File Revision Date:
February 11, 2003

Data Set Description:

PI: De la Casiniere Alain
Instrument: UV Sperctrometer (JYDH10 system)
Site: Briançon, France (44.90N, 6.65E, 1310m) Sept. 1999.

Measurement Quantities:
Spectral irradiance on a horizontal surface (cosine weighted) of UV 280-450 nm at 0.75 nm resolution (FWHM). Scans are taken at intervals of 0.5 hours from sunrise to sunset.

The data summaries on the NDSC database include the following:

1. 280-400 nm integral
2. UVA, 315-400 nm integral
3. UVB, 280-315 nm integral
4. Erythemal UV
5. Derived ozone (from ratio 305/340 nm intensity)

Contact Information:

Name: A. De la Casiniere
Address: Universite Joseph Fourier, IRSA, 17, quai Claude Bernard, 38000, Grenoble, France
Phone: (+33)-476-575-050
FAX: (+33)-476-575-026
Email: Alain.de-la-Casinieree@ujf-grenoble.fr

Reference Articles:
Refereed journals.

Bais, A. F., S. Madronich, J. Crawford, S. Hall, B. Mayer, M. VanWeele, J. Lenoble, J. Calvert, C. Cantrell, R. Shetter, A. Hofzumahaus, P. Koepke, P. Monks, G. Frost, R. McKenzie, N. Krotkov, A. Kylling, W. H. Swartz, S. Lloyd, G. Pfister, T. Martin, P. Roeth, E. Griffioen, A. Ruggaber, M. Krol, A. Kraus, G. Edwards, M. Mueller, B. Lefer, P. Johnston, H. Schwander, D. Flittner, B. G. Gardiner, J. Barrick, R. Schmitt, International photolysis frequency measurement and model intercomparison : spectral actinic solar flux measurements and modelling, J. Geophysical Res., accepted, 2003

Smolskaia, I., D. Masserot, J. Lenoble, C. Brogniez, A. de la Casiniere, Retrieval of the UV effective snow albedo during 1998 winter campaign in the French Alps, Applied Optics, Vol. 42 (9), 20 March 2003

Lenoble,J., T. Martin, M. Blumthaler, R. Philipona, A. Albold, T. Cabot, A. de La Casinière, J. Gröbner, D. Masserot, M. Müller, T. Pichler, G. Seckmeyer, D. Schmucki, M. L. Touré, A. Yvon, Retrieval of the ultraviolet aerosol optical depth during a spring campaign in the Bavarian Alps, Applied Optics, 41, 9, 1629-1639, 2002

Masserot, D., J. Lenoble, C. Brogniez, M. Houet, N. Krotkov, and R. McPeters, Retrieval of ozone column from global irradiance measurements and comparison with TOMS data. A year of data in the Alps, Geophysical Research Letters, 29, 10.1029/2002GL014823, 2002

de La Casinière, A., Towards a watching of the UV solar spectrum in France - Vers un suivi du spectre solaire ultraviolet en France, Lettre pigb-pmrc France, 13, 63-69, février 2002

de La Casinière, A., M. L. Touré, D. Masserot, T. Cabot, and J. L. Pinedo Vega, Daily doses of biologically active UV radiation retrieved from commonly available parameters, Photochemistry and Photobiology, accepted, August 2002

Gröbner, J., D. Rembges, A. F. Bais, M. Blumthaler, T. Cabot, W. Josefsson, T. Koskela, T. M. Thorseth, A. R. Webb, and U. Wester, Quality assurance of reference standards from nine European solar-ultraviolet monitoring laboratories, Applied Optics, 41, 21, 4278-4282, July 2002

de La Casinière, A., T. Cabot, M. L. Touré, D. Masserot, Method for correcting the wavelength misalignment in measured UV spectra, Applied Optics 40 (33), 6130-6135, 2001

Masserot, D., C. Brogniez, T. Cabot, A. de La Casinière, F. Disson, M. Houët, J. Lenoble, M. L. Touré, J. L. Pinedo Vega, Ozone retrieval from ground based spectral UV irradiance measurements at two French stations, IAMAS Assembly, Innsbrück, Austria, 10-18 July 2001

Touré, M.L., D. Masserot, M. Houët, C. Brogniez, T. Cabot, A. de La Casinière, F. Disson, J. Lenoble, Climatology of spectral UV radiation and cloudiness impact from two French stations, IAMAS Assembly, Innsbrück, Austria, 10-18 July 2001

Weihs, P., J. Lenoble, M. Blumthaler, G. Seckmeyer, R. Philipona, A. de La Casinière, C. Sergent, T. Martin, J. Gröbner, T. Cabot, D. Masserot, D. Schmucki, S. Simic, G. Rengarajan, Effective surface albedo due to snow cover of the surrounding area, SPIE's 46th Annual Meeting, San Diego, California USA, 29 July-03 August 2001

