# Solar radiation energy budgets studies

The Meteorological research community is very ambitious to understand climate changes and global impact on life. With modern advanced measurement equipment, e.g. satellites, remote sensing technologies and sophisticated computer models, multiple meteorological parameters can be analyzed at a large scale at the same time. As the climate system is very complex it is difficult to give accurate predictions of our future climate. We work with climate models, which are based on the consequences of impacts thus far observed. Apart from these impacts additional forcings occur, which make it even harder to give reliable climate predictions. Nevertheless, our present sophisticated climate models enable us to give a characterization of our future climate. For instance, we expect that before the end of this century, the average surface temperature will have increased by 1.4º to 5.8ºC.

The sun is the driving force of our climate, consequently Solar energy budget studies are most important to be able to understand the complexity of the solar energy and thermal balance on earth. To detect long term trends regarding climate changes, accurate solar irradiance data and other atmospheric parameters are needed to feed the climate models. Therefore only the highest class solar sensors are used to measure the Direct, Global and Diffuse irradiance.

## HOW-TO Application Guide

1. Define the solar parameters to be measured. Global radiation can be measured with a pyranometer or Sun tracker sensor system, which measures the DNI, DHI and GHI separately. Also the spectrally resolved components can be relevant.

2. Verify if the radiation measurement is described in applicable norms or regulations; there is a reason why those instructions give guidelines for radiation measurements; take these considerations into account when choosing your radiometer system.

3. Determine which data quantity you will need: daily totals or one minute values or something in between. The shorter the timing, the higher the quality of the radiometer must be. There is an ISO classification for pyranometers which is widely used and which states useful information about instruments and accuracies (see ISO 9060, look also at "CIMO Guide", publication WMO-No. 8).

4. Will you have data redundancy, meaning that more than one instrument is available to measure the same kind of radiation quantity? This significantly increases the quality of the measurements as any irregularities can be discovered quickly.

5. Take care about data quality and instrument maintenance, such as cleaning, re-calibration, etc. It is very important not to lose sight of your radiation sensors: no instrument works well when its soiled or polluted. Furthermore, re-calibration is a logical, recurring necessity.