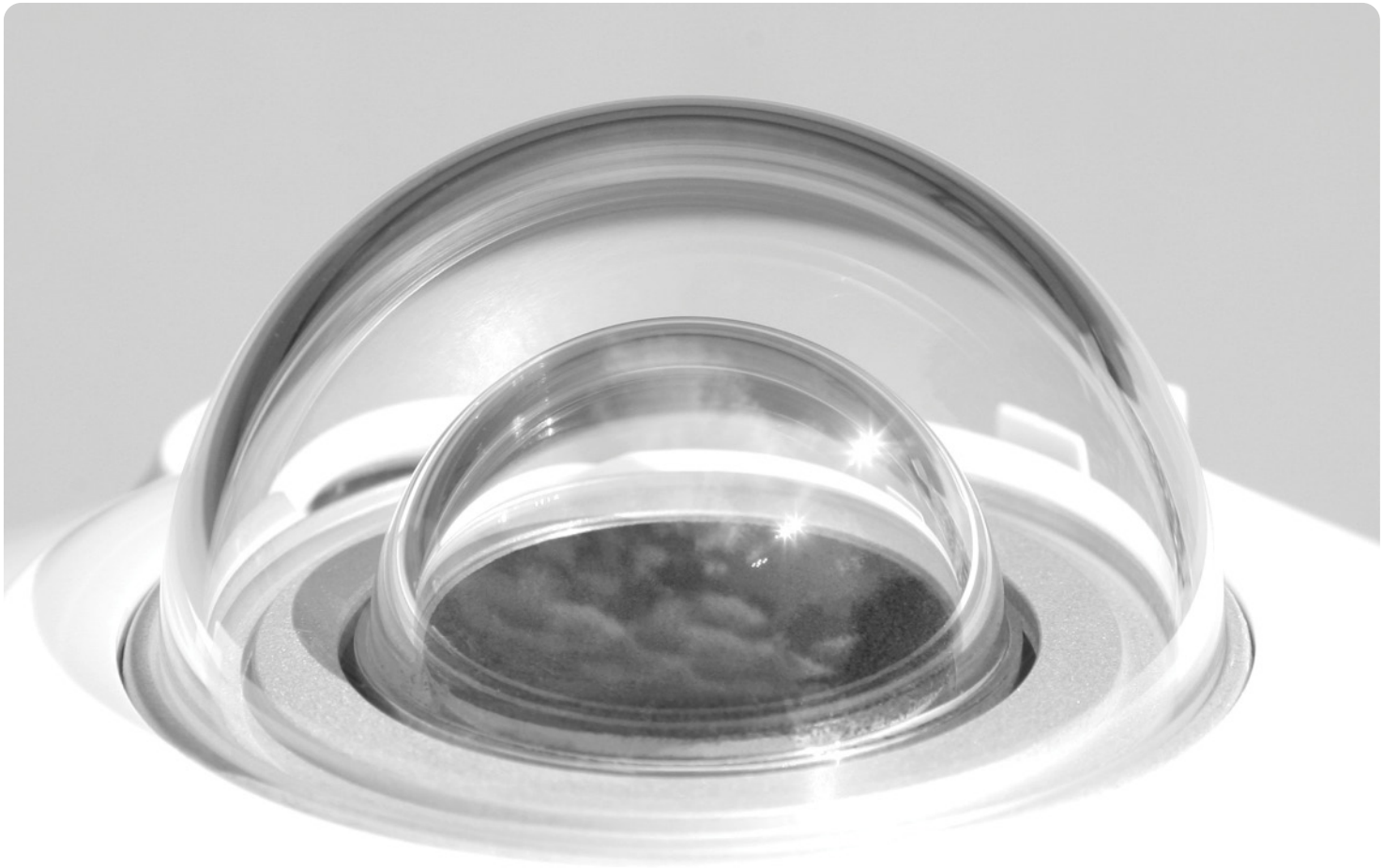

Newsletter 13

Report from the 10th World Solar Challenge
Dome Improvement for Pyranometers
Solar Resource Assessements in South Africa

