

Climate research with maximum added value

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The sun is the driving force of life on earth. How much of its energy reaches the earthÂ's surface is being recorded by BSRN, a worldwide network of 54 radiation measurement stations. Their data are not only of interest to climate researchers. Photovoltaic installations, for example, generate more energy if the manufacturers consider BSRN measurements. The potential still provided by the measurement results will be discussed next week during an international workshop in Potsdam, Germany.

The problem appeared to be almost paradoxical. Whenever small groups of white, dense cumulus clouds passed by the sun in the sky over Munich, more sun rays hit the photovoltaic plates of a manu-facturer than physicists had calculated for a day of sun under cloudless blue skies. The consequence: the installations produced maximum energy values which could not be used, however, because the converters of the solar modules were not ideally adjusted. "Only once a comparison was made with the radiation data of our European BSRN stations, did the cause for these maximum radiation values become clear. Under conditions of this type, not only the direct sun rays hit the solar modules, but also the white scatter light from the clouds. This is an added extra which must of course be included in the calculation and considered in the case of photovoltaic systems ", says Dr. Gert König-Langlo, head of the World Radiation Monitoring Center (WRMC) at the Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association.

Radiation issues such as this will be the topics when the Alfred Wegener Institute invites to the twelfth international BSRN Workshop in



Potsdam. Some 70 radiation experts and data users from all over the world have so far registered. "The main focus of the three-day event will be to get talking to each other. As BSRN we endeavour to provide the best surface radiation data in the world. But for this we must also know what the data users require exactly", says Gert König-Langlo.

The Basic Surface Radiation Network currently consists of 54 measurement stations and the WRMC as central data archive: "We collect the measurement data of all 54 stations and the Alfred Wegener Institute itself even operates two of these. One measurement station is located at the Neumayer Station III in the Antarctic and the other at the Arctic research station in Ny Ålesund in Spitzbergen", explains Gert König-Langlo.

Each of these stations contains a wealth of sensors which measure the surface radiation at intervals of a few seconds. An average value and a maximum and a minimum are calculated per minute. "Our data have such a high temporal resolution that radiation fluctuations can be recognised precisely and it can be seen when the <u>sun</u> disappeared behind the clouds and when there was a clear sky", says Gert König-Langlo. Since the end of the eighties a data set has been created in this way which is now so large that a single person would have to note the respective radiation data around the clock every min-ute of the day for 670 years to obtain about the same data volume.

This density of the BSRN measurement data is appreciated primarily by the operators of scientific satellites. They use the <u>radiation</u> values as ground-based, highly precise and reliable comparative data to uncover measurement errors in their satellite data. Climate modellers have recourse to the data set if they wish to check the accuracy of their computer calculations. And a study from 2011 has shown that when planning thermal solar power stations it is a good idea to consult the BSRN measurement re-sults. Gert König-Langlo: "These many examples



show that the network and its archive at the Alfred Wegener Institute make a substantial contribution to climate observations."

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