Table 1: List of participating agencies and their acronyms.

Acronym	**Agency full name**
ARPA Valle d'Aosta	Regional Environmental Protection Agency of Aosta Valley
ARPA Piemonte	Regional Environmental Protection Agency of Piedmont
ARPA Puglia	Regional Environmental Protection Agency of Apulia
Sapienza Univ. Roma	Sapienza – University of Rome
CNR-IBIMET	Italian National Research Council - Insitute of biometeorology
LaMMa	Laboratory for the environmental monitoring and modeling for a sustainable development
CNR-ISAC	Italian National Research Council - Institute of Atmospheric Sciences and Climate
ENEA	Italian National Agency for new technologies, energy and sustainable economic development
ARPA Lazio	Regional Environmental Protection Agency of Latium
APPA Bolzano	Provincial Environmental Protection Agency of Bolzano

Table 2: Instruments and agencies participating to the comparison campaign. The institute to which the measurements are traceable is stated (in parentheses, the name of the reference instrument or facility through which the traceability is reached). The traceability was specified for the model, too, since some parameters were fixed with reference to Bentham 5541.

Id	**Agency**	**Instrument**	**Ser. Num.**	**Type of meas.**	**Traceability**	**Calib. date**	**Corrections**	**Temp. stab.**
00	ARPA Valle d'Aosta	Bentham DTMc300F	5541	Spectral irr.	PTB (QASUME)	2010	SHICrivm	Y
01	ARPA Valle d'Aosta	Kipp&Zonen UV-S-AE-T	000526	Broadband irr. (UV-A, UV-E)	PTB (Bentham 5541)	2010	Spectral, angular (matrix)	Y
02	ARPA Valle d'Aosta	Kipp&Zonen UV-S-AE-T	040618	Broadband irr. (UV-A, UV-E)	PTB (Bentham 5541)	2010	Spectral, angular (matrix)	Y
03	ARPA Valle d'Aosta	Yankee Env. Syst. UVB-1	020528	Broadband irr. (UV-E)	PTB (Bentham 5541)	2010	Spectral, angular (matrix)	Y
04	ARPA Piemonte	Kipp&Zonen UV-S-AE-T	080003	Broadband irr. (UV-A, UV-E)	NIST (Kipp&Zonen)	2009	Spectral, angular (matrix)	Y
05	ARPA Puglia	Kipp&Zonen UV-S-AE-T	080005	Broadband irr. (UV-A, UV-E)	NIST (Kipp&Zonen)	2009	Spectral, angular (matrix)	Y
06	Sapienza Univ. Roma	Yankee Env. Syst. UVB-1	970827	Broadband irr. (UV-E)	PTB (QASUME)	2006	Spectral, angular (matrix)	Y
07	CNR-IBIMET/ LaMMa	Solar Light 501A	5790	Broadband irr. (UV-E)	PTB (QASUME)	2008	None (abs. factor)	Y
08	ENEA and ARPA Lazio	Solar Light 501A	13126	Broadband irr. (UV-E)	NIST (Brewer #123)	2010	Spectral, angular (Bodhaine et al., 1998)	Y
09	APPA Bolzano	Solar Light digital 501	3733	Broadband irr. (UV-A)	NIST (Solar Light)	2010	Spectral (fixed factor)	Y
10	APPA Bolzano	Solar Light digital 501	2717	Broadband irr. (UV-E)	NIST (Solar Light)	2010	Spectral (fixed factor)	Y
11	ARPA Valle d'Aosta	Kipp&Zonen Brewer MKIV	66	Total ozone and spectral irr.	PTB (QASUME)	2010	Angular, straylight, temperature, SHICrivm	N
12	CNR-ISAC	ISAC UV-RAD filter rad.	N.A.	Narrowband irr. (7 ch.)	PTB (Bentham 5541)	2006	None	Y
13	ENEA and ARPA Lazio	ENEA F-RAD 02 filter rad.	N.A.	Narrowband irr. (13 ch.)	NIST (Brewer #123)	2010	None	Y
14	ARPA Valle d'Aosta	libRadtran 1.5 (model)	N.A.	Spectral irr.	PTB (Bentham 5541)	2008-2010	N.A.	N.A.

Table 3: Input parameters to the radiative transfer model.

