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Retrieval of Photolysis Frequencies of Ozone, Nitrogen Dioxide and Formaldehyde from UV Irradiance Measurements

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An empirical approach for the retrieval of O_3, NO_2 and HCHO photolysis frequencies from measurements of UV irradiance is presented in this paper. Four months (March- July 2003) of synchronous measurements of actinic flux and global irradiance measurements performed in Thessaloniki, Greece with a Bentham and a Brewer spectroradiometer were analyzed. The data series were used to extract polynomials for the conversion of irradiance to J(O^1D), J(NO_2) and J(HCHO). The comparison of these photolysis rates' values to corresponding values calculated by actinic flux measurements showed a ratio very close to unity. The validity of the method under different atmospheric conditions was examined by applying the polynomials to another set of actinic flux and irradiance measurements performed in Weybourne (UK) and in Buchhofen (Germany). The method was implemented on UV irradiance measurements performed with a Brewer spectroradiometer in Thessaloniki, Greece from 1995 to 2004.