IRS2012-110
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Improving spectral solar UV traceability to SI

J. Gröbner and the EMRP ENV03 Team
PMOD/WRC, davos dorf, Switzerland (julian.groebner@pmodwrc.ch)

The European Metrology Research Project Traceability for surface spectral solar ultraviolet radiation is a collaboration between National Metrology Institutes (NMI), partners from Industry and the research community in Europe. The project will significantly enhance the reliability of spectral solar UV radiation in the wavelength range 290 nm to 400 nm measured at the earth surface by developing new methods of observation (techniques and devices) to provide traceable solar UV irradiance measurements with an uncertainty of less than 2 %. This activity is essential to unambiguously quantify decadal changes in solar UV radiation due to the expected changes in the global climate system.
The project will shorten the traceability chain of the solar UV measurements to the SI and reduce the associated transfer uncertainties. The objective is to approach uncertainties in the field comparable to those currently achieved only for primary spectral irradiance scale realisations at NMI level, i.e. at the level of 1 %. To provide traceable solar UV irradiance measurements with an uncertainty of less than 2 %, the portable reference spectroradiometer known as 'QASUME' will be fitted with an improved global entrance optic and newly developed solid-state detectors. Furthermore, a Fourier transform spectroradiometer will be adapted for spectral solar UV irradiance measurements to demonstrate the feasibility of using this type of device as an alternative reference spectroradiometer.
To support the use of cost-effective array spectroradiometers in UV monitoring networks (as replacements for current UV filter radiometers), significant progress needs to be achieved in the characterisation of these devices. New characterisation techniques and post-correction methods will be developed to determine and correct the stray light, linearity, and wavelength scale of array spectroradiometers. This will be supported by the design and construction of novel array spectroradiometers with improved stray light characteristics based on band pass filters and micro-electro-mechanical systems.
Finally, the dissemination of the improved irradiance traceability and the demonstration of the tools and methods developed in this project will occur by a large field intercomparison of spectroradiometers at the World Radiation Center, Davos, Switzerland in 2014. Participants from the end-user community involved in solar UV measurements are invited to this field intercomparison. Participating spectroradiometers from the end-users will be characterised and calibrated by using the facilities developed in this project to provide traceability of spectral solar UV irradiance at this new level of uncertainty to the wider European UV monitoring community.