**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "NO$_2$ and HCHO photolysis frequencies from irradiance measurements in Thessaloniki, Greece" *by* C. Topaloglou et al.

C. Topaloglou et al.

Received and published: 18 April 2005

Response to Referee 1

MS-NR:acpd-2005-0046 Title: NO2 and HCHO photolysis frequencies from irradiance measurements in Thessaloniki, Greece. Author(s): C. Topaloglou, S. Kazadzis, A. Bais, M. Blumthaler, B. Schallhart, and D. Balis

Regarding the unbalanced discussion on J(NO2) and J(HCHO): Figure 1 was corrected and the HCHO information was added as recommended. A new figure (8) was added describing the methodology of the J(HCHO) polynomial retrieval as it has already been done for J(NO2ňň) in order to improve the balance between the treatment of the pho-

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

EGU

tolysis rates that are under discussion. Also, a figure (2b) was added describing the actinic flux to global irradiance variability versus solar zenith angle for 325 nm. A sentence was added to the text in the HCHO section: "In the wavelength range of interest for the two reactions of HCHO (Fig.1) the variability of the actinic to global ratio versus the solar zenith angle is smaller than the one at 390nm as it is shown in Fig. 2b."

Regarding the aerosol optical properties information: Differences in the aerosol optical properties of different site can affect the implementation of the method for one site to another. However the relation of actinic to global irradiance and the polynomial retrieval are mostly affected from the amount of clear versus cloudy cases at each solar zenith angle bin that was used in this method. In any case, since more information about the aerosol properties of the two sites are not available, the only discussion presented in the text is that Thessaloniki is a urban site and Buchhofen a rural area.

Regarding the transportability of J(HCHO) and the NO2 - HCHO balance in the text: A figure (10) was added demonstrating the transportability of the J(HCHO) as it has been done for J(NO2) as recommended.

Regarding the J(O1D) : The J(O1D) case was examined in the previous paper from Kazadzis et al., 2004. The method used was similar with this for HCHO. [Associating the independent from ozone ratio of J /Jpseudo (where Jpseudo values calculated by global irradiance) to the irradiance at 360nm (or 325nm)]. More figures describing the J(O!D) retrieval method were not included to avoid repetitions.

Regarding figure 6: Figure 6 describes only data from Brewer MKIII (the double monochromator) calculated with the two versions of the method, using 360nm and 325nm, to examine the validity of the method itself when using different wavelengths as an independent variable without adding any differences of the instruments' themselves in the overall uncertainty. The text was corrected and a sentence was added: "The results for the use of both wavelengths (360nm and 325nm) from the Brewer double monochromator data are presented in Fig.6." General comment concerning

Jpseudo: A paragraph was added in the text to explain the choice of the J(NO2) instead of J(NO2)/J(pseudo) parameterization as a function of Irradiance and solar zenith angle.

"Alternatively, using global irradiance instead of actinic flux in formula (8), a series of pseudo NO2 photolysis frequencies (Jpseudo) were produced and the ratio J(NO2) / Jpseudo as a function of the global irradiance integral (E375-400) was examined. 3rd degree polynomials J(NO2)/Jpseudo = f(E375-400) were retrieved, and their application showed similar results to those derived from the first method described. (Their average ratio was 1.002ś0.100 (2std) including all solar zenith angles). This technique is similar to the J(O1D) analysis presented in Kazadzis et al., 2004, (using J(O1D)/Jpseudo ratio and irradiance at 325nm) so the implementation of this method for J(NO2) data using the integral of the irradiance (E375-400) and solar zenith angle is also described. The advantage of using the first method described, directly retrieving J(NO2) from global irradiance, is that input optic spectroradiometers having upper wavelength limits lower than 420nm, (e.g. Brewer single and double spectroradiometers) can be used, as it is described in section 3.3. "

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 1619, 2005.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

EGU