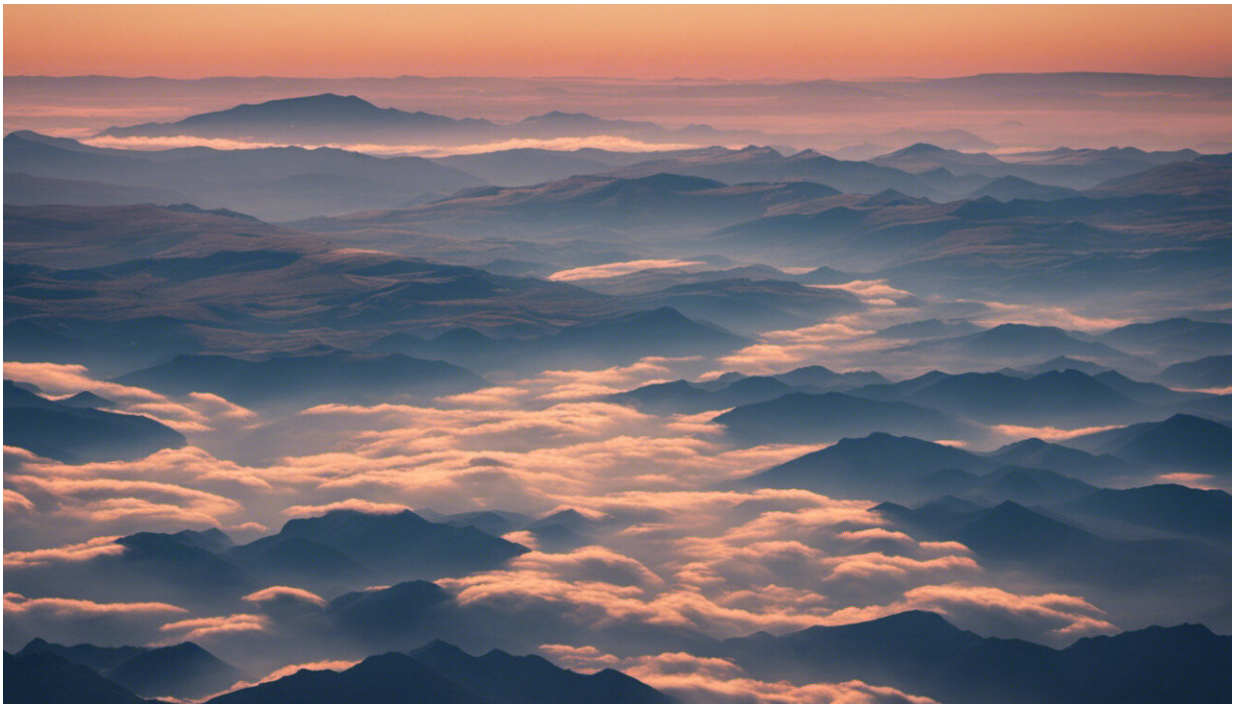


Future standard for solar irradiance delivered to Switzerland

June 23 2015



Credit: AI-generated image ([disclaimer](#))

Scientists from the National Physical Laboratory (NPL) have installed a Cryogenic Solar Absolute Radiometer (CSAR) at the Physikalisch-Meteorologisches Observatorium Davos World Radiation Center (PMOD/WRC) in Switzerland. CSAR is expected to replace the current standard for Direct Solar Radiation, significantly improving our

knowledge and confidence for global climate research.

Direct Solar Radiation is a measure of the radiative power per unit area of the Sun on the Earth's surface. Accurate measurements of Direct Solar Radiation are crucial for developing robust climate models and evaluating the efficiency of solar cells.

Currently, measurements of Direct Solar Radiation are based on the World Radiometric Reference (WRR), determined by a collection of independently-designed instruments, known as the World Standard Group (WSG). Every five years, over 50 institutions from around the globe gather to compare and normalise their measurements to the WRR to ensure consistency.

However, the artefact-based nature of the WSG and the age of its constituents is leading to concerns over measurement uncertainties and potential longer term errors. Traceability to the SI units has long been recognised as the only reliable route to establish [accurate measurements](#).

NPL, in collaboration with PMOD/WRC and METAS (the National Measurement Institute of Switzerland), is working to establish an improved reference standard for Direct Solar Radiation which is directly traceable to the SI. CSAR, uses cryogenic (i.e. very low) temperatures and the principle of electrical substitution to measure optical power. Cryogenic radiometers, pioneered by NPL, have been recognised as the most accurate means of measuring [optical radiation](#) and are the primary standards of choice at most of the world's National Metrology Institutes.

CSAR will be approximately ten times more accurate than the current standard for Direct Solar Radiation, and was designed so that it could ultimately be flown in space as part of the TRUTHS (Traceable Radiometry Underpinning Terrestrial- and Helio- Studies) mission. CSAR would not only make measurements of the Sun but also provide a

reference to improve the accuracy of Earth-viewing instruments, such as those of the European Commission and European Space Agency's Copernicus program.

During the upcoming WMO International Pyrheliometer Comparison (IPC XII), CSAR will be measuring Direct Solar Radiation alongside the WSG. CSAR is expected to replace the World Standard Group as the SI standard for Direct Solar Radiation, within the next five to ten years.

Provided by National Physical Laboratory

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