KIPP & ZONEN
SINCE 1830

Content

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Contact

If you have a news item for the newsletter or want to share your experiences with Kipp & Zonen applications and contribute to our next issues, please e-mail the editor: kelly.dalu@kippzonen.com

Challenges of the Sun

2010 is turning out to be an important year for Kipp & Zonen. Business continues to be very strong, especially in the market for Solar Energy. The awareness of the importance of precise solar radiation measurement is growing. The article from the Stellenbosch University in South Africa shows that it is essential to make high quality on-site ground measurements.

We continue to support solar powered competition events with our products. You can read in this newsletter the report by Solar Team Twente of their participation in the World Solar Challenge, in Australia last year.

This year we are sponsoring the Delta Lloyd Solar Boat Team of the Technical University in Delft, which will race in the Frisian Challenge for Solar Powered Boats. The race takes place from 4 to 10 July and starts in Leeuwarden, the Netherlands. 47 teams from 6 different countries, including America and Brazil, will follow the 220 km long course of the 'Elfstedentocht' (eleven cities tour for ice skating) in Friesland.

The drive for more accurate weather forecasting, better efficiency in the renewable energy market and improved crop yields in agriculture, results in the demand for better measuring devices, higher accuracies, more intelligence in the sensor and up-to-date interfacing. An example is the rapidly increasing sales of the CMP 11 pyranometer, compared to the CMP 6. The new Mierij Meteo wind measuring set MW 35/36 also meets these requirements with an universal interface that allows for analogue (voltage or current) or digital (frequency or RS485) output. In the near future we will follow this trend with further introductions.

With this newsletter we continue to keep you informed about new products and applications. If you have any feedback, we are happy to receive this and to come back to you.

Have a nice summer and a relaxing vacation!

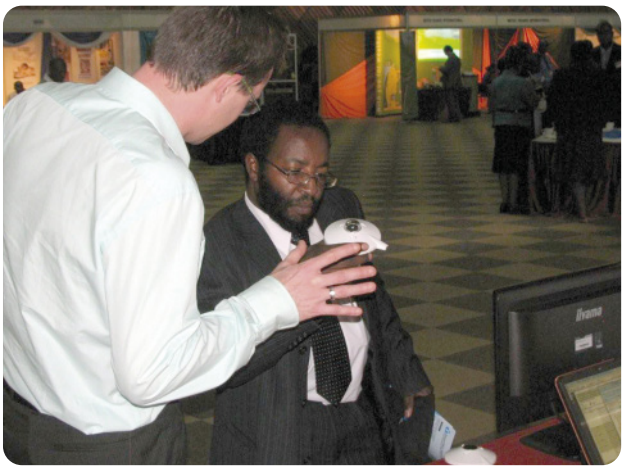
Yours sincerely,

Ben Dieterink, President
Kipp & Zonen B.V.

First Conference and Exhibition in Nairobi

In April this year Nairobi, Kenya was the location for the first 'Conference of Ministers for Meteorology in Africa'. Kipp & Zonen attended the event and the associated exhibition together with our distributor, Campbell Scientific South Africa.

The African continent is especially affected by changes in the climate. The increasing number of natural hazards is affecting most countries in Africa, especially in agriculture, transport, food security, public health and tourism. This presents many challenges which need to be addressed internationally across the continent. For this reason the First Conference of Ministers for Meteorology in Africa, and a preparatory Expert Meeting, was held between 12th and 16th April.



This meeting resulted in a joint ministerial declaration noting the increasing risks and threats to sustainable development associated with disasters, which are mostly related to extreme meteorological and hydrological events. It was recognized that weather and climate information, services, and products are of key importance for supporting climate sensitive sectors of the economies of the region.

Since climate change knows no borders, the importance of expanding existing national, regional and international meteorological services, and the establishment of new organisations, was deemed of high importance. This includes cooperation with worldwide meteorological frameworks such as the World Meteorological Organisation.

