PREFACE

This thesis contains the work done by the author during 1997-2002 on the 'Investigation of Middle Atmospheric Winds, Waves and Tides from Low latitudes' at Equatorial Geophysical Research Laboratory (Indian Institute of Geomagnetism) and Department of Physics, Manonmaniam Sundaranar University, Tirunelveli.

The thesis deals with the dynamical processes occurring in the low latitude middle atmosphere with special emphasis on mesosphere and lower thermosphere (MLT). The MLT wind data obtained by the medium frequency (MF) radar at Tirunelveli are largely used in the thesis. The dynamics of the MLT region is strongly influenced by gravity waves, tides, and planetary waves propagating upward from lower atmospheric regions. The main objective of the thesis is to investigate the characteristics and variabilities of these wave motions; their interactions among them and with background wind.

The thesis consists of six chapters. The first chapter is the introduction to this thesis. The scope of the thesis has also been given in this chapter. The second chapter deals with the MF radar system details, mode of operation and method of wind estimation. A few mathematical techniques, which are used for analyzing the data, are also described in this chapter. In the third chapter, long and intraseasonal variabilities of MLT winds are presented. In the fourth chapter the tidal characteristics are studied and the observed amplitudes and phases of tidal components are compared with the updated values of Global Scale Wave Model. Considerable discussion is devoted to the gravity wave-tidal interaction as a causative mechanism for the short-term variability of tides. In the fifth chapter, characteristics of planetary-scale waves are presented. The interaction of these waves with the background wind is also discussed. Observational evidence for the occurrence of non-linear tidal-planetary wave interaction is provided. The results presented in the third, fourth and fifth chapters are summarized in the sixth chapter. The scope for future work is also given in this chapter. References are given at the end.
Papers pertaining to the work done by the author, published in the international journals are also included. Some of the published results are reported in the thesis.

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