Parameter	**Value**
Solar spectrum	Atlas-3 (shifted to air wavelengths)
Atmosphere	Standard midlatitude summer
Aerosol properties	Shettle profile, rural type, background stratospheric
SSA	Default reduced by 10 %
Angstrom parameters	Brewer measurements
Ozone cross sections	Molina&Molina 1986
Number of streams	12
Altitude	570 m a.s.l.
Total ozone	Brewer measurements
Effective ground albedo	3 %
Local pressure	950 hPa
Solver	Pseudospherical disort (sdisort)
Convolution	Triangular slit function (FWHM 1 nm)

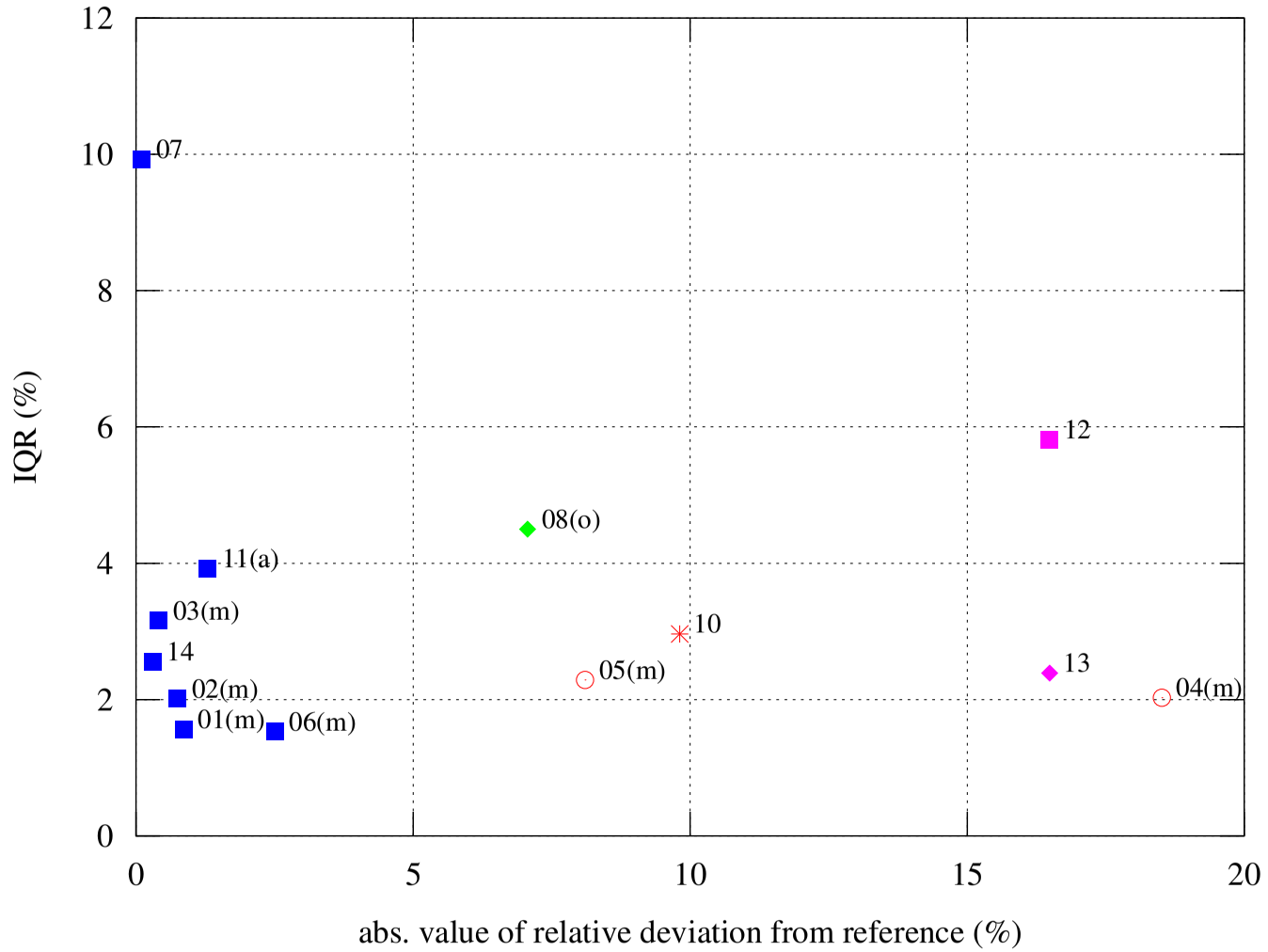

Figure 1: Summary of the overall performances of the radiometers during clear sky days. Only results relative to the UV Index are shown. The horizontal axis represents the absolute value of the relative difference between the instruments and the reference (median of the ratios of previous graphs, minus unity). The vertical axis represents the IQR distance.The shape of the markers refers to the traceability: NTP through QASUME or Bentham 5541 (squares), NIST through Kipp&Zonen facility (circles), NIST through Yankee Env. Systems facility (asterisk), NIST through ENEA Brewer #123 (diamonds). The letters beside the id numbers mark the correction methods to the measurements: spectral-angular matrix (m), only angular correction (a), other corrections (o) and fixed coefficient or no correction at all (no markers). Colours are used to identify instruments with similar characteristics (see text).