Kipp & Zonen instruments have been used on the African continent for many years, in several different countries. Naturally, Kipp & Zonen was happy to support this first meeting by exhibiting during the conference and we look forward to future meetings ■

Dome Improvement for Pyranometers and Albedometers

In the constant search to optimize performance Kipp & Zonen has improved the domes of its solar radiometers. The CMP 6, CMP 11 and CMP 21 pyranometers, and the CMA 6 and CMA 11 albedometers are now being produced with a new type of glass for both the inner and outer 2 mm domes.

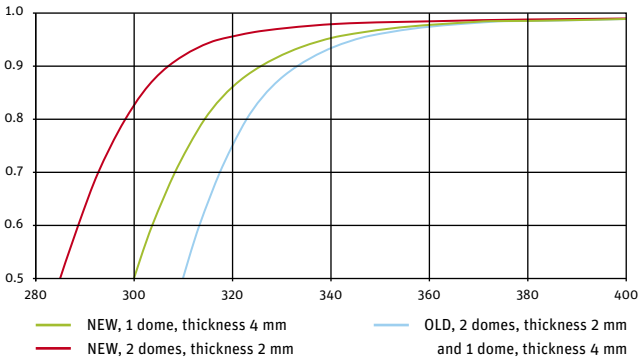
The main benefit of the new glass is the wider spectral range at shorter wavelengths. The 50 % transmission point has been improved from 310 nm to 285 nm. The second improvement is that the new glass has 20 % better thermal conductivity. This results in a dome temperature closer to the temperature of the instrument body and therefore a lower offset due to thermal radiation.

The single 4 mm thick dome used on the CMP 3 pyranometer and the CNR 2 and CNR 4 net radiometers has also been improved and the 50 % transmission point is now 300 nm instead of 310 nm.

These changes will not result in a mismatch with older instruments but gives a more accurate contribution from UV radiation. The long-wave 50 % transmission point remains the same at 2800 nm.

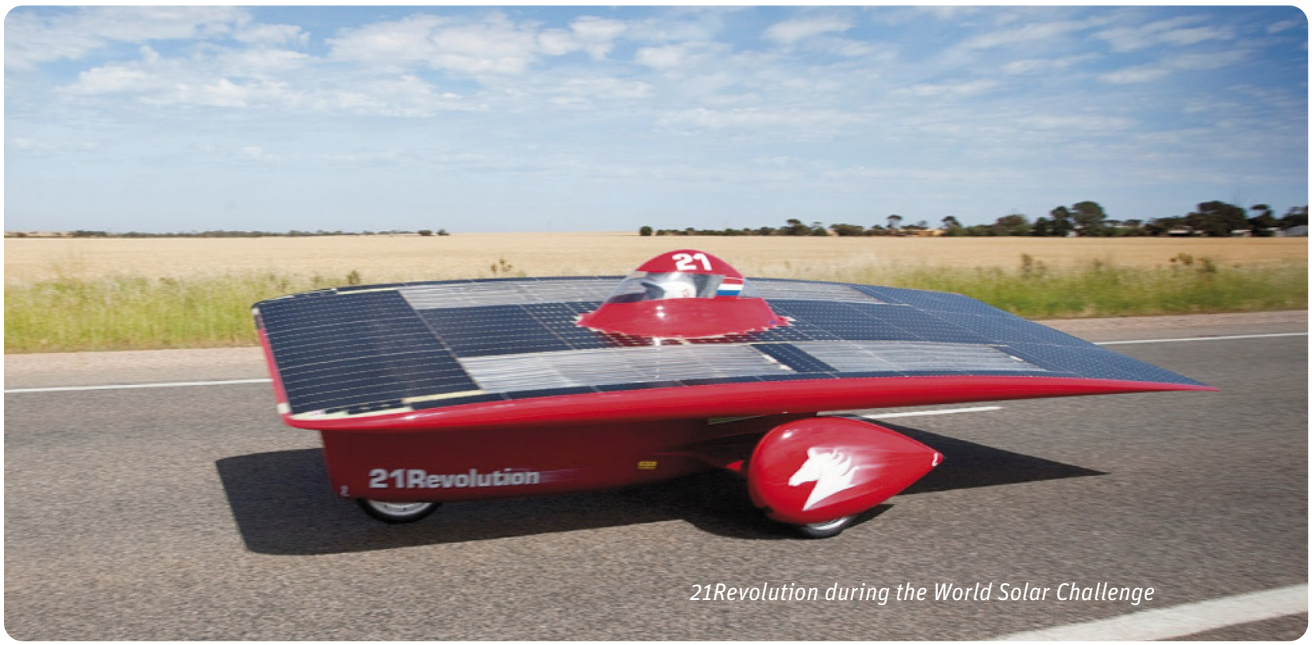
The new domes will be fitted to pyranometers, albedometers and net radiometers shipping from July 2010 ■

