Dissertation

on

AIRGLOW STUDIES IN LOW LATITUDES

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by

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PREFACE

Airglow radiations in the visible portion of the electromagnetic spectrum have been studied in many aspects at middle and high latitude stations from ground based observations and also by rockets. Until recently the behaviour of these emissions in low and equatorial latitudes has received little attention. The emissions in the infrared region of the spectrum are almost not studied in low latitudes except for a few attempts at some places.

The thesis incorporates the results and conclusions of the night airglow studies made during 1966-69 at the Atmospheric Optics Observatory, Hill View, Mt.Abu (24.6°N, 72.7°E geographic); (15.4°N, 144.2°E geomagnetic) India. Night airglow observations on two hydroxyl bands OH (7-2) and OH (8-3) were taken. The three emissions at 6300 A, 5893 A and 5577 A were also observed, using two fixed and one automatic all-sky scanning, photoelectric photometers. Two other photometers were constructed and used for measuring the atmospheric extinction coefficients at wavelengths 6080 A, 5750 A and 5360 A.

The author, working at Physical Research Laboratory, Ahmedabad, India, under the guidance of Prof. P.V. Kulkarni and Prof. K.R. Ramanathan, has designed and constructed the different photometers and all the necessary electronic circuits. From time to time different modifications were done to improve

the quality of observations. The author has maintained the various photometers at Mt. Abu and taken the night airglow observations during 1966-1969. Scaling and the reduction of airglow data into absolute units, taking proper care of regular calibration with radioactive sources and the analysis and interpretation of the various results are done by the author. The computations were carried out with the IBM 1620 computer facility at the Physical Research Laboratory.

The thesis contains seven chapters. Two chapters describe the methods that were used to account for the passage of the night airglow emissions through the lower atmosphere and the absolute calibration of photometers. In the rest of the chapters the results obtained with the different photometers are critically examined with a view to understand some of the physical processes in the upper atmosphere. In the last chapter the conclusions of all the above night airglow studies are summarised.

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CONTENTS

		Page
	Preface	(i)
	Acknowledgements	(iii)
CHAPTER I	BRIEF REVIEW OF NIGHT AIRGLOW WORK - EXPERIMENTAL SET UP AT MT.ABU	
1.1	Introduction	1
1.1.1	Distinction between aurora and night airglow	1
1.1.2	Spectrum of the night airglow	2
1.1.3	Earlier night airglow studies in low latitudes	6
1.1.4	Need for further study of night airglow emissions	7
1.1.5	Atmospheric Optics Observatory at Mt.Abu	9
1.2	Instrumental set up at Mt. Abu	10
1.2.1	Pole photometer	11
1.2.2	Red photometer	13
1.2.3	All-sky scanning photometer	15
1.3	Observations schedule and data collection	22
CHAPTER II	EXTINCTION COEFFICIENT (τ_λ) OF THE ATMOSPHERE	
2.1	Introduction	29

2.2		Extinction Photometers - Description	41
	2.2.1	Extinction Photometer I	41
	2.2.2	Extinction Photometer II	47
2.3		Method of observation and procedure of determining τ_λ	48
2.4		Observations	52
	2.4.1	Procedure	52
	2.4.2	Observation schedule	55
2.5		Results and conclusions	57
2.6		Actual use of τ in night airglow calculations	64
CHAPTER III		REDUCTION OF AIRGLOW DATA TO ABSOLUTE UNITS (RAYLEIGHS):	
3.		Introduction	66
3.1		Principle of the two colour method	67
3.2		Method of using C^{14} source for calibration	68
		Notation used	69
	3.2.1	Method for the emission lines	74
	3.2.2	Reduction of OH band intensity into Rayleighs	78
3.3		Approximations and errors in the two colour method	83
3.4		Contamination of OH in the intensities of emission lines	94
3.5		Corrections to be applied to the observed deflections	103