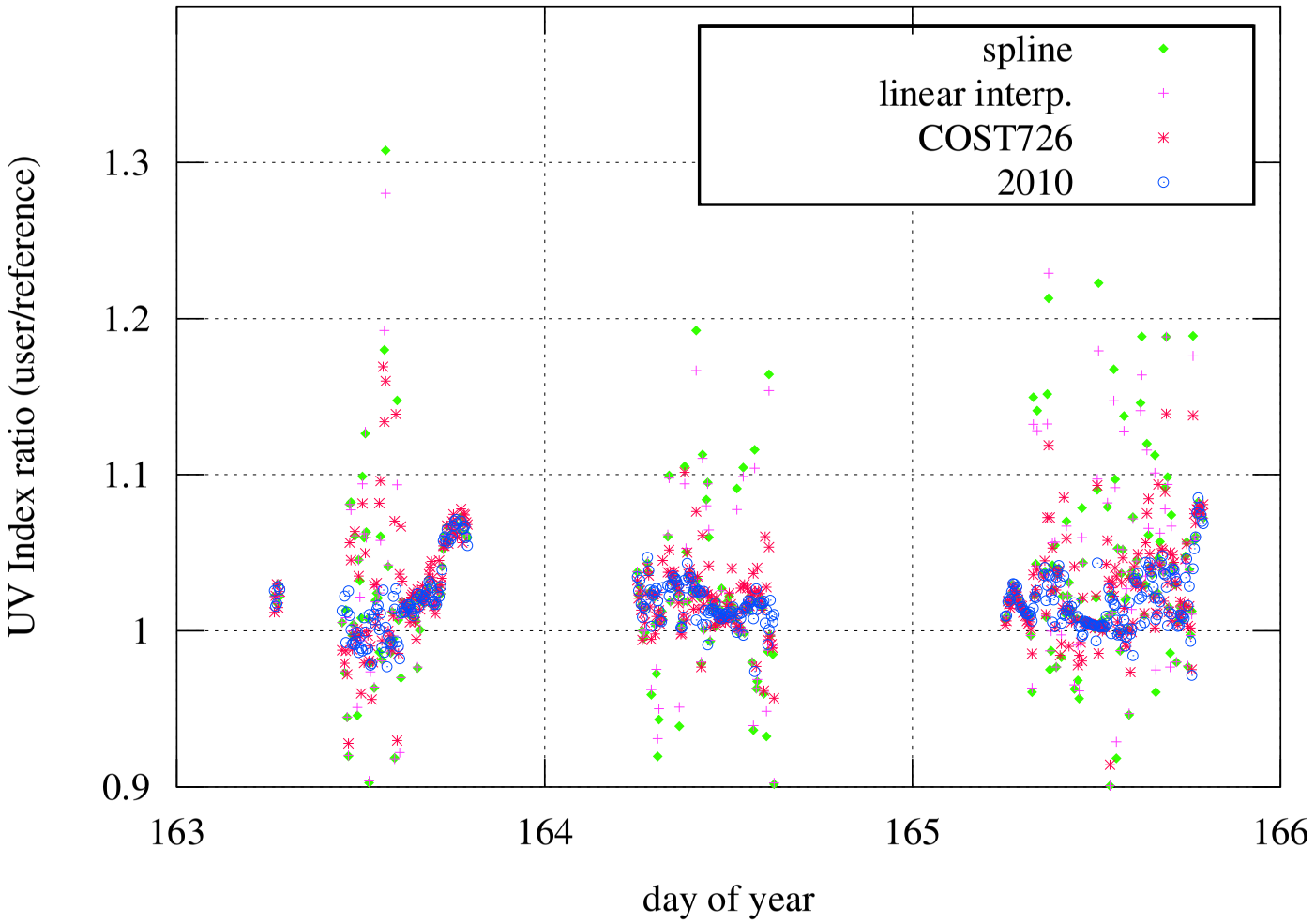

Figure 2: Comparison of several methods to downscale the broadband data. The graph shows the ratio of the broadband irradiance measured with instrument 01 and the reference during three cloudy days. Cubic spline interpolation is represented with green diamonds, simple