

## Table of Contents

<b>1. Introduction and Executive Summary .....</b>	<b>1</b>
<b>2. SUV-100 UV Spectroradiometer Instrumentation Description .....</b>	<b>3</b>
2.1. Automated Spectroradiometer Section .....	3
2.2. Operational Requirements .....	5
2.2.1. Installation .....	5
2.2.2. Calibration .....	6
2.3. Specifications .....	7
2.4. Auxiliary Sensors .....	8
2.4.1. TSI (UV-A Band Sensor) .....	8
2.4.2. Eppley Sensors .....	9
2.5. Software .....	10
<b>3. Normal System Operation .....</b>	<b>11</b>
3.1. Scan Schedule .....	11
3.2. Scan Descriptions with Examples .....	12
3.2.1. Data Scan .....	12
3.2.2. Response Scan .....	15
3.2.3. Wavelength Scan .....	15
3.2.4. Absolute Scan .....	17
3.2.5. External Wavelength Scan .....	17
3.3. Calibration and Data Processing Protocols .....	18
3.3.1. Wavelength Calibration and Correction .....	18
3.3.1.1. Wavelength Calibration and Correction with Internal Mercury Scans Implemented for volume 1-6 Data .....	19
3.3.1.2. Wavelength Calibration and Correction by the Fraunhofer- Correlation Method Implemented for Volume 7 Data .....	25
3.3.2. Irradiance Calibration .....	30
3.3.2.1. Interpolation of Values in Certificates of 200-Watt Standards .....	31
3.3.2.2. Calibration of the Response Lamp .....	33
3.3.2.3. Determination of the System Responsivity and Calibration of Solar Data .....	34
3.3.2.4. Comparison of Standards of Spectral Irradiance .....	34
3.3.2.5. Calibration of Spare Lamps .....	37
3.3.3. Biological Dose Calculations .....	38
3.3.4. Sun Angles .....	40
<b>4. Examples of Network Data .....</b>	<b>41</b>
4.1. Noon-time UV Levels in Contrast to Total Column Ozone Data .....	41
4.1.1. McMurdo Station .....	41
4.1.2. Palmer Station .....	45
4.1.3. South Pole Station .....	48
4.1.4. Ushuaia, Argentina .....	51
4.1.5. Barrow, Alaska .....	54
4.1.6. San Diego, California .....	57

4.2. Daily Doses.....	61
4.2.1. McMurdo Station.....	61
4.2.2. Palmer Station .....	64
4.2.3. South Pole Station .....	66
4.2.4. Ushuaia, Argentina .....	69
4.2.5. Barrow, Alaska .....	71
4.2.6. San Diego, California .....	74
4.3. Differences Between Sites .....	76
4.4. UV Irradiance Trends .....	79
4.5. Factors Affecting UV Radiation .....	80
4.6. Amplification of UV Radiation Correlated with Ozone Depletion .....	83
<b>5. Quality Control Summary.....</b>	<b>85</b>
5.1. Advancements.....	87
5.2. McMurdo Station, Antarctica .....	91
5.2.1. Weather Observations.....	94
5.2.2. Ozone Observations.....	94
5.2.3. McMurdo Station 1/11/97-1/18/98.....	95
5.2.3.1. Stability in the Wavelength Domain.....	95
5.2.3.2. Responsivity Stability .....	98
5.2.3.3. Lamp Intercomparison.....	100
5.2.3.4. Missing Data.....	102
5.3. Palmer Station, Antarctica .....	103
5.3.1. Weather Observations.....	105
5.3.2. Ozone Observations.....	106
5.3.3. Palmer Station 4/10/97-4/5/98.....	107
5.3.3.1. Stability in the Wavelength Domain.....	107
5.3.3.2. Responsivity Stability .....	111
5.3.3.3. Lamp Intercomparison and Calibration Events .....	115
5.3.3.4. Missing Data.....	117
5.4. Amundsen-Scott South Pole Station .....	119
5.4.1. Weather Observations.....	120
5.4.2. Ozone Observations.....	120
5.4.3. South Pole 1/16/97-1/8/98.....	122
5.4.3.1. South Pole Volume 7 Offset Problem.....	122
5.4.3.2. Stability in the Wavelength Domain.....	123
5.4.3.3. Responsivity Stability .....	127
5.4.3.4. Lamp Intercomparison.....	130
5.4.3.5. Azimuth Dependency of Volume 7 Data .....	133
5.4.3.6. Catalog of Missing Data .....	135
5.5. Ushuaia, Argentina .....	137
5.5.1. Weather Observations.....	139
5.5.2. Ozone Observations.....	139
5.5.3. Ushuaia 3/25/97-4/19/98 .....	141
5.5.3.1. Stability in the Wavelength Domain.....	141
5.5.3.2. Responsivity Stability .....	144
5.5.3.3. Lamp Intercomparison and Calibration Events.....	150
5.5.3.4. Missing Data.....	152