	3.5.1	Atmospheric correction	105
	3.5.2	Scattering correction	106
	3.5.3	Extinction correction	106
CHAPTER IV		5577 A AND 5890-96 A EMISSIONS IN NIGHT AIRGLOW	
4.		Introduction	113
4.1		Brief review of the earlier work	114
	4.1.1	Atomic oxygen (OI) 5577 A emission	114
	4.1.2	Sodium 5890-96 A emissions in the night airglow	120
4.2		Observational results	122
	4.2.1	Statistical distributions	122
	4.2.2	Nocturnal variation	124
	4.2.3	Seasonal variation	138
	4.2.4	Spatial variations	142
	4.2.5	Correlation of 5577 A and 5893 A	145
	4.2.6	Effect of solar flares and magnetic storms	148
CHAPTER V		STUDIES OF OH BANDS IN NIGHT AIRGLOW	
5.		Introduction	154
5.1		Brief review of OH work	155
	5.1.1	Mechanism of excitation of OH bands	165
5.2		Observational results	169
	5.2.1	Methods of observation	169

	5.2.2	Data collection and reduction to absolute units	170
	5.2.3	Covariation between OH (7-2) and OH (8-3) bands	170
	5.2.4	Nocturnal variation of OH emission	173
	5.2.5	Possible cause of different types	181
	5.2.6	Fluctuations in the nocturnal variation	181
	5.2.7	Seasonal variation	183
5.3		Interrelation between OH and other night airglow emissions	185
	5.3.1	Correlation between OH and 5893 A (Na) emissions	185
	5.3.2	Comparison of OH and 5577 A emissions	193
	5.3.3	Relation between 5577 A and OH due to vertical eddy transport	195
	5.3.4	Correlation between OH and 6300 A emissions	197
5.4		Effect of celestial X-ray sources on OH night airglow intensity	201
	5.4.1	Nocturnal variation of OH (7-2); isophote maps	205
CHAPTER VI		F REGION NIGHTGLOW EMISSIONS OF ATOMIC OXYGEN	
6.		Introduction	211
6.1		Brief review of earlier work	213
	6.1.1	Introduction	213
	6.1.2	Phenomena connected with 6300 A emission	216
		A) Barbier's relation	216

		B) Nocturnal variation	217
		C) Seasonal variation	221
		D) Long term variation	222
		E) Studies at equatorial stations	222
		F) Airglow enhancements and their explanation	223
		G) Correlation with 5577 A	224
		H) Effect of magnetic storms	224
	6.1.3	Earlier work at Mt.Abu	224
	6.1.4	Problems for further study of 6300 A in low latitudes	225
	6.1.5	Scope of the present work	227
6.2		Behaviour of 6300 A at Mt. Abu	228
	6.2.1	Introduction	228
	6.2.2	Post twilight decay	229
	6.2.3	Intensity around midnight	232
	6.2.4	Predawn enhancement; Cole's hypothesis	234
	6.2.5	Comparison of the intensity of 6300 A in low and high active periods.	238
	6.2.6	Barbier's formula	243
	6.2.7	Behaviour of 6300 A during spread F conditions	249
6.3		6300 A enhancements	253
	6.3.1	Introduction	253
	6.3.2	Pre-midnight enhancements	256
	6.3.3	Correlation of pre-midnight enhancement of 6300 A with the changes in electron density profiles of the F region of the ionosphere	260

		A) Pre-midnight enhancement: electron content (N_T) in the ionosphere	260
		B) Pre-midnight enhancement: vertical drifts in the ionosphere	262
		C) Pre-midnight enhancement in low latitudes: Height variation of the F_2 region at the magnetic equator (Thumba)	264
	6.3.4	Post midnight enhancements	268
	6.3.5	Correlation of the post-midnight enhancement with changes in the electron density profiles of the F_2 region	270
6.4		Correlation of 6300 A intensity and the electron content in the ionosphere - Height of 6300 A emission	272
6.5		6300 A isophote maps	273
	6.5.1	Introduction	273
	6.5.2	6300 A aligned isophote maps	277
	6.5.3	Southward movement of 6300 A isophotes and the decay phase of the equatorial anomaly	279
6.6		Covariation of 6300 A and 5577 A emissions in tropical night airglow and the emission of 5577 A from the F region	285
	6.6.1	Barbier's relation for 5577 A emission	294
	6.6.2	Calculations of 6300 A and 5577 A intensities from the N(h) profiles	297
CHAPTER VII		SUMMARY AND CONCLUSIONS	301
References			313