linear interpolation with pink crosses, the COST Action 726 algorithm with red asterisks and the algorithm used in this study with blue circles.

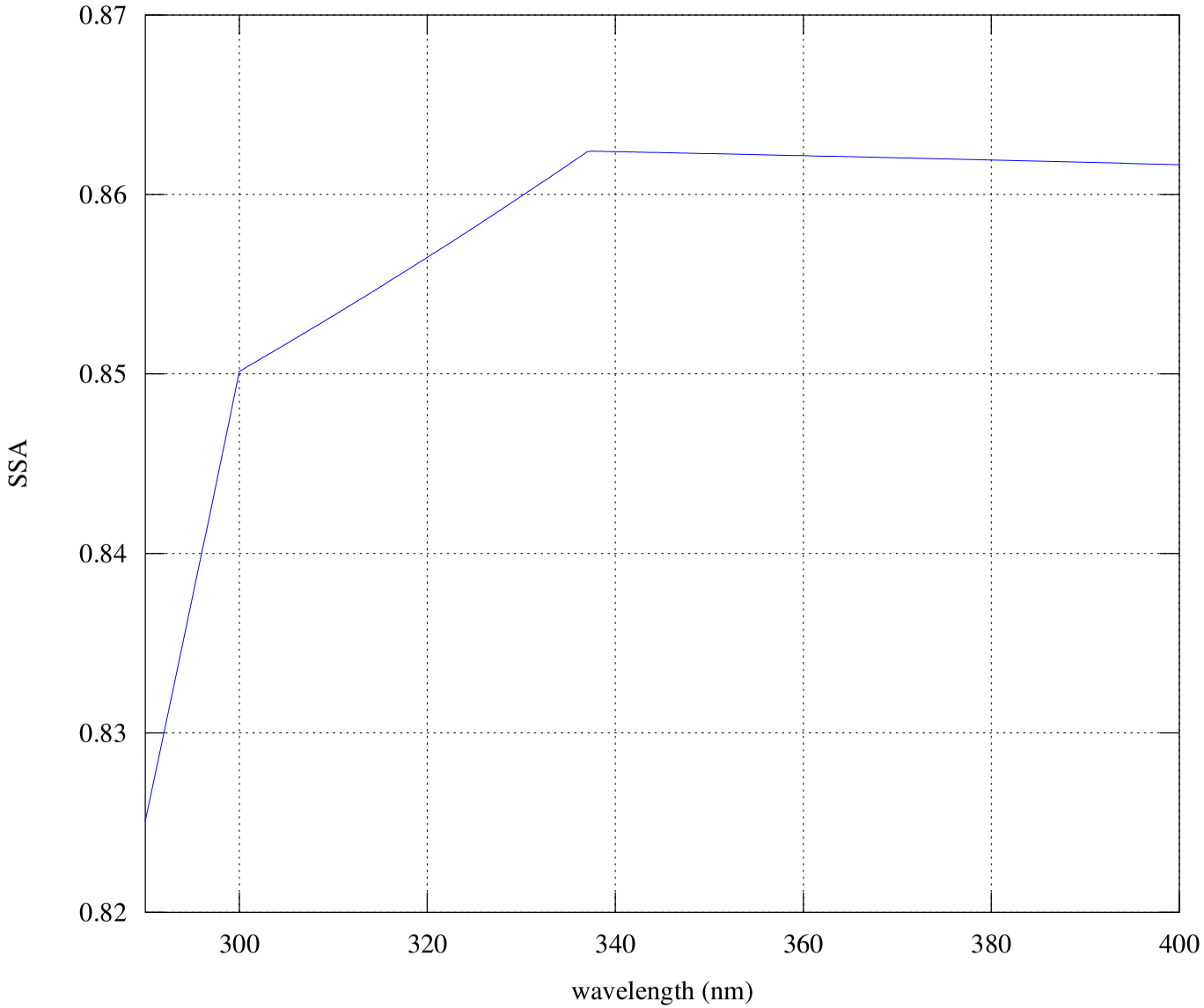

Figure 3: Spectral single scattering albedo used in the radiative transfer model, scaled as described in the paper.

