

Questionnaire on activities in radiometry and photometry

Reply from: PMOD/WRC

Delegate: Werner Schmutz

1. Summarize the progress in your laboratory in realizing top-level standards of:

- (a) broad-band radiometric quantities
- CMC Total Solar Irradiance
 - IPC-XII, Euramet supplemental comparison.
 - Improved monitor for integrated transmittance to work with the Cryogenic Solar Absolute Radiometer (CSAR). The window transmittance can now be measured with 0.02% accuracy.
- CMCs Responsivity global solar irradiance weighted UV (280–400 nm), UVB (280–315 nm), UVA (315–400 nm), Erythema CIE.
 - The uncertainty in spectral solar UV irradiance measurements by the solar spectroradiometer QASUME was decreased from 5 % to now less than 3 %. The work was carried out in the frame of the EMRP Project SolarUV and accepted for publication in the peer-reviewed literature (Hülßen et al., Applied Optics, 2016).
- (b) spectral radiometric quantities
- (c) photometric quantities

2. What other work has taken place in your laboratory in scientific or technological areas relevant to the CCPR?

Calibration of space absolute radiometer:

Characterization and end-to-end calibration against the NIST-traceable cryogenic radiometer at LASP (Boulder, USA) of the CLARA space TSI radiometer.

3. What work in PR has been/will be terminated in your laboratory, if any, in the past /future few years? Please provide the name of the institution if it has been/will be substituted by a DI or accredited laboratory.

none

4. What are present, new or emerging needs of users of your services that are not being supported sufficiently by current CCPR activities or initiatives? In the light of this information please suggest desirable changes in the future working program of the CCPR.

Next CMC that WMO needs to be realized is *Responsivity IR solar irradiance*. The PMOD/WRC is in preparation for such a CMC, but world-wide support/interest by other laboratories would be appreciated

Consultative Committee for Photometry and Radiometry (CCPR)

23rd Meeting (22 - 23 September 2016)

5. What priorities do you suggest for new research and development programmes at NMIs in the area of Photometry and Radiometry?

In line with the answer above to 4, it is suggested that NMIs develop absolute radiometer for IR.

6. Are there any research projects where you might be looking for collaborators from other NMIs or are there studies that might be suitable for collaboration or coordination between NMIs?

Cavity coating for absolute radiometers.

7. Have you got any other information to place before the CCPR in advance of its next meeting?

none

8. Bibliography of radiometry and photometry papers of your laboratory since the last CCPR (September 2014)?

Egli, L., Gröbner, J., Hülsen, G., Bachmann, L., Blumthaler, M., Dubard, J., Khazova, M., Kift, R., Hoogendijk, K., Serrano, A., Smedley, A., and Vilaplana, J.-M.: Quality assessment of solar UV irradiance measured with array spectroradiometers, *Atmos. Meas. Tech.*, 9, 1553-1567, doi:10.5194/amt-9-1553-2016, 2016.

Feldmann A., Burnitt T., Porrovecchio G., Smid M., Egli L., Gröbner J., Nield K., Diode-Array UV solar spectroradiometer implementing a digital micromirror Device, *Metrologia*, 51, 6, 2014. doi:10.1088/0026-1394/51/6/S289, 2014.

Gröbner, J., I. Reda, S. Wacker, S. Nyeki, K. Behrens, and J. Gorman, A new absolute reference for atmospheric longwave irradiance measurements with traceability to SI units, *J. Geophys. Res. Atmos.*, 119, doi:10.1002/2014JD021630, 2014.

Hülsen, G., J. Gröbner, S. Nevas, P. Sperfeld, L. Egli, G. Porrovecchio, and M. Smid, Traceability of solar UV measurements using the QASUME reference spectroradiometer, accepted for publication, *Applied Optics*, 2016.

Nevas, S., Gröbner J., Egli, L., and M. Blumthaler, Stray light correction of array spectroradiometers for solar UV measurements, *App. Opt.*, 53, 19, 4313-4319, 2014.

Vignola, F., Z. Derocher, J. Peterson, L. Vuilleuimer, C. Felix, J. Gröbner, and N. Kouremeti, Effects of changing spectral radiation distribution on the performance of photodiode pyranometers, *Solar Energy*, 129, 224-235, 2016.

Walter B., Fehlmann A., Finsterle W., Suter M., Soder R., and Schmutz W., Spectrally integrated window transmittance measurements for a cryogenic solar absolute radiometer, *Metrologia* 51, S344-S349, doi: 10.1088/0026-1394/51/6/S344, 2014.