Weihs, P., T. Martin, G. Seckmeyer, D. Schmucki, R. Philipona, C. Sergent, E. Pougatch, M. Blumthaler, J. Gröbner, A. de La Casinière, T. Cabot, J. Lenoble, D. Masserot, S. Simic, G. Rengarajan, A. Albold, T. Pichler, M. Mueller, Modelling the effect of an inhomogeneous surface albedo on incicent UV radiation in mountainous terrain : determination of an effective surface albedo, J. Geophysical Res. 28 (16), 3111-3114, 2001

Gröbner, J, A. Albold, M. Blumthaler, T. Cabot, A. de La Casinière, J. Lenoble, T. Martin, D. Masserot, M. Müller, R. Philopona, T. Pichler, E. Plougatch, R. Rengarajan, D. Schmucki, G. Seckmeyer, C. Sergent, M. L. Touré, and P. Weihs, Variability of spectral solar ultraviolet irradiance in an Alpine environment, J. Geophysical Res., 106, D22, 26991-27003, 2000

Lenoble, J., 2000: Influence of environment reflectance on UV zenith radiance for cloudless sky. Appl. Optics, 39, 4247-4254.

Pachart, E., J. Lenoble, C. Brogniez, D. Masserot, J.L.Bocquet, 2000: Consistency tests on UV spectral irradiance measurements using modeling and broadband instruments. J. Geophys. Res., 105, 4851-4856.

Lenoble, J., Influence of the environment reflectance on the ultraviolet zenith radiance for cloudless sky, Applied Optics 39 (24), 4247-4254, 2000

Pachart, E., J. Lenoble, C. Brogniez, D. Masserot, J.L. Bocquet, 1999 : Ultraviolet spectral irradiance in the french Alps. Results of two campaigns. J.Geophys. Res., 104, 16777-16784.

Van Weele, M., T.J. Martin, M. Blumthaler, C. Brogniez, P.N. den Outer, O. Engelsen, J. Lenoble, B. Mayer, G. Pfister, A. Ruggaber, , B. Walravens, P. Weihs, B.G. Gardiner, D. Gillotay, D. Haferl, A. Kylling, G.Seckmeyer, W.M.F. Wauben, 2000: From model intercomparison towards benchmark UV spectra for six real atmospheric cases. J.Geophys. Res., 105, 4915-4926.

Bais, A. F.,B. G. Gardiner, H. Slaper, M. Blumthaler, G. Bernhard, R. McKenzie, A. R. Webb, G. Seckmeyer, B. Kjeldstad, T. Koskela, P. Kirsch, J. Gröbner, J. B. Kerr, S. Kazadzis, K. Leszczynski, D. Wardle, C. Brogniez, W. Josefsson, D. Gillotay, H. Reinen, P. Weihs, T. Svenoe, P. Eriksen, F. Kuik, A. Redondas : The SUSPEN intercomparison of ultraviolet spectroradiometers. J. Geophys. Res.(accepted).

Other journals.
Lenoble, J., C. Sergent, 2000: Etude du rayonnement ultraviolet dans les Alpes. Neige et Avalanches, N° 90, Juin 2000, 20-23.

Masserot, D., J.L. Bocquet, J. Lenoble, C. Brogniez, M. Barnéoud-Rousset, 2000: Résultats d'une campagne hivernale de mesures du rayonnement ultraviolet (UV) en milieu alpin (Briançon-février 1998). Nouvelles dermatologiques, 19, 445-450.

Proceedings.
Bocquet, J. L., E. Pachart, C. Brogniez, J. Lenoble, D. Gillotay, D. Bolsée, 1997: Measurements of UV-B spectral irradiance. Beginning of a regional network. IRS'96 : Current Problems in Atmospheric Radiation, W.L. Smith and K. Stamnes, Edits., A. Deepak Publishing, 888-891.

de La Casinière, A., J. Lenoble, D. Masserot, C. Brogniez, T. Cabot, UV spectral irradiance. Results of campaigns. Beginning of a French network, in IRS 2000 : Current Problems in Atmospheric Radiation, Proceedings of the International Radiation Symposium (W. L. Smith and Y. M. Timofeyev Eds), Deepak publishing, pp 1169-1172, St Petersburg Russia 24-29 July 2000

Gröbner, J, M. Blumthaler, A. de La Casinière, J. Lenoble, R. Philipona, G. Seckmeyer and P. Weihs, Solar UV irradiance variability characterized by simultaneous spectrometry, Proceedings of the Quadrennial Ozone Symposium , Sapporo, Japan, 3-8 July 2000

Pachart, E., J. Lenoble, C. Brogniez, J. L. Bocquet, P. Wang, 1997: Modelling of UV-B irradiance. omplementarity with measurements. IRS'96: Current Problems in Atmospheric Radiation, W.L. Smith and K. Stamnes, Edits., A. Deepak Publishing, 855-858.

