

CONTENTS

Page

Chapter 1 **Introduction**

Section 1.1	Chemical Identity of Ozone & Historical Background	1
Section 1.2	Discovery of Ozone Depletion	6
Section 1.3	Survey of Literature	6
Section 1.4	Aims and Object of Work	12
Section 1.5	Data Source and Instrumentation	14
Section 1.6	Data	18
Section 1.7	Brief Descriptions of the Subsequent Chapters	81

Chapter 2

A Study of the Variation of Daily Ozone Concentration in Antarctica With Daily Solar Ultraviolet Flux

Section 2.1	Introduction	89
Section 2.2	Analysis, Discussion and Conclusions	90
2.2.1	Analysis	90
2.2.2	Correlation Between Solar UV Flux and O ₃ Concentration of Antarctic Survey Station Halleybay & McMurdo	91
2.2.3	Conclusions	92
Section 2.3	Tables, Figures & References	94

Chapter 3

Cause of Southpolar O₃ Depletion and Hazards on Ecology

Section 3.1	Introduction	100
Section 3.2	Analysis, Discussion and Conclusions	101
3.2.1	Analysis	101
3.2.2	Correlation Between Each of Two Components of Solar UV Flux and O ₃ Concentration of Antarctic Survey Station Halleybay & Syowa	102
3.2.3	Conclusions	103
Section 3.3	Tables, Figures & References	104

Chapter 4**Southern High Latitude O₃ Depletion, It's Variation With Solar Flux and Hazards on Nature**

Section 4.1	Introduction	110
Section 4.2	Analysis, Discussion and Conclusions	112
4.2.1	Analysis	112
4.2.2	Correlation Between Each of Two Components of Solar UV Flux and O ₃ Concentration of Antarctica Survey Station McMurdo	113
4.2.3	Correlation Between Each of Two Components of 10.7cm Solar Radio Flux and O ₃ Concentration of Antarctica Survey Station Haleybay	114
4.2.4	Discussion	115
4.2.5	Conclusions	116
Section 4.3	Tables, Figures & References	118

Chapter 5**Antarctic Ozone Sink, It's Covariation with Solar Parameter and Possible Effects on Environment**

Section 5.1	Introduction	124
Section 5.2	Analysis, Discussion and Conclusions	125
5.2.1	Analysis	125
5.2.2	Correlation Between Each of Two Components of 10.7cm Solar Radio Flux and O ₃ Concentration of Antarctica Survey Station McMurdo	126
5.2.3	Effects of Pollutants on Atmospheric O ₃ Concentration	127
5.2.4	Conclusions	129
Section 5.3	Tables, Figures & References	131

Chapter 6**Arctic Ozone Destruction, Cause Investigation and Related Hazards on Earth's Environment**

Section 6.1	Introduction	136
Section 6.2	Analysis, Discussion and Conclusions	138
6.2.1	Analysis	138
6.2.2	Nature of Variation of O ₃ Concentration at Barrow in Arctica During 1979 to 1999	138

6.2.3	Correlation of Ozone Concentration at Barrow with Solar Parameters	139
6.2.4	Effects of Pollutants on Atmospheric O ₃ Concentration	139
6.2.5	Impact of Ozone Depletion on Environment	140
6.2.6	Conclusions	142
Section 6.3	Tables, Figures & References	144

Chapter 7

Mid Latitude O₃ Covariation With Derived Solar UV Radiation And Possible Environmental Consequences

Section 7.1	Introduction	150
Section 7.2	Analysis, Discussion and Conclusions	153
7.2.1	Analysis	153
7.2.2	Correlation Between Derived Solar UV Flux and O ₃ Concentration of Mid Latitude Stations: Bucharest and Lauder	154
7.2.3	Conclusions	155
Section 7.3	Tables, Figures & References	157

Chapter 8

Tropical O₃ Deficit at DumDum (India), It's Correlation with Solar UV Radiation and Possible Effects on Biosphere.

Section 8.1	Introduction	168
Section 8.2	Analysis, Discussion and Conclusions	170
8.2.1	Analysis	170
8.2.2	Nature of Variation of O ₃ Concentration at DumDum in India During 1979 to 1998	171
8.2.3	Correlation of O ₃ Concentration at Indian Tropical Station DumDum from Nov'78 to Oct'84 with Various Solar Parameters	172
8.2.4	Correlation of O ₃ Concentration at Indian Tropical Station DumDum During 1987 to 1997 with Analytically Extrapolated Solar UV Flux <i>(Obtained From Table 7.3.1; Chapter 7)</i>	173
8.2.5	Conclusions	173
Section 8.3	Tables, Figures & References	176

Chapter 9**The Subhimalayan Column Ozone Covariation with Meteorological Parameters and It's Possible Impact on Environment at Jalpaiguri**

Section 9.1	Introduction	184
Section 9.2	Analysis, Discussion and Conclusions	186
9.2.1	Analysis	186
9.2.2	Correlation of Total Column O ₃ Concentration at Subhimalayan Station Jalpaiguri with Various Meteorological Parameters	187
9.2.3	The Possible Impact on the Environment at Jalpaiguri	188
9.2.4	Discussion	188
9.2.5	Conclusions	189
Section 9.3	Tables, Figures & References	190

Chapter 10**A Mathematical Derivation of Atmospheric O₃ Concentration at Jalpaiguri, it's Variation and Effect on Environment**

Section 10.1	Introduction	195
Section 10.2	Analysis, Discussion and Conclusions	196
10.2.1	Analysis	196
10.2.2	Variation of O ₃ Concentration at Jalpaiguri During 1979 to 1999	197
10.2.3	Discussion	198
10.2.4	Conclusions	199
Section 10.3	Tables, Figures & References	201

Chapter 11**Summery, Conclusions, Findings and Future Scope of Work**

Section 11.1	Summery and Conclusions	212
Section 11.2	The Findings of Present Dissertation Work	214
Section 11.3	Future Scope of Work	222

Chapter 12

Section 12.1 Bibliography 223

Section 12.2

Appendix

- A- Calculation of Correlation Coefficient Between Daily O₃ Concentration at Halleybay (Antarctica) and Daily Solar UV Flux in the Month of October During 1979 to 1984 245
- B- Calculation of Variable Component and Basic Component of Solar UV Flux for the Month of January 1979 246
- C- Calculation of Correlation Coefficient Between O₃ Concentration at Syowa, Variable Component of Solar UV Flux and Basic Component of Solar UV Flux in Spring (i.e., September & October) During 1979 to 1984 247
- D- Calculation of Variable Component and Basic Component of Solar 10.7 Radio Flux for the Month of January 1979 248
- E- Calculation of Correlation Coefficient Between Monthly Mean O₃ Concentration at Barrow, Monthly Mean Solar UV Flux, and Yearly Mean O₃ Concentration in Autumn During 1979 to 1984 249
- F- Calculation of Solar UV Flux with respect to Relative Sunspot number by Using the Equation 7.2.1.1 250
- G- The Pair of 146 Number of Ozone Data of DumDum and Jalpaiguri, Used for Regression Analysis to Obtain the Equation No.: 10.2.1.1 with the Help of M.S.Excel 252
- H- Some of the Statistical Methods to Analyse the Available Data of Ozone Depletion. 254

Section 12.3

List of Papers Published/Accepted for Publication from the Present Work 259