Atmos. Meas. Tech. Discuss., 3, C2819–C2822, 2011
www.atmos-meas-tech-discuss.net/3/C2819/2011/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Influence of the calibration on experimental UV index at a midlatitude site, Granada (Spain)" *by* M. Antón et al.

M. Antón et al.

mananton@unex.es

Received and published: 23 February 2011

(* Reviewer comment, ++ Our response)

* 1. In section 2.2 could you specify the value and features of the surface albedo you used in the model input? Could you also add information about the standard profiles you used in the model (i.e. ozone and aerosol profiles)? Could you estimate the error in the UVI derived from the model calculation?

++ Thank you for your questions. Regarding the surface albedo, we use a fixed value of 0.035. In addition, the standard profiles used in the model input correspond with the

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

standard atmosphere midlatitude summer (afglms), and midlatitude winter (afglmw) given by Anderson et al. (1986). These profiles comprise 50 levels between 0 and 120 km. For aerosol, we use the spring-summer and fall-winter profiles given by Shettle (1989). All this information has been added in the text (Subsection 2.2): "We implemented the UVSPEC model using standard profiles from the standard atmosphere midlatitude summer (afglms), and midlatitude winter (afglmw) which comprise 50 levels between 0 and 120 km (Anderson et al., 1986). In all simulations, cloud-free conditions are assumed, with a surface albedo of 0.035. For aerosol, the appropriated spring-summer and fall-winter profiles given by Shettle (1989) were used." The following reference has been included in the Reference List: - Anderson, G., Clough, S., Kneizys, F., Chetwynd, J., and Shettle, E.: AFGL atmospheric constituent profiles (0–120 km), Tech. Rep. AFGL-TR-86-0110, Air Force Geophys. Lab., Hanscom Air Force Base, Bedford, Mass., 1986. - Shettle E. P.: Models of aerosols, clouds and precipitation for atmospheric propagation studies', in AGARD Conference Proceedings No. 454, Atmospheric propagation in the uv, visible, ir and mm-region and related system aspects, 1989. Regarding the error in the UVI derived from the UVSPEC/LibRadtran model, it is not possible to give an approximated estimation since this model (and all RT models) is influenced by errors in the measurement of the input quantities (linked with extraterrestrial spectrum, the surface albedo, the solar zenith angle, the total ozone column and the characteristics of clouds and aerosols). Therefore, it is necessary to know the errors in all these input quantities to provide a correct estimation of error in the UVI from UVSPEC. Using standard uncertainties of the input quantities, Cordero et al. (2007) showed that the uncertainty of the irradiance in the UV-B part of the spectrum given by UVSPEC was strongly influenced by the uncertainty attributed to the ozone column data and aerosol properties. - Cordero, R.R., GSeckmeyer, D. Pissulla, L. Dasilva, F. Labbe: Uncertainty evaluation of the spectral UV irradiance evaluated by using the UVSPEC radiative transfer model, Optics Communications, 276, 44–53, 2007.

* 2. In section 3.2 and 3.3 you compare Brewer erythemally integrated irradiance and UVB-1 radiometer output obtained during the campaign in 2007. The UVB-1 calibration

AMTD

3, C2819–C2822, 2011

factors based on the one-step method depend on the accuracy in the Brewer calibration factors. Could you estimate this accuracy and give some comment about that?

++ We agree with the reviewer in that the uncertainties of Brewer measurements must be indicated in the work. In addition, we think that a description of the Brewer spectrophotomer used as reference instrument in our work must also be included in the text. Thus, we have added the following new information in the Subsection 2.1: "In this work, we have used a Brewer MK-III double monochromator spectrophotometer as reference instrument in order to obtain the calibration factors of the UVB-1 radiometer. This spectrophotometer is located at El Arenosillo (Huelva, Spain) and it measures spectral global UV irradiance between 290 and 363 nm with spectral resolution (FWHM) $\sim$0.6 nm, and wavelength accuracy of 0.05 nm. Besides the everyday tests performed with the internal lamps, this Brewer spectrophotometer is periodically calibrated by comparison with a quartz-halogen NIST-traceable standard lamp (1000W DXW type) with an uncertainty of 1.56% at 250 nm and 1.12% at 350 nm. This calibration transfer produces systematic uncertainties of $\pm$5% in the Brewer spectral irradiance measurements (Vilaplana, 2004). In addition, the Brewer instrument used in this work is also periodically intercompared with respect to the transportable Quality Assurance of Spectral Ultraviolet Measurements in Europe (QASUME) spectroradiometer (European irradiance reference) (Gröbner et al., 2006)."

The following references have been included in the Reference List: - Vilaplana, J. M.: Measurement and analysis of ozone and UV solar radiation at El Arenosillo-INTA (Huelva, Spain) (in Spanish). Ph.D. thesis, Universidad de Valladolid, Valladolid, Spain, 247 pp., 2004. - Gröbner, J., Blumthaler, M., Kazadzis, S., Bais, A., Webb, A., Schreder, J., Seckmeyer, G., Rembges, D.: Quality assurance of spectral solar UV measurements: result from 25 UV monitoring sites in Europe, 2002 to 2004. Metrologia, 43, S66–S71, 2006.

* 3. Your work refer to the 2007 campaign. Does the calibration coefficients showed any changes during the period 2007-today? How your results would be affected by this

AMTD

3, C2819–C2822, 2011

change? Could you give a quantitative estimate of this difference?

++ Several works have shown the high stability of YES UVB-1 radiometers if they are properly maintained, especially in regard to the periodic replacement of the desiccant. For instance, Bigelow et al. (1998) analyzed the long term calibration stability of the US government's UV monitoring network over a four year period, indicating that the stability of UVB-1 instruments was outstanding. Our UVB-1 radiometer took part in a calibration campaigns in September 2007 at El Arenosillo (Spain). A new calibration campaign of broadband UV radiometers will take place in July 2011 at El Arenosillo-. Thus, we will be able to estimate the real stability of our UVB-1 radiometer for the period 2007-2011. We have added the following comment in the text (Subsection 2.1): ""Several works have shown the high stability of YES UVB-1 radiometers if they are properly maintained, especially in regard to the periodic replacement of the desiccant. For instance, Bigelow et al. (1998) analyzed the long term calibration stability of the US government's UV monitoring network over a four year period, showing that the UVB-1 instruments are quite stable."

The following reference has been included in the Reference List: - Bigelow, D.S., J. R. Slusser, A. F. Beaubien, and J. H. Gibson: The USDA Ultraviolet Radiation Monitoring Program, Bulletin of the American Meteorological Society, 79, 601-615, 1998.

* 4. Minor comments Page 5657 Line 6: change "manufacturer' " with "manufacturer's" Figure 6 at Page 5670: change "manufacturer' " with "manufacturer's" P5663 L4: there are two double-dots, please replace with one. ":: => :"

++ This minor errors have been corrected.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 5645, 2010.