Calculated relative transmittance of two domes including the wavelength dependent reflection losses



Improved Reliability for the 21Revolution Solar Car

After a tough race Solar Team Twente ended the 10th World Solar Challenge in 8th position with their 21Revolution solar car. In testing, and during the race across Australia from Darwin to Adelaide, Kipp & Zonen instruments were used to measure and log solar radiation data.



21Revolution during the World Solar Challenge

Before the race started in October 2009 the team carried out a development, test and measurement programme. The solar radiation monitoring system for the pre-race measurements was installed on top of the scouting building of Solar Team Twente in Darwin for several weeks.

A CMP 6 pyranometer provided data on the global radiation (the sum of direct and diffuse radiation). A second pyranometer, mounted on a CM 121B shadow ring, measured only the diffuse radiation allowing the direct radiation to be calculated. A solar cell of the same type as the 2238 cells powering the 21Revolution was placed as a reference. The data was stored using a Kipp & Zonen LOGBOX SD data logger, perfect for this application because an external power supply and computer are not needed to log the data.

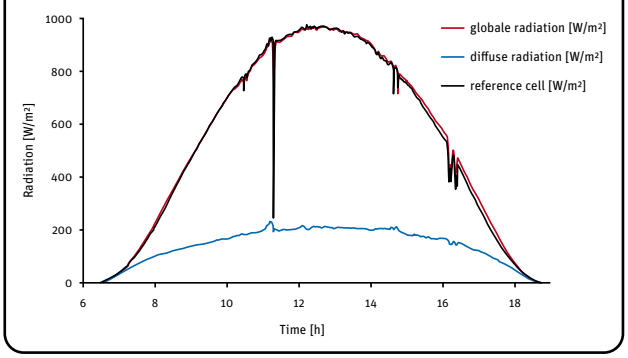
The reference cell also measures the incoming radiation. However the efficiency of the cell (the amount of radiation converted into electrical energy) depends on the temperature, angle of incidence and solar spectrum.

The data from the Kipp & Zonen instruments and the reference cell enabled the team to decide which parameters were most relevant for the race strategy.

During the race one CMP 6 pyranometer was placed on a car which provided live weather forecasts and the second CMP 6 on top of a car following the 21Revolution. This car was the Decision Making Unit (DMU) that was used to monitor the solar radiation, the solar car performance, and to control the race strategy.

In the DMU car all the measurement channels of the 21Revolution were monitored by telemetry and evaluated to make important decisions. Information included suspension loads and electrical system parameters such as motor current, battery charge level and the power of the solar panels. The real-time output of the panels and the measurements of the CMP 6 pyranometer on the DMU were compared to a computer-based model that calculated the expected performance. This enabled the team to closely monitor the solar car and to make race strategy decisions.

