Consultative Committee for Photometry and Radiometry (CCPR)

24th Meeting (19 - 20 September 2019)

Questionnaire on activities in radiometry and photometry

Reply from:

Delegate: PMOD/WRC

---

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

   (a) broad-band radiometric quantities :
   Updated 4 CMCs for solar UV broadband filter radiometers to reflect the reduced uncertainties achieved by reducing the uncertainties of the spectral solar UV irradiance measurements used as reference.
   (approved 28 November 2018, see PR_CH.pdf list on the KCDB web-site).
   An improved version of the Monitor for Integrated TRAnsmittance (MITRA) has been developed and is currently being built. The MITRA is needed to correct the solar irradiance measurements (DNI) by the Cryogenic Solar Absolute Radiometer (CSAR).

   (b) spectral radiometric quantities :
   A new service category for responsivity, solar, spectral irradiance was created.
   2 new CMCs were approved for spectroradiometer to spectroradiometer calibrations using the sun as radiation source. The wavelength covered by the CMC extends from 300 nm to 500 nm.
   (approved 3 May 2019, see PR_CH.pdf list on the KCDB web-site).

   (c) photometric quantities :

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

   We have included the Infrared Radiometry Section of the World Radiation Center in our Quality System following ISO/EN 17025 and are initiating inter-laboratory comparisons with NMIs (PTB and NPL) to validate the infrared longwave irradiance measurements in view of submitting relevant CMCs for this quantity.

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.

As World Radiation Center on behalf of the WMO, we are providing traceability to our reference standards for quantities such as atmospheric downwelling longwave irradiance and aerosol optical depth, which currently are not supported by CCPR activities and do not have the required service categories or CMCs in the KCDB.

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

   The WMO CIMO Task Team on Radiation References, in its final report available on its web-site (http://www.wmo.int/pages/prog/www/IMOP/reports/2017/CIMO-TT-RadRef-Mtg_Report.docx) listed several issues which require the attention of the metrology community. In the document, the High-level Issues Nb. 2, 4 and 15 require the support of the metrology community to provide traceability of atmospheric longwave irradiance to SI.
   Specifically, traceability to SI for hemispherical atmospheric radiation measurements in the thermal infrared is crucial: The main Stake-holder is the WMO CIMO, through its Task Team on Radiation References, established in 2014; Customers are the atmospheric radiation budget community and specifically the BSRN (BSRN is a project of the Data and Assessments Panel from the Global Energy and Water Cycle Experiment (GEWEX) under the umbrella of the World Climate Research Programme (WCRP) and as such is aimed at detecting important changes in the Earth's radiation field at the Earth's surface which may be related to climate changes.) which measure atmospheric longwave irradiance in the wavelength range 4 µm up to 100 µm.

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?

   This is currently accomplished through the European EMPIR Programme.

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

   no

8. Bibliography of radiometry and photometry papers of your laboratory since the last CCPR (September 2016)?

1. Gröbner, J., and N. Kouremeti, The Precision solar Spectroradiometer (PSR) for direct solar irradiance measurements, Solar Energy 185, 199-210, 2019.
2. Meelis-Mait S., S. Nevas, N. Kouremeti, J. Gröbner, S. Pape, S. Pendsa, P. Sperfeld, and F. Kemus, LED-based UV source for monitoring spectroradiometer properties, Metrologia, 55, S97-SS103, 2018.
3. Vaskuri, A., Kärhä, P., Egli, L., Gröbner, J., and Ikonen, E.: Uncertainty analysis of total ozone derived from direct solar irradiance spectra in the presence of unknown spectral deviations, Atmos. Meas. Tech., 11, 3595-3610, https://doi.org/10.5194/amt-11-3595-2018, 2018.
4. Gröbner, J., Kröger, I., Egli, L., Hülsen, G., Riechelmann, S., and Sperfeld, P.: The high-resolution extraterrestrial solar spectrum (QASUMEFTS) determined from ground-based solar irradiance measurements, Atmos. Meas. Tech., 10, 3375-3383, https://doi.org/10.5194/amt-10-3375-2017, 2017.
5. Nyeki, S., Wacker, S., **Gröbner, J.,** Finsterle, W., and Wild, M.: Revising shortwave and longwave radiation archives in view of possible revisions of the WSG and WISG reference scales: methods and implications, Atmos. Meas. Tech., 10, 3057-3071, https://doi.org/10.5194/amt-10-3057-2017, 2017.
6. 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, Applied Optics, 55, 26, 7265-7275, 2016.

7. 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.

8. 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.

9. Kopp, G., Dudok de Wit, T., Ball, W. T., Finsterle, W., Fröhlich, C., Kokkonen, K., Meftah, M, Schmutz, W. K., The New “Community-Consensus TSI Composite” for Solar and Climate Researchers, AGU Fall Meeting 2018, #SH32B-08Remesal Oliva, A., Finsterle, W., Wlater, B., Schmutz, W., Characterisatin oof a new carbon nanotube detector coating for solar absolute radiometers, Journal of Physics: Conference Series, Vol. 972, Issue 1, id. 012007 (2918), doi: 10.1088/1742-6596/1/012007

10. Walter, B., Winkler R., Graber, F., Finsterle, W., Fox, N., Li, V., Schmutz, W., Direct Solar Irradiance measurements with a Cryogenic Solar Absolute Radiometer, AIP Conference Proceedings, Vol. 1810, Issue 1, id.080007 (2017), doi: 10.1063/1.4975538