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Instruments for Atmospheric Research

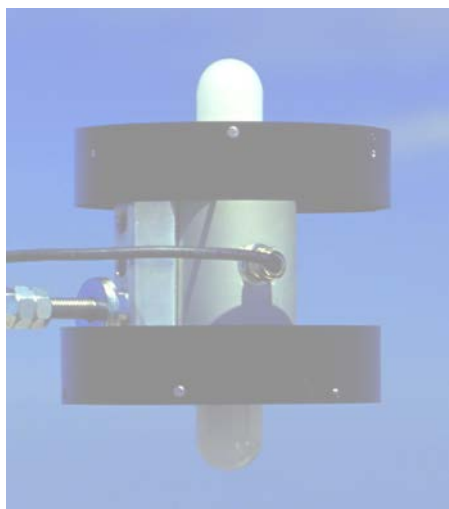
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j(NO₂) AND j(NO₃)- FILTER RADIOMETER

In the troposphere ozone is produced via the photolysis of NO₂ if the resulting NO is converted to NO₂ by peroxyradicals without loss of ozone. For the use in the European research project EUROTRAC/TOR we have developed a radiometer to quantify the photolysis rate of NO₂ as one of the important parameters of the above mentioned cycle of the (anthropogenic) ozone production.

The **J(NO₂)-RADIOMETER** determines the rate of the in-situ NO₂-photolysis in the atmosphere via a continuous measurement of the actinic flux in the appropriate wavelength of the 4- π -sr-hemisphere. The basic design is adopted from the device described by JUNKERMAN, PLATT and VOLZ (J. Atm. Chem. 1987). It was thus modified, that the dependence of the output-signal on the angle of the incending light is minimized by using a set of quartz diffusers. The radiometer is insensitive to atmospheric parameters and does not consist of any movable parts. We operate a set of master-radiometers which are calibrated with the chemical actinometric system at the KFA-Jülich. The re-calibration of the delivered systems is guaranteed by sending one of our master-radiometers to the user for a limited time. **J(NO₃)-radiometers** are calibrated by comparison with spectrographic measurements



4-pi-jNO₂-Filter Radiometer

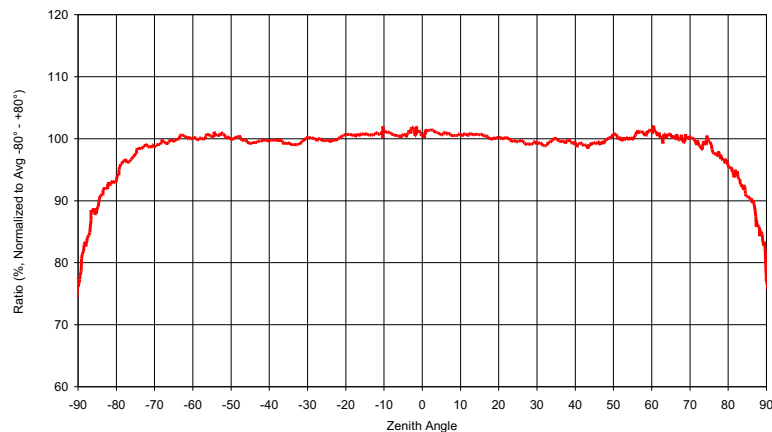
SPECIFICATIONS |

FIELD OF VIEW	2* 180°(4 π sr)
ANGULAR DEPENDENCE +/- 80° ZENITH DISTANCE	Approx. +/- 5% (w.resp. to the averaged signal from -90° - +90°)
WAVELENGTH CHARACTERISTICS	Best fit to the photolysis frequency of the NO ₂ - molecule
ABSOLUTE CALIBRATION	Better than +/- 5% with respect to a chemical Actinometer (FZ Jülich) and j-spectrograph
SENSITIVITY	ca. 1.5 * 10 ⁻⁶ sec ⁻¹ / mV
LINEARITY	Better 1% according to the characteristics of the detector
DETECTOR	HAMAMATSU Head-on Vacuum Phototube
OUTPUT SIGNAL	2 * 0-10 VDC for the two fields of view
POWER SUPPLY	230/110 VAC, 12 / 28 VDC version upon request
OPERATING TEMPERATURE	> 30°C, controlled as option, to prevent dew, ice and snow
INSTRUMENT-BODY	Aluminum
WEIGHT	Approx. 800 g.
OPTICAL SYSTEM	Quartz
QUALITY ASSURANCE	The systems can be tested by slowly rotating the two detector- heads. A SOP is part of the delivery.
INTERCALIBRATION	Several master-systems are permanently operated. A yearly calibration of our master- radiometers with the JÜLICH chemical actinometer will be performed. The user may send their radiometers to our laboratory once per year for a one-week recalibration We also can send one of our master-devices to the user for a limited time
MAINTENANCE	There are no parts to be changed or repaired by the user except a tube with drying agent.
OPTIONS	Aircraft versions are available as 2-pi-devices

ACTINIC JNO₂ FILTER-RADIOMETER



2-pi-jNO₂-Radiometer



Angular Characteristics of the Detector Optics

- Calibration service for JNO₂-filter radiometers and spectrographs The calibration service is permanently available. Instruments can be sent for calibration at any time of the year. The instruments are operated in parallel with our J(NO₂) - master devices and with an absolutely calibrated actinic spectral radiometer at a mountain site. The master- spectrograph is calibrated regularly using a 1000 Watt FEL standard, NIST- and PTB- traceable. Spectrographs, sent in for calibration are absolutely calibrated with the 1000 Watt – lamp and in an atmospheric inter-comparison with our master-spectrograph.

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