Graph 1

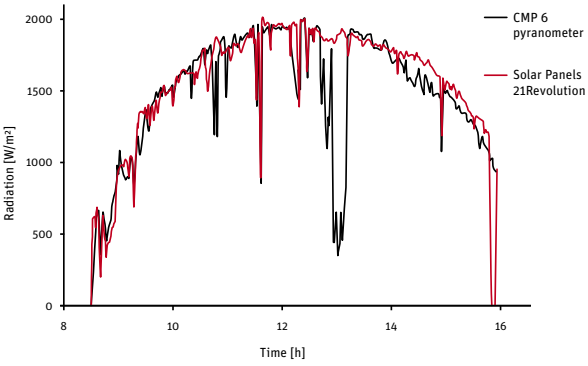


Graph 1 shows measurements from the pre-race system in Darwin. The output of the reference cell (black line) is multiplied with a calibration factor to compare it to the global radiation measured by the CMP 6 pyranometer (red line). It shows that the data lay close to each other, which indicates that the solar panel is not sensitive to the changing spectrum in the morning or evening. This graph provided the calibration factor of the reference cell for the race.

The blue line in the graph shows the diffuse part of the incoming radiation. This is important to know because the lens system of the 21Revolution panels is not able to focus diffuse radiation onto the under-laying solar cells. The drop in the graph around 11:00 am was caused by a cloud. Just before the cloud blocks the direct radiation, the edge of the cloud reflects the radiation which causes the intensity to rise. According to the team; “We know there is a standard calculation for diffuse radiation. However we prefer to measure it ourselves to precisely know the effects of clouds and ‘angles’.”

Graph 2 shows the incoming radiation on the first day of the race. Overall the data resembles the output of the solar panels. But around 13:00 p.m. there is a big deviation. When a deviation like this occurs it is up to the DMU to find the cause as soon as possible. Luckily, this time it was not a system malfunction. It was due to a media stop when the DMU was separated from the 21Revolution and most likely the DMU was parked in the shade which effected the incoming radiation to the CMP 6 pyranometer. During tests, however, the measurements indicated that a whole group of cells were not operating correctly.

Graph 2



Solar Team Twente says; “The Kipp & Zonen instruments certainly helped to increase the reliability and optimise the performance of our solar car systems during the World Solar Challenge” ■

DMU with a CMP 6 pyranometer on top follows 21Revolution

Solar Resource Assessments in South Africa for Concentrated Solar Power Developers

The Department of Energy of the South African Government has established a target for renewable energy production to reach 10,000 GWh by December 2013. Of this, 6,000 GWh is expected to come from mainstream on-grid electricity generation.

In order to meet the remaining 4,000 GWh of the target, the National Energy Regulator of South Africa (NERSA) published in March 2009 a Renewable Energy Feed-In Tarif (REFIT) to encourage investment in developing technologies, as follows:

- Wind: 1.25 ZAR/kWh
- Small hydroelectric: 0.94 ZAR/kWh
- Landfill gas: 0.90 ZAR/kWh
- Concentrating solar: 2.10 ZAR/kWh

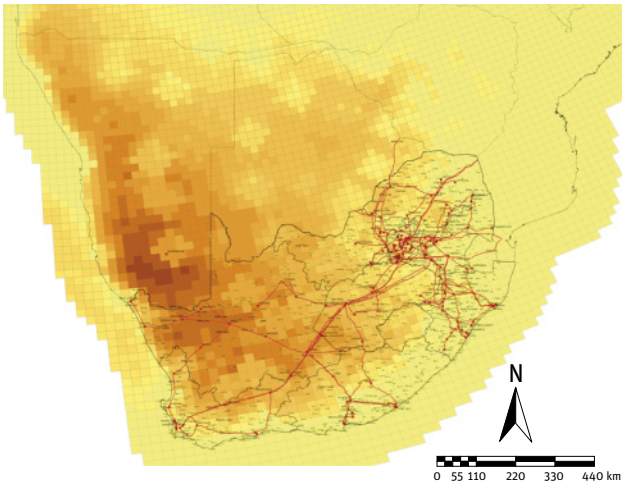
In October of 2009 the following additional tariffs were published:

