

Playing in the Champions League of Radiation Measurement

Gobabeb is part of the Baseline Surface Radiation Network (BSRN)



mcr meteorology
climatology
remote sensing



The Introduction

The prominent "radiation rock" at the Gobabeb Research and Training Centre where in former times global radiation was measured with an analog Fuess-Robitzsch bimetal radiation recorder has successfully been revitalized. The MCR (Meteorology, Climatology and Remote Sensing) research group from University of Basel together with Gobabeb and the Karlsruhe Institute of Technology installed there a Baseline Surface Radiation Network (BSRN) station.

In a technical assistance agreement these three made a solemn vow to carry out these measurements at least for six years (end 2018): ".....shall cooperate in common fields of Baseline Surface Radiation Network."

The measurements in Gobabeb will close an important gap in the global network of BSRN stations. There used to be a station in the Republic of South Africa, but it is not in service any more. So the Gobabeb BSRN station is currently the only active one in Africa south of the equator (more details on <http://www.bsrn.awi.de>).

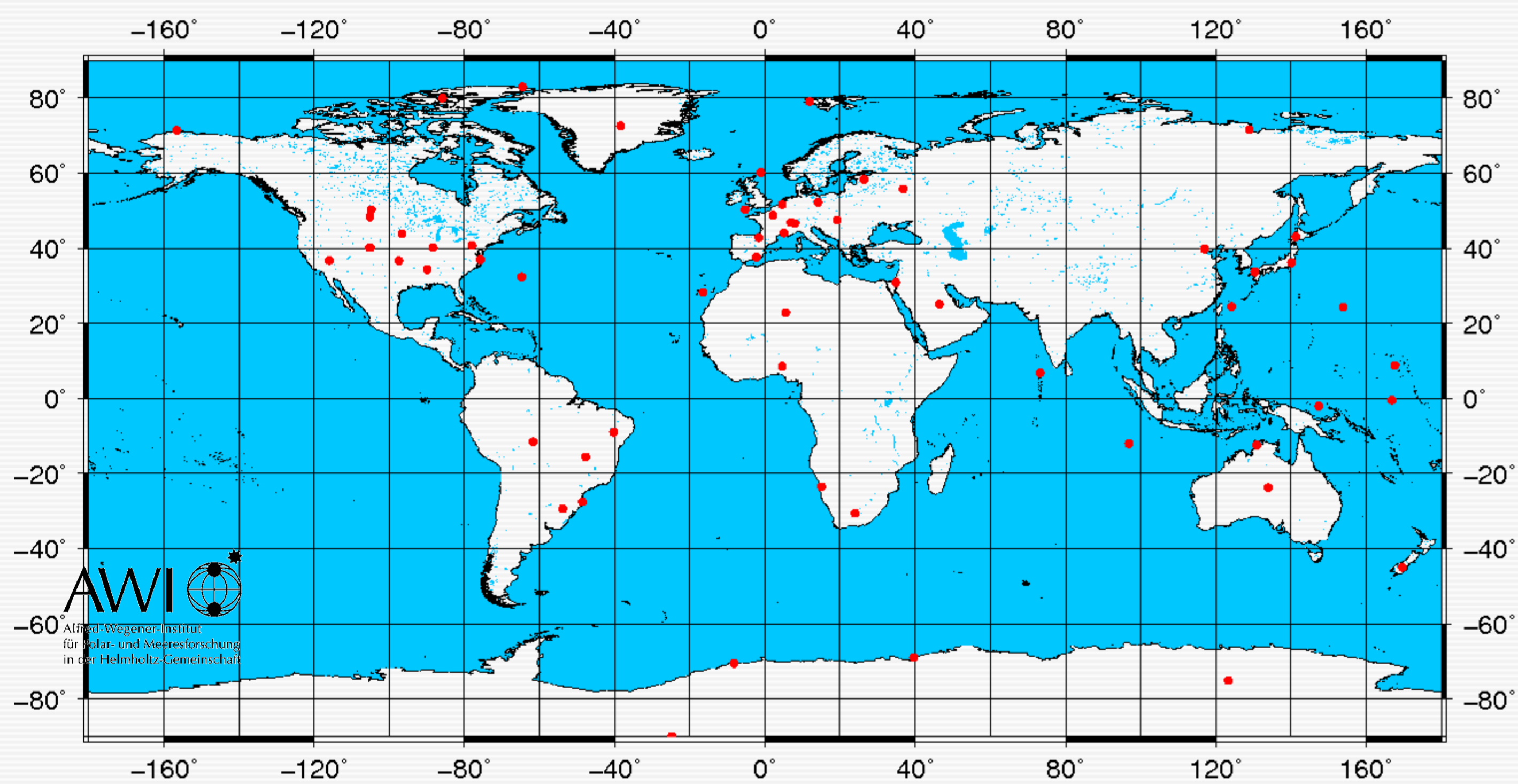
The Motivation

A detailed knowledge of the incoming and outgoing radiation fluxes at the Earth's surface is essential for modeling weather and climate. Therefore such data "are of primary importance in supporting the validation and confirmation of satellite and computer model estimates of these quantities." BSRN is a project of the Radiation 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.

The Network

The Baseline Surface Radiation Network (BSRN) fulfills this task. "At a small number of stations (currently about 40) in contrasting climatic zones, covering a latitude range from 80°N to 90°S, solar and atmospheric radiation is measured with instruments of the highest available accuracy and with high temporal resolution (1 to 3 minutes)."

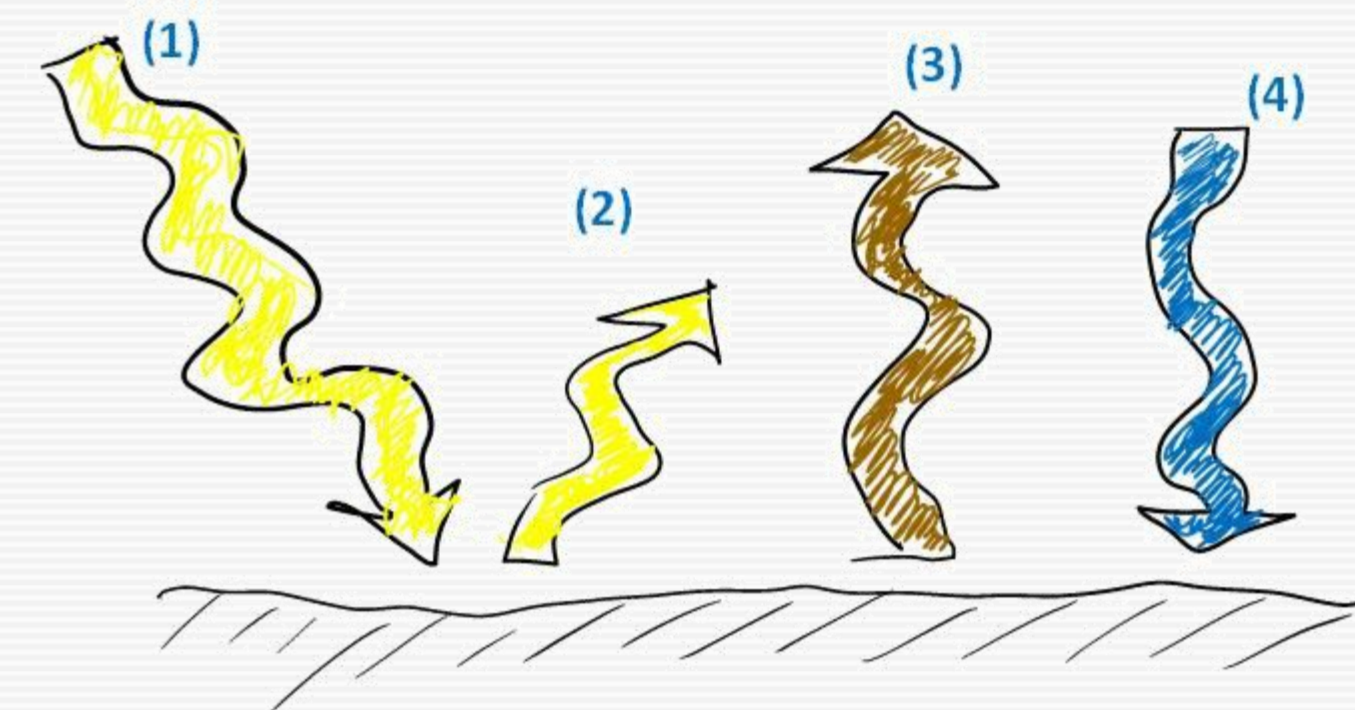
Running and planned BSRN stations, September 2012



