

CHAPTER 5

DISCUSSION and CONCLUSION

In this work, the influences of Interplanetary Magnetic Field has been investigated.

At the very beginning of the study, a simple statistical technique, Superposed Epoch Method, was employed. The results of the SPE has shown that there is a certain influence of Interplanetary Magnetic Field on the variability of Ionospheric F layer critical frequency, A polarity reversal in IMF B_z of magnitude 11nT/h resulted in a ~ 1 MHz decrease in the f_0F_2 values. Also the effect of Interplanetary Magnetic Field on the variability of geomagnetic activity has been shown. The minimum Dst during the IMF B_z polarity reversals was computed to be about 60nT and the increase in the Kp values was calculated to be around 5. In addition, it has been seen that the quasi-steady IMF B_y polarity, increase the duration of the influence on geomagnetic activity.

Although the dependence of the geomagnetic activity on the IMF B_y could be observed, the influence of IMF B_y could not be shown in the f_0F_2 values due to lack of data. Thus, in order to quantify the effect, another technique, Genetic Programming was employed. Using this technique, a model, GETY-IYON, which forecasts 1 hour ahead forecast of Ionospheric F layer critical frequency, was constructed. The overall error of the model was 7.3%. The success of the model was seen to be higher during summer, whereas the errors increased during winter. This difference was dependent on the dominance of the data during summer. It has been also concluded that the Genetic Programming was very effective in constructing a mathematical model in relation to a physical process, however it was very difficult to construct a model in forecasting a physical process.