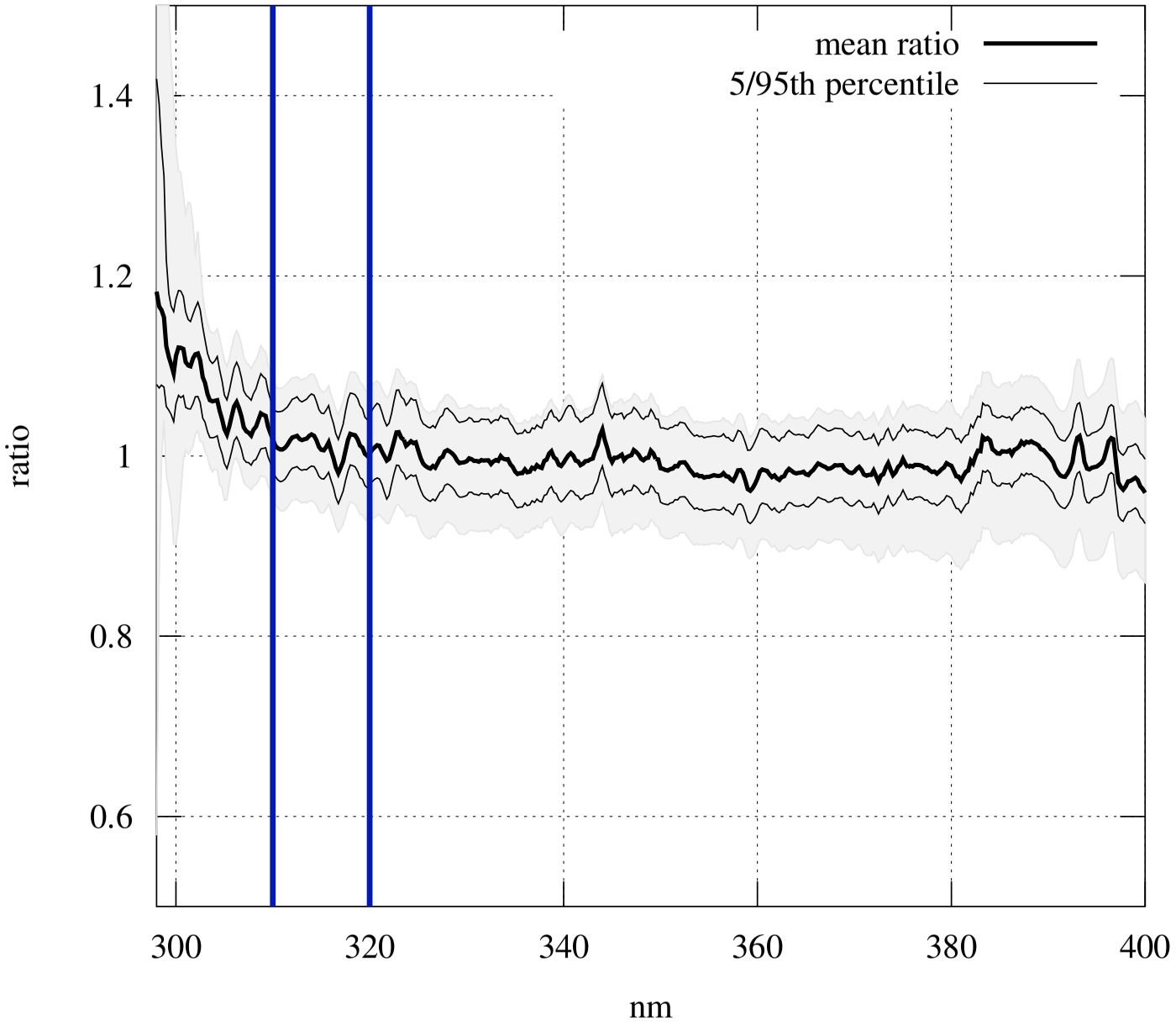

Figure 4: Spectral ratios between model irradiance, using Bass&Paur cross-sections, and reference spectra for clear-sky days. The blue vertical bars represent the Brewer (direct-sun) ozone measurement range.