The Sun

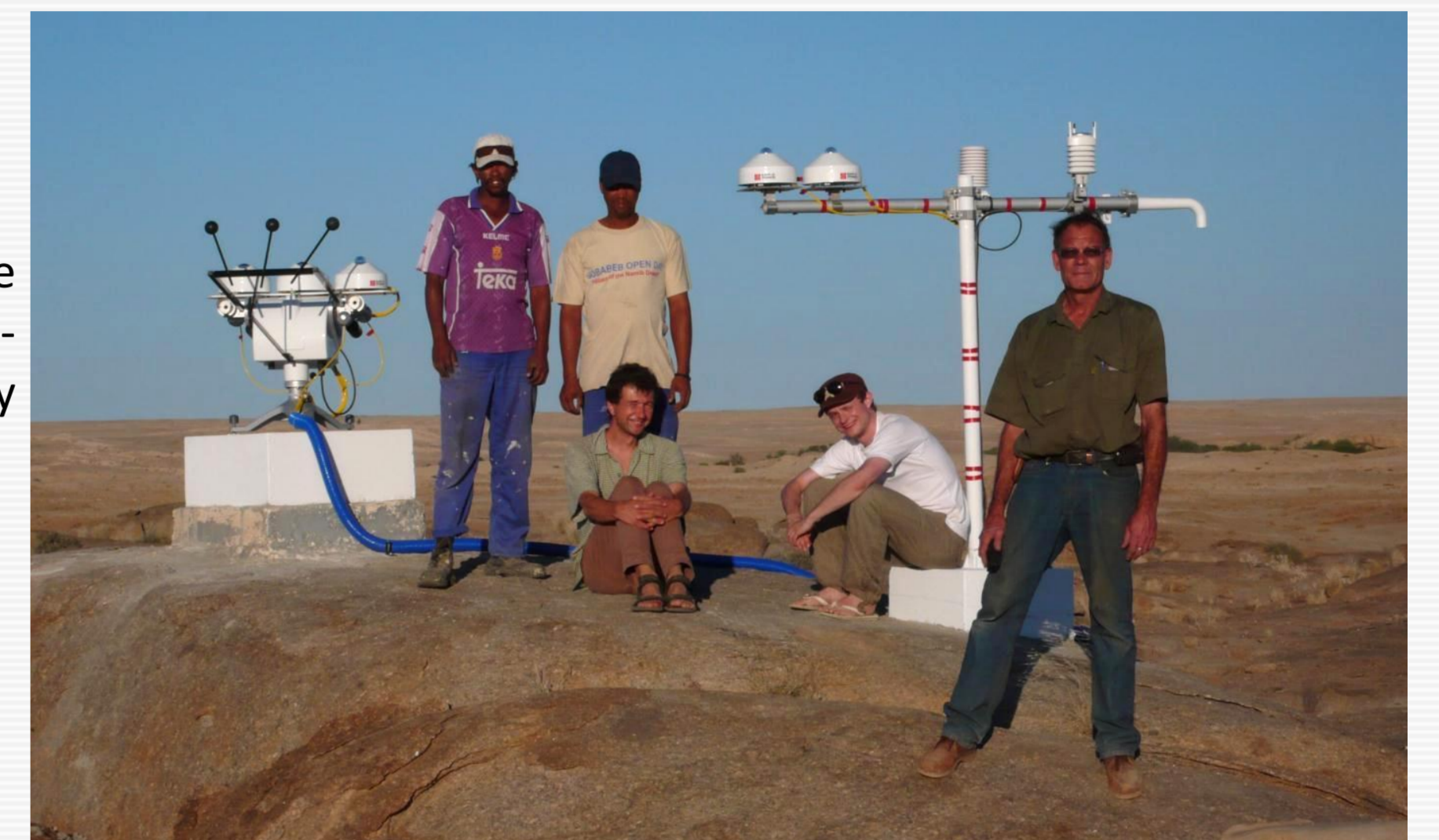
Is the only source of energy for our Earth. On average 1360 Wm⁻² of solar radiation arrive at top of the atmosphere.

