

Solar radiation calibration scale change

WRR solar irradiance scale is expected to go down

WRR contains a systematic error relative to SI. Therefore, the scale will be adapted. It will likely shift by 0.34 %. The change is relevant to climatology, solar resource assessment and solar system performance assessment.

Introduction

The WRR has been used since 1980 as the scale representing the physical units of solar irradiance.

PMOD: designated institute under METAS

The WRR scale is maintained by **PMOD**. The formal status of PMOD in international metrology is "designated institute". For details see the website of the Swiss Institute of Metrology **METAS**. In other words, PMOD is responsible maintenance of the highest standard for solar irradiance measurement with pyranometers and pyrhemometers.

What will happen to WRR

It has become clear that WRR contains a systematic error relative to SI. The WRR scale will be adapted to the new latest insights. It will likely shift by 0.34 %.

The WRR scale was too high, which means that all irradiance measured with traceability to WRR must be corrected to lower values in $[W/m^2]$. With the correction from WRR to the new scale, the sensitivities of instruments in $[V/(W/m^2)]$ will go up by 0.34 %.

The name of the new scale is not yet known.

WMO does not recommend to correct past data. It does however recommend to store information with data obtained with pyranometers and pyrhemometers about the scale that is used. The decision on introduction of the new scale will be made at the WMO congress in 2027.

Literature reference for scale change

A reference for the proposed scale change is: Fehlmann A., Kopp G., Schmutz W. et al. *Fourth World Radiometric Reference to SI radiometric scale comparison and implications for on-orbit measurements of the total solar irradiance*.

Metrologica 49 (2012) p34-38

PMOD pyranometer calibration*

Calibrated quantity	responsivity to solar irradiance
Calibrated instrument	pyranometer
Measurand	$V/(W/m^2)$
Uncertainty	0.66 %
Calibration method	pyranometer comparison to pyrhemometer
Calibration conditions	- instrument tilt 0.0° - angle between normal of receiver surface and solar beam : 24° to 50° - global solar irradiance : $800 W/m^2$ to $1000 W/m^2$
Calibration reference:	World Radiometric Reference (WRR)
Type of source	sun and clear sky

* Reference: [BIPM website](#)

What we do at Hukseflux to prepare

Hukseflux in its latest industrial pyranometers allows to add metadata, to indicate if calibration is traceable to WRR or to the new scale, to on-board calibration records and to on-board records of calibration history. All these records are stored in the instrument.

About Hukseflux

Hukseflux is the leading expert in measurement of energy transfer. We design and manufacture sensors and measuring systems that support the energy transition. We are market leaders in solar radiation- and heat flux measurement. Customers are served through the main office in the Netherlands, and locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia and Japan.

Would you like more information?
E-mail us at: info@hukseflux.com