

Acknowledgements

At the outset, I wish to express my thanks and gratitude to Dr. A. Jayaraman under whose direction the work contained in this thesis has been carried out. His enthusiasm, positive outlook, encouraging attitude and meticulous guidance have made the years working with him pleasant and memorable. I am deeply grateful for all the knowledge and experience that I have gained from him during the course of this work through very many useful discussions and for his personal kindness at every stage.

I am grateful to Prof. B.H. Subbaraya, who is a great inspiration to me, for his guidance, encouragement and care and for many beneficial discussions throughout this work. His sincere advice on the many facets of life will go a long way in shaping my career.

It is a pleasure to thank Mr. Y.B. Acharya for his concern and encouragement throughout this work. I thank him for developing the instruments used for balloon-borne and ground based observations. I am immensely grateful for his help and cheerful presence during the balloon experiments and lidar observations. I wish to acknowledge Messrs. J.T. Vinchhi and S.M. Shukla for their involvement in the fabrication and testing of the payload. My special thanks are due to Mr. Vinchhi for his help during the balloon-borne and ground based observations.

I am profoundly thankful to Dr. M.S. Shah for her concern and encouragement throughout this work.

I thank Dr. Shyam Lal for the concern he showed about the progress of this work and my personal well-being. Many enlightening and delightful discussions I had with him still linger in my mind.

I was greatly benefitted by my working with Dr. B.R. Sitaram, a storehouse of knowledge, without whose help the model calculations presented in this thesis would not have been possible. I express my sincere thanks to him.

I accord my thanks to Profs. Harish Chandra and Vijay Kumar for their comments and remarks during my assessment reviews. I am grateful for the encouragement given to me during my Ph. D. tenure by Profs. R. Sridharan, J.N. Goswami, S.K. Bhattacharya, A.C. Das and R.K. Varma.

My interactions at various stages with the faculty members of our area Profs. R.

Raghavarao, S.P. Gupta, Drs. G. Subramanian, D.K. Chakrabarty, H.S.S. Sinha, R. Sekar, K.P. Subramanian, S.A. Haider, Mr. R. Narayanan and with Prof. J.N. Desai, Drs. T. Chandrasekhar and N.M. Ashok were beneficial and I thank them for the same. I thank Profs. B.G. Anandarao, S. Krishnaswami, A.K. Singhvi, Dr. R. Ramesh and the late Mr. C.S.R. Murthy for their encouragement. I thank all my area colleagues for providing me a pleasant working atmosphere during the course of this work. I acknowledge the secretarial assistance rendered by Messrs. N.P.M. Nair, Philip Samuel and N.R. Pillai.

I am indebted to the staff of the Hyderabad balloon facility for the successful balloon launches, in particular to Mr. M.N. Joshi, the Scientist-in-Charge and Messrs. R. Vasudevan and S. Sreenivasan. I thank Prof. S.V. Damle of Tata Institute of Fundamental Research and Mr. P. Rajaratnam of ISRO HQs for helping in various stages in planning and conduct of the balloon experiments.

My thanks are due to Dr. Sai Iyer for the knowledge I gained from his expertise in computers.

This acknowledgement would be incomplete if I do not recall with fond memory, the various other facilities that I have availed and the people associated with them. To mention a few, this includes Mr. Ghanashyam Dholakia, Mr. P.S. Shah and all other staff members of the computer centre, Mrs. Rhoda Bharucha, Mrs. Urmila Ghiya, Mrs. Rohini Patil and all other staff members of the library and Mr. D.R. Ranpura of the photography section. I remember them with deep gratitude for the support and service I have obtained from them during the course of my thesis work. The functional block diagrams found in this thesis are due to courtesy: Dr. A. Jayaraman and Mr. S.K. Bhavsar. I thank them for their sincere efforts.

Words are perhaps inadequate to express my thanks to my dear and wonderful friends Sam Ragland, Ravi Bhushan, Venkataramani, Krishnan, Gurubaran, Devashis Banerjee, Debasish Majumdar, Sivakumaran, Manish, Tarun, Santhanam, Janardhan and Seema, whose persistent cooperation and vivacious company was a source of strength, joy and refreshment. My friendship with them has been unique and unforgettable. I wish to place on record my thanks to all my other friends, to name a few, Subrat, Anjan, Pandey, Navin, Dipankar, Jitesh, Manohar Lal, Supriya, Srinivasan, Himadri, Vijaykumar, Di-

nanath, Biswajoy, Varun, Pallam Raju, Prahlad, Gautam, Mitari, Sushma, Poullose, Watson, Sandeep, Abhijit, Debabrata, Prashant, Biju, Prabir, Jyoti, Chetan, Ratan, Muthu, Anandmayee, Aparna, Nanda Kumar and Prosenjit, for their warm and affectionate company. Jagadheesha's efforts in data collection are greatly acknowledged.

My special thanks are due to my parents who by their relentless support, encouragement and understanding made it all possible. Letters from my mom showering love and affection had been inspiring me all through the years. I deeply express my thanks to my dad, who was more a friend, for his enthusiasm and patience, which have left a deep indelible impression in my mind. I am in dearth of words to thank my sisters Mrs. Visalakshi and Ms. Mathanghi for their love and care and for being a source of emotional support through their letters. It is indeed a pleasure to thank my brother-in-law Mr. Karthikeyan and his family for the moral support and encouragement. I express my deep sense of gratitude to the families of my uncle Mr. Venkataraman, my sister Mrs. Rathna, my aunt Mrs. Jayanthi and my brother Mr. Ganesan for their boundless love and encouragement.

At times, if I was bored or felt lonely during my stay in Ahmedabad, it was due to being faraway from home. The long and beautiful letters from my nieces Padmapriya, Anupama, Jaishri, Kanchana, Chitra and my friend Chandra gave me the required pep and encouragement to work with renewed vigour and enthusiasm. I thank them for their untiring efforts. I thank all my relatives and family friends for their constant queries about the progress of my work and my well-being.