On its travel it interacts with the atmosphere (reflection, scattering, absorption) and the Earth's surface receives **direct and diffuse solar (shortwave) radiation (1)** from the sun and **long-wave radiation (4)** from the atmosphere. From the surface part of the shortwave incoming is **reflected (2)** and **long-wave outgoing radiation (3)** is emitted.



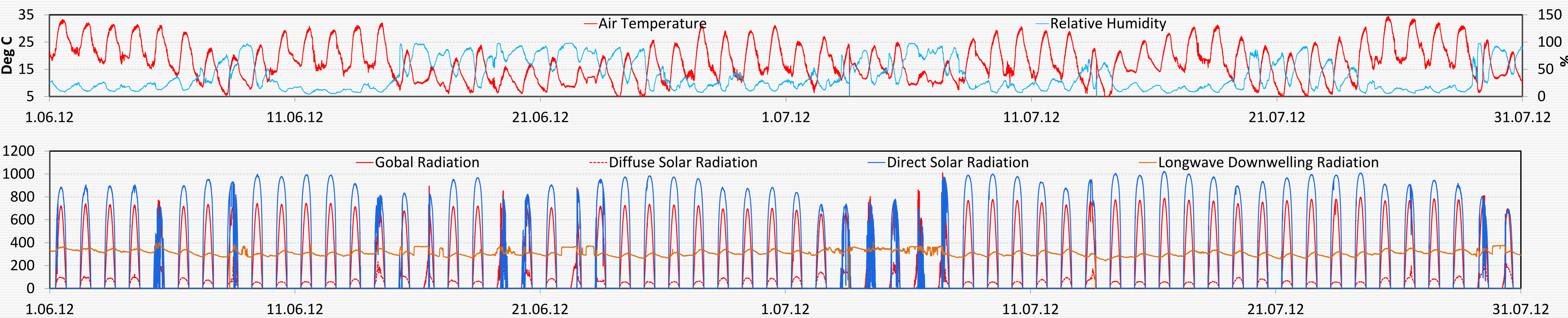
The Construction Team

Precise installation for accurate measurements. Successful completion of hardware work early May, 2012.



The Maintenance Team

Quality control and quality assurance in the field. Instruments are checked and maintained on a daily basis.



The Instruments I...

Direct solar radiation is measured with a [pyrheliometer \(1\)](#). It is basically a tubus collecting the direct radiation from the sun.

Global radiation (direct and diffuse solar radiation on a horizontal surface) is measured with a [pyranometer \(2\)](#).