- Concentrated solar power troughs without storage at ZAR 3.14/kWh
- Solid biomass at ZAR 1.18/kWh
- Biogas at ZAR 0.96/kWh
- Photovoltaic systems (large ground or roof mounted) at ZAR 3.96/kWh
- Concentrated solar power (central tower) with 6 hours storage at ZAR 2.31/kWh

1 Euro is equal to approximately 9.3 South African Rand (ZAR).

South Africa has some of the best solar energy resources in the world with locations having an annual sum of Direct Normal Irradiation (DNI) exceeding 2900 kWh/m2 (8000 Wh/m²/d). This, along with the attractive REFIT scheme, has lured many Concentrated Solar Power (CSP) developers to South Africa. A DNI map of South Africa based on satellite derived data from the National Renewable Energy Laboratory (NREL) in the USA is shown at right.

The Centre for Renewable and Sustainable Energy Studies (CRSES), situated within the Department of Mechanical and Mechatronic Engineering at Stellenbosch University, has the capability to offer solar resource assessment services to CSP developers. The service includes the specification, installation and operation of a solar measuring station for a minimum period of one year. In addition, satellite-derived data from various sources are compared to the measured ground-level data.



In February 2010 the first solar radiation measurement station was installed. This uses a Kipp & Zonen SOLYS 2 sun tracker, a CHP 1 pyrheliometer, two CMP 6 pyranometers and a Campbell Scientific CR800 data logger to measure direct, diffuse and global solar radiation.

A second station was installed in May, comprising two CMP 6 pyranometers and a CM 121 shadow ring. The installation will be expanded in July by adding a CHP 1 pyrheliometer, a SOLYS 2 sun tracker, a Campbell Scientific CR1000 data logger and a 10 m meteorology mast with anemometer, wind vane, temperature, humidity and barometric pressure sensors.

Both stations are located in Upington; a town in the Northern Cape Province that is known for having high annual DNI sums, due to low rainfall and minimal cloud cover. When it does rain in Upington, it is mainly during the night or in the early morning hours. It was found that, in general, for the Upington area the satellite-derived data under-estimates the measured data. This is good news for CSP developers and the future of solar energy in South Africa ■

We wish to thank **Riaan Meyer** of the **Centre for Renewable and Sustainable Energy Studies**, (CRSES) Stellenbosch University, South Africa for contributing this article. The Kipp & Zonen distributor in South Africa that provides the equipment to CRSES is Campbell Scientific Africa (Pty) Ltd. of Stellenbosch, www.csafrica.co.za

New Website for Mierij Meteo

Mierij Meteo has just released a new website and invites you to take a look at www.mierijmeteo.nl. A completely new lay-out and menu structure has up-to-date information about their meteorological sensors and systems and helps you to easily find the right products for your application.

In addition to the comprehensive information on the product webpages, the “related downloads” side-bar offers you information about the product, in pdf, with the click of a mouse button. Another new feature of the Mierij Meteo website is the “ADD TO BASKET” button. After putting all your selected products into the basket it is just one click to send Mierij Meteo your quote request.

The “Download Center” tab at the top of the page gives direct access to all the product brochures in pdf. Later this year the product manuals will also become available through the Download Center.

Mierij Meteo will continue improving the service of their website and you are welcome to share your comments and recommendations by sending them to Barry Engelen (be@mierijmeteo.nl) ■

Fairs & Events

METEOREX - Exhibition of Meteorological Instruments, Related Equipment and Services Helsinki - Finland	31 Aug - 02 Sept 2010
EU PVSEC - 25th European Photovoltaic Solar Energy Conference and Exhibition Valencia - Spain	06 - 09 September 2010
EMS - 10th European Meteorological Society Annual Meeting Zurich - Switzerland	13 - 17 September 2010

Passion for Precision

Kipp & Zonen is the leading company in measuring solar radiation and atmospheric properties. Our passion for precision has led to the development of a large range of high quality instruments, from all weather radiometers to complete measurement systems.

We promise our customers guaranteed performance and quality in: Meteorology, Climatology, Hydrology, Industry, Renewable Energy, Agriculture and Public Health.

We hope you will join our passion for precision.

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