CHAPTER VI

GENERAL DISCUSSION AND NEED FOR FURTHER WORK IN TROPICS.
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In the preceding chapters, we have described the equipment used, its calibration, the method of reducing the data and the results which have come out. The data at Abu have been compared with those at a few other stations.

The nocturnal variations of all the three radiations under study have been found to differ from one another. The OI green line exhibits a midnight maximum, with the hour of occurrence changes with season. The OI red lines show a post-twilight decrease in intensity. The intensity of Na-D lines is observed to remain more or less constant during night with a slight decrease towards dawn.

The seasonal variations of OI green line possess two maxima one in autumn and the other in spring and a minimum in winter.

Unfortunately nothing definite is known about the variation during the monsoon period June to September. But there are indications of another minimum in that season.

The study of isophote maps reveals the patchy nature
of airglow and the existence of movements. A tentative estimate of the size of airglow cells has yielded a diameter of about 2500 km which is of the same order as that found by other workers.

Magnetic and sunspot activities do not produce any significant effect on the variations of intensity of the OI green and red lines. There is however evidence of the enhancement of airglow intensity due to solar flares in the case of OI green line. The intensity of the OI red lines is found to depend on the critical frequency $f_{cF_2}$ and the heights $h_pF_2$ and $h'F$ of the F layer.

Although some of these broad features of tropical airglow have been ascertained, there is great scope for further work, and also for the improvement in the work done at Abu.

As can be seen the instrument used in these investigations used rather broad band optical filters. This has introduced errors in the observations owing to background radiation. The effect could be reduced by using narrow band interference filters or birefringent filters such as those by Dunn and Manning\(^1\), Roach et al\(^2\) and others\(^3\). The possibility of using spectroscopic technique also requires to be explored. Barbier\(^4\) has used an eight-colour photometer and studied the correlations amongst the intensities at different wavelengths to eliminate this contamination.
Commercial radioactive sources are known to be temperature dependent. To check the stability of the equipment over long periods, frequent calibrations are necessary. This is important because the electronic equipment and the optical filters used may not retain the same character over a long range of years. Further the effect of the finite field of view of the photometer and of extinction and scattering in the atmosphere should be properly estimated.

For studying effects of solar activity on airglow it is essential to collect data over a long period of years. In the auroral zone the intensity of airglow is known to increase with increasing magnetic activity, whereas there is hardly any effect due to changes in magnetic activity on airglow variations in low latitudes. The study of the dependence of airglow variations with changes in magnetic activity with latitude should prove interesting if more data are collected.

The study of airglow has received insufficient attention especially in low latitudes. A few stations from the geographic or geomagnetic equator to middle latitudes will prove valuable, for problems like the determination of the height of the emitting layer, the nature of airglow movements and their latitude dependence. The selection of these stations should be such as to reduce serious gaps in the data due to the monsoons.
The OH bands have not been studied in the tropics. Na-D and OI red lines need further attention.

REFERENCES