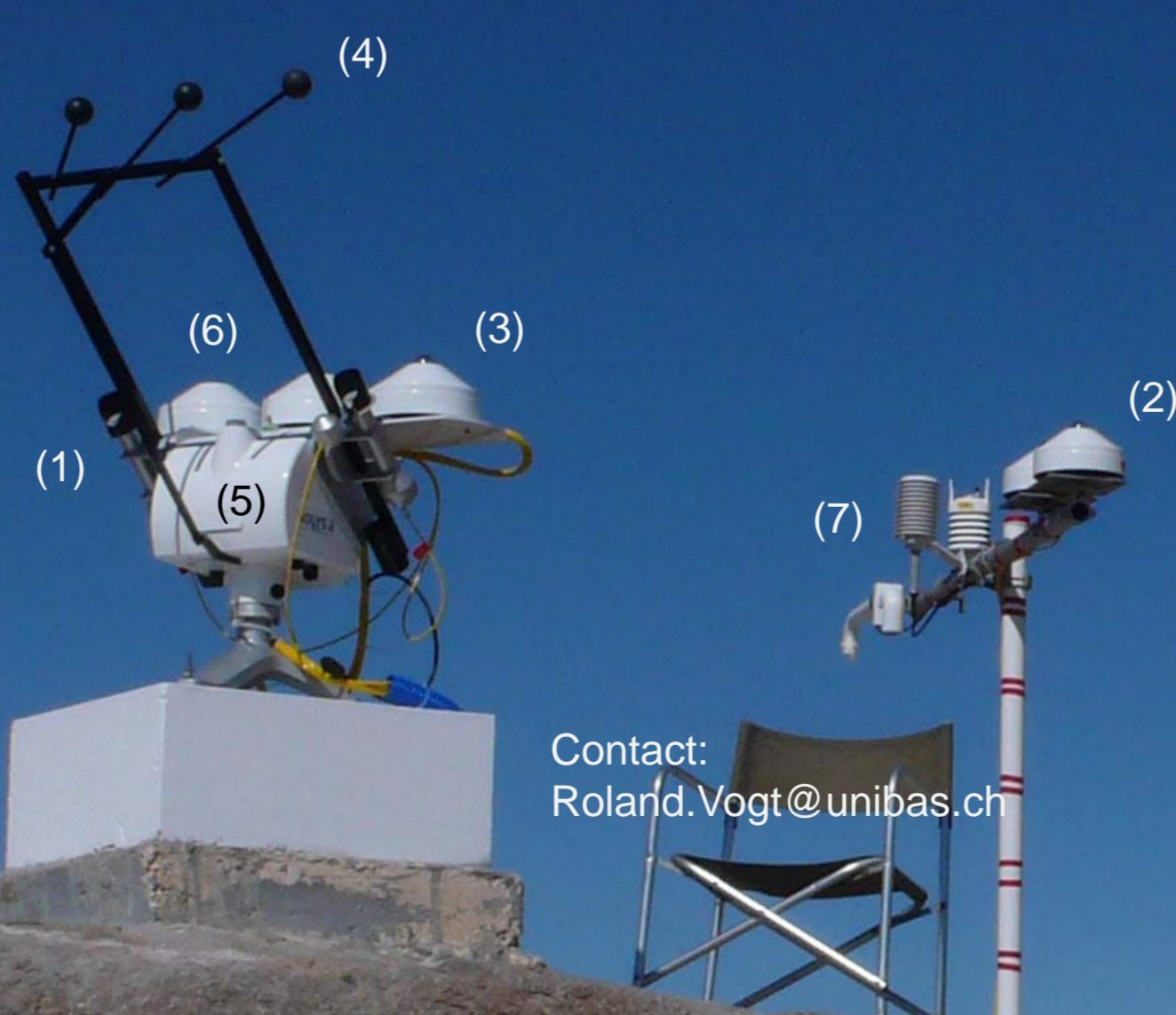
The diffuse radiation is measured with a pyranometer (3), where direct radiation is blocked with a shadow ball (4).

A tracker (5) positions the shadow ball and the pyrheliometers automatically towards the sun.

A [pyrgeometer \(6\)](#) measures longwave downwelling radiation.

A datalogger measures the instruments and stores the data which are transmitted via GPRS (MTC) to a server.

Additional meteorological variables are sampled separately (7).



The Instruments II...

All radiation instruments are from Kipp & Zonen, Netherlands.

Pyranometer: CMP22.

Pyrgeometer: CGR4.

Both ventilated.

Pyrheliometer: CHP1.

Tracker: SOLYS2.

Data logger: Campbell CR3000.

Meteorological variables:

Vaisala WXT520, Vaisala HMP45,

Ventilated thermocouple Campbell

ASPTC.