Blumthaler, M., J. Gröbner, A. de la Casinière, J. Lenoble, R. Philipona, G. Seckmeyer, P. Weihs: Characteristics of the UV radiation field in the Alps. Proceedings IRS'2000, St. Petersburg, July 2000, to appear.

de la Casinière, A., J. Lenoble, D. Masserot, C. Brogniez, T. Cabot: UV spectral irradiance. Results of campaigns. Beginning of a French network. Proceedings IRS'2000,St. Petersburg, July 2000, to appear.

Gröbner, J., M. Blumthaler, A. de la Casinière, J. Lenoble, R. Philipona, G. Seckmeyer, P. Weihs: Solar UV irradiance variability characterized by simultaneous spectroradiometry. Proceedings of the Quadrennial Ozone Symposium, Sapporo, Japan, 3-8 July 2000, to appear.

Weihs, P., S. Simic, G. Rengarajan, T. Martin, G. Seckmeyer, D. Schmucki, R. Philipona, C. Sergent, M. Blumthaler, J. Gröbner, A. de la Casinière, T. Cabot, J. Lenoble, D. Masserot: Modelling the effect of an inhomogeneous surface albedo on incident UV in mountainous terrain; determination of an effective surface albedo. Proceedings IRS'2000, St. Petersburg, July 2000, to appear.

Thesis.
Wang, P., 1995: Modélisation et mesure du rayonnement solaire ultraviolet. Thèse Universté des Sciences et Technologies de Lille, France, No 1484.

Pachart, E., 1997: Mesures et modélisation du rayonnement ultraviolet au sol. Thèse Université des Sciences et Technologies de Lille, France, No 2148.

Instrument Description:
Cosine response error is 11%, instead of 5%, at SZA=60 degrees.

Data are cosine corrected.
Global and diffuse spectral irradiances are modeled for clear sky at several Solar Zenith Angle (SZA), assuming that sky radiance is isotropic. The cosine correction (CC)is defined as:
$CC(sza) = 1/ [R(sza) [1-p(sza)] + p(sza) D]$
Where

R	Cosine response
p	ratio of diffuse to global irradiances
D	Correction on diffuse irradiance as defined by Grainger (1993)

A polynomial form of cosine correction has then been developped depending only on SZA. Since SPUV01 and 02 spectroradiometers measure only global irradiance, the fraction of diffuse irradiance is unknown. This fraction is the main source of uncertainties that could reach up to 5% for SZA over 20 degrees.

Up to Dec 2001 Cosine response error was 11%, instead of 5%, at SZA=60 degrees.

From Dec 2001 to present Cosine response error is less than 5%, at SZA=75 degrees.

References:

Grainger R.G., Reid E. Basher, Mc Kenzie R.L., UV-B Robertson-Berger meter characterization and field calibration, Applied Optics, Vol. 32, No. 3, Jan 1993.

Pachart E., Lenoble J., Brogniez C., Masserot D., Bocquet J.L., Consistency tests on UV spectral irradiance measurements using modeling and a broadband instrument, JGR, Vol. 105, No D4, Feb. 2000.

Wavelength error is corrected with ShicRIVM program. Residual shift is lower than 0.02 nm in the UV range, except in the range 325-345 nm

Sampling step is 0.5 nm somewhat larger than 0.5xFWHM (0.35 nm)

Slit function.
specification of 10-3 at 2.5 FWHM is reached
specification of 10-5 at 6 FWHM not achieved

Absolute calibration uncertainties
Lower than 10%.

Only global irradiance is measured.

Algorithm Description:

Acquisition program works under SPECTRAMAX 1.1d from J&Y
Current Macro version is Solar4.a

Setup Acquisition defined by calibration.
Selection of calibration and reference irradiance files specified in above file
Dark noise and straylight during calibration removed.
Reference irradiance interpolated (cubic spline) at calibrated wavelengths.
Measuring setup checked.
Dark noise and straylight during measurement removed.
Signal converted into irradiance
Wavelength shift calculated with SHICRIVM program (version 2.7).
Wavelength shift corrected.
Spectral irradiance interpolated (cubic spline) at original wavelengths.

Instrument History:

Mar 1999 First measurements during CUVRA campaign (Garmisch-PartenKirschen, Germany)
Jul 1999 Acquisition system modified (Datascan -> Spectralink)
Sep 1999 Measurements at Briançon began
Jan 2000 Setup acquisition modified (solar02.scn ->solar04.scn)
Dec 2001 Heating system improved

Jan 2002 Diffuser changed
Ago 2002 New diffuser with 3m optical fiber installed

The data processing algorithm has undergone many revisions, which will continue.