5.6. Barrow, Alaska USA .....	155
5.6.1. Weather Observations .....	156
5.6.2. Ozone Observations .....	157
5.6.3. Barrow 10/26/95-10/21/97 .....	158
5.6.3.1. Stability in the Wavelength Domain.....	158
5.6.3.2. Responsivity Stability.....	161
5.6.3.3. Lamp Intercomparison.....	163
5.6.3.4. Missing Data .....	164
5.7. San Diego, California USA.....	167
5.7.1. Weather Observations .....	168
5.7.2. Ozone Observations .....	168
5.7.3. San Diego 9/2/97-10/2/98 .....	170
5.7.3.1. Stability in the Wavelength Domain.....	170
5.7.3.2. Responsivity Stability.....	174
5.7.3.3. Lamp Intercomparison.....	181
5.7.3.4. Missing Data .....	186
<b>6. Errata and Data Quality Issues .....</b>	<b>187</b>
<b>7. Acknowledgments.....</b>	<b>191</b>
<b>Appendices .....</b>	<b>193</b>
A1. References .....	195
A2. CD-ROM Format.....	205
A2.1. Volume 1.0 CD-ROM: 1990 Season.....	206
A2.2. Volume 2.0 CD-ROM: 1991 Season.....	206
A2.3. Volume 3.0 CD-ROM: 1992 Season.....	206
A2.4. Volume 4.0 CD-ROM: 1993 Season.....	206
A2.5. Volume 5.0 CD-ROM: 1994-1995 Season.....	207
A2.6. Volume 6.0.a and 6.0.b CD-ROM: 1995-1997 Season .....	207
A2.7. Volume 7.0a and 7.0b CD-ROM: 1997-1998 Season .....	207
A2.8. Directory Structure .....	208
A3. Database Organization.....	209
A3.1. Database 1: Detailed Scan Parameters with AXSS Observations.....	209
A3.2. Database 2: Extracted Wavelength Data .....	210
A3.3. Database 3: Spectral Integrals and Dose Weightings .....	211
A3.4. Database 4: General Interest (short form) .....	213
A3.5. Database 5: Quality Control .....	213
A3.6. Glossary of Database Notation.....	214
A4. Full Resolution Data Format.....	217
A4.1. Format 1A .....	217
A4.2. Format 1B.....	218
A4.3. Format 1C (Volumes 2 and 3 CD-ROM) .....	218
A4.4. Format 1D (Volumes 4, 5 and 6 CD-ROM) .....	218
A4.5. Format 2A (Volume 6 and 7 CD-ROMs) .....	219
A5. Code Fragments for Dose Weightings and Integrations .....	221
A5.1. Spectral (Non-weighted) Integrals.....	221

A5.2.	Dose Weightings .....	222
A5.2.1.	Erythema Dose1.....	223
A5.2.2.	Erythema Dose2.....	223
A5.2.3.	Erythema Dose3.....	224
A5.2.4.	Setlow Dose .....	224
A5.2.5.	Hunter Dose .....	225
A5.2.6.	Caldwell Dose.....	225
A5.2.7.	Weighted TSI (Dose4 .....	226
A6.	Ozone Data .....	227
A6.1.	TOMS Data .....	227
A6.1.1.	The TOMS Ozone Measurement .....	227
A6.1.2.	TOMS Data Format .....	228
A6.1.3.	Contacts for NASA TOMS Data .....	229
A7.	Weather Data .....	231