Knowledge of low latitude geomagnetic phenomena vis-a-vis the high latitude ones, is meagre and is only of recent origin and considerable attention is being focussed the low latitude studies only with the starting of the national Geophysical Year.

The importance of geomagnetic studies in the low latitudes began to be appreciated only with the opening of the Observatory at Huancayo in 1922. Study of the Huancayo observations has revealed many interesting facts. For example, it is now known that near the magnetic equator, amplitude of the solar geomagnetic tide is nearly twice what it should be. This discovery stimulated valuable theoretical and observational work on the conductivity of the ionosphere, and has led to the discovery of the existence of an intensified current called the 'Electrojet' in the ionosphere.

The geomagnetic equator passes through South India, and we have, therefore, an advantage for studying such phenomena. Fortunately we have a geomagnetic observatory at Kodaikanal (geomagnetic latitude 0.6° N) - a northern counterpart of Huancayo. The geomagnetic observations of Kodaikanal could with profit be compared with those of Huancayo, for a clearer understanding of the phenomena. Taking these factors into consideration, I thought of giving a synthetic picture of the lunar and solar geomagnetic tides in the low latitude region.
A review of the existing knowledge regarding the lunar and solar geomagnetic tides and of the methods of analysis of the data indicates that the Chapman-Miller technique is suitable for the present purpose. Following this method, the lunar and solar geomagnetic tides have been determined for the different seasons, at Kodaikanal, Alibag, Honolulu, San Juan and Apia. Incorporating similar results obtained by earlier workers for Huancayo and Ibadan, a synthesis of the L and S fields in the low latitudes is made, considering the seasonal and latitudinal (geographic, geomagnetic and magnetic) variations in the amplitudes and phases of the L and S tides. The main features of the L and S fields are compared with similar results for high latitude stations. Comparison has been made of the seasonal variations in the amplitude and phase of the lunar semi-monthly wave calculated from the absolute daily ranges at Kodaikanal, with similar results obtained by Bartels and Johnson for Huancayo. The variabilities of the absolute solar and lunar daily ranges and their inter-dependence have been studied. The possibility of the currents causing the lunar geomagnetic tides being located in each of the layers D, E, F1 and F2 is examined both from the theoretical and observational points of view. Certain similarities have been brought out between lunar geomagnetic tidal variations and the F2 phenomena which indicate that the L currents may be located in the F2 layer. The theoretical difficulties in the way of such a hypothesis have been analysed.
It may be stated here, that the material presented in this thesis is taken from the original work done entirely by me in the India Meteorological Department. However, the lunar and solar geomagnetic tides at Kodaiyana for one season and at Apia for the three seasons have been determined with the help of my junior colleagues and certain results of these investigations have been incorporated in Chapters two and three of this thesis. The reprints of my published papers have been appended at the end.

I thank the Director General of Observatories, New Delhi for giving me necessary facilities for carrying out the investigation, including the access to unpublished data of the Alibag Observatory. I am thankful to Mr. C.Ra and Dr. R.Amuthakrishnan, Deputy Directors General of Observatories and Mr. K. Nagabhushana Rao, Director, Regional Meteorological Centre for their keen interest and encouragement. I had many stimulating discussions with my esteemed friends and colleague Dr. A.A. Rama Sastry, during the period of this investigation. He has also given me helpful criticism and many useful suggestions in the course of the preparation of the thesis. I am deeply grateful to him for all his help.

Pona.

V. Rao 27/11/1