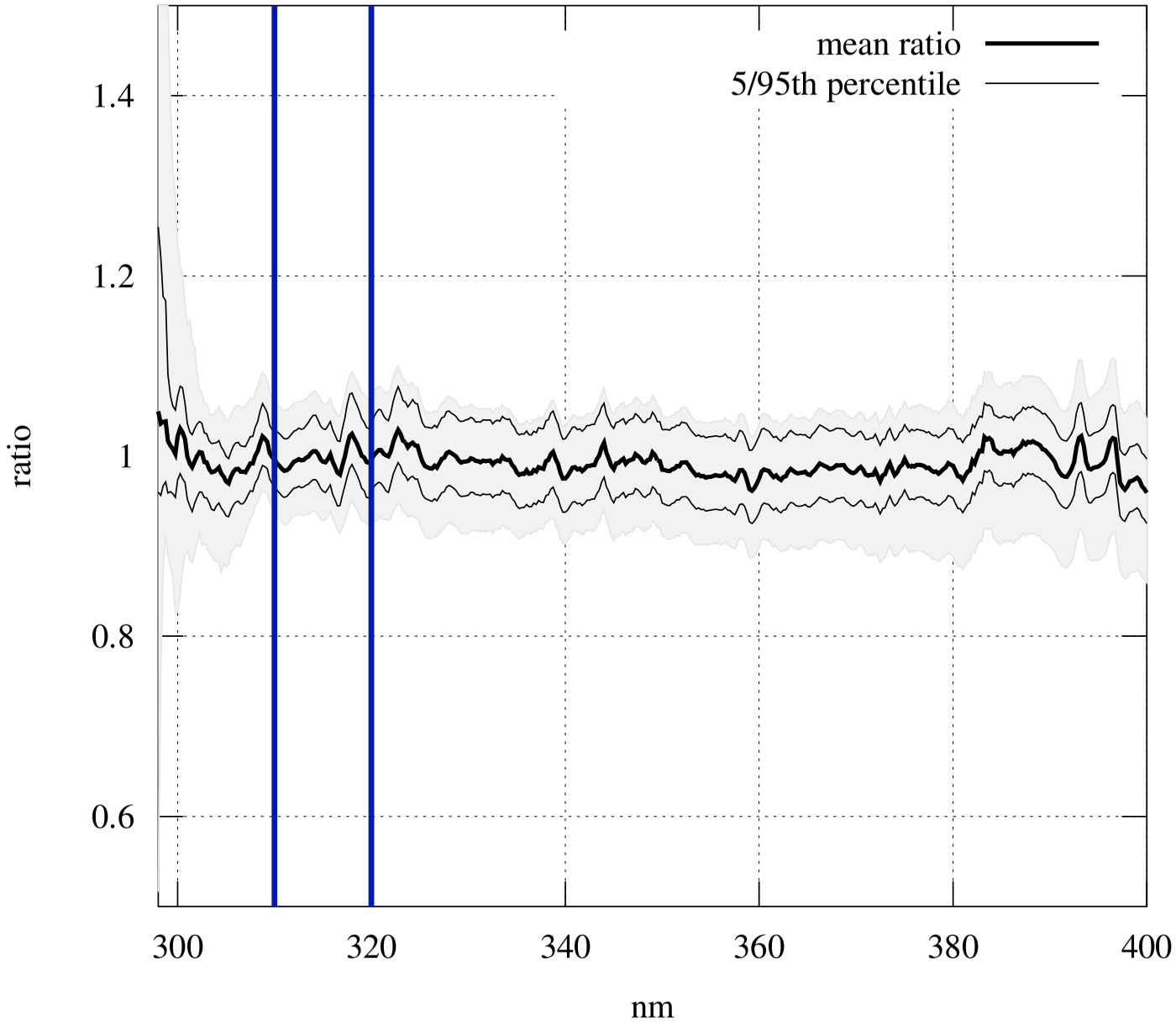

Figure 5: Spectral ratios between model irradiance, using Molina&Molina cross-sections, and reference spectra for clear-sky days. The blue vertical bars represent the Brewer (direct-sun) ozone measurement range.