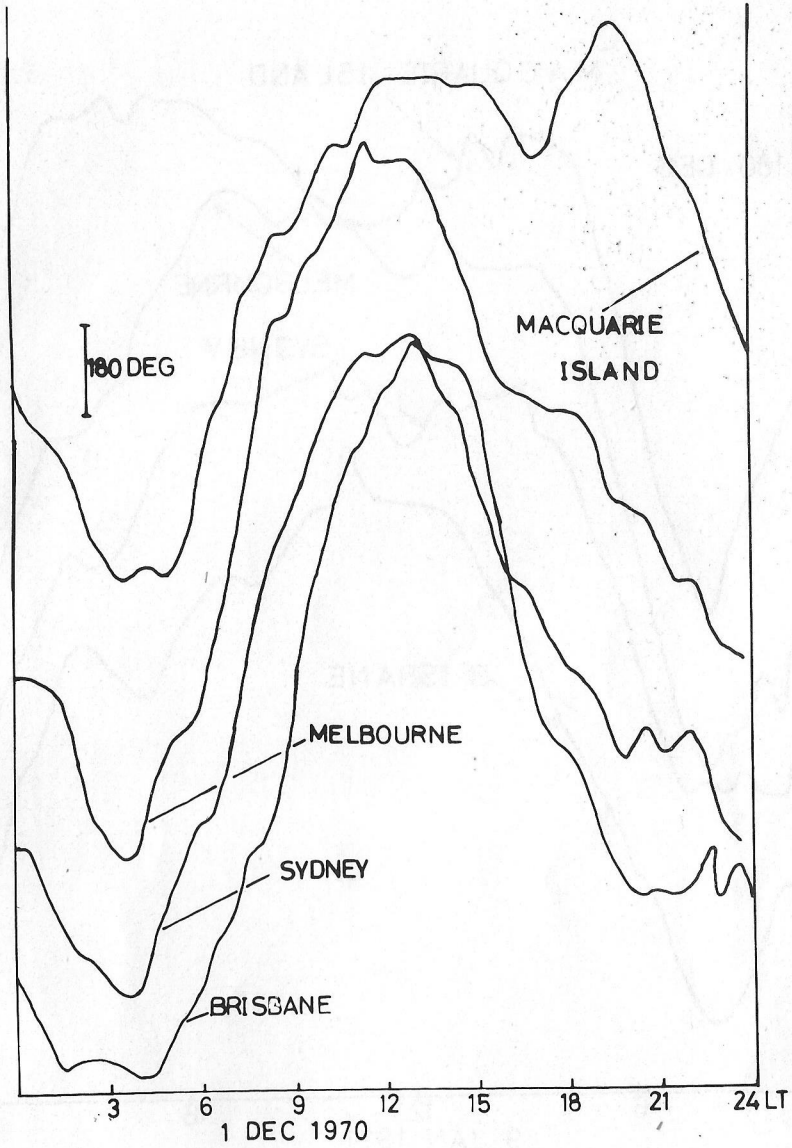


Figure 5:

Comparison of total electron content from four stations.

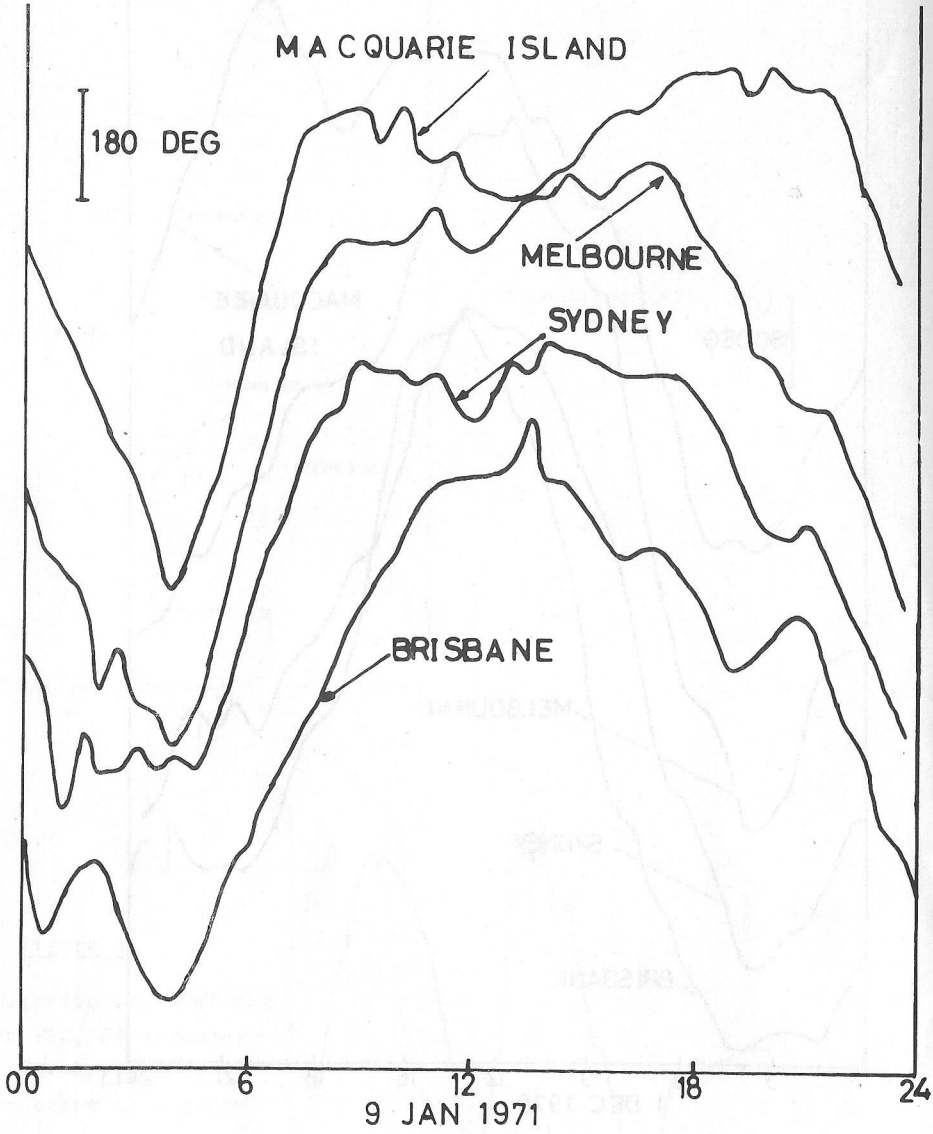


Figure 6:

Comparison of total electron content from four stations.