



# Newsletter 37

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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](mailto:kelly.dalu@kippzonen.com)

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Kipp & Zonen B.V. - 2016



Xander van Mechelen  
CCO of Kipp & Zonen B.V.

## Changing Climate and Markets; the only Constant is Customer Innovation

In the last months I have been travelling a lot. In Edmonton, Canada, the temperature was up by 20 degrees Celsius. It should have been snowing! In The Netherlands the month of April was colder than the Christmas month of December... We know more and more about climate, but climate itself keeps surprising us. Solar energy markets are just as unpredictable. India, Brasil, Chile and Japan are all promising markets, but when do they really take off?

Fortunately, the thing that we can rely on is our customers. Kipp & Zonen employees have been talking a lot to customers during exhibitions and field visits. And the customers clearly tell us what they need. We listen and we act.

Innovation by Kipp & Zonen is the other thing we (and you!) can rely on, it's our main area of focus. This is where we can translate customer demands into good solutions. Sometimes we cannot develop everything ourselves fast enough, and have to buy it. In May we acquired Black Photon's Airshield® DNI technology for pyrhemometers.

The technology has been transferred to give Kipp & Zonen the exclusive rights to manufacture and offer a complementary new accessory that greatly reduces soiling of the pyrhemometer optical window in dry and dusty environments. It was the conversations with customers that convinced us to make this step.

Another Innovation that we are very proud of is the launch of RaZON<sup>+</sup>; our new compact and all-in-one solar monitoring and logging system. It was the solar energy group of customers who gave input for the unique functionalities in this new product, especially the O&M and resource assessment companies. In this newsletter you will find an extensive article about the RaZON<sup>+</sup>.

Until 2015, Kipp & Zonen's ambition was to sell the best instruments. In 2016 we redefined this ambition as to sell the best field measurements; in the end this is the only thing that counts for our customers. There is a clear trend that investors are becoming more and more interested in solar plant performance after commissioning. A new development for this is our free downloadable 'Suncertainty' app for smartphones and tablets.

Good installation, good maintenance and knowledge about the real-time accuracy of the radiation measurements are just as important as having a good instrument. For this reason we presented at the Solar Asset Management conference in San Francisco the Suncertainty app. Instrument measurement uncertainty is not static; it depends on local factors like weather conditions, location, date and time of the day. Good solar plant management requires insights into the uncertainties of measurements. Knowing this can result in early maintenance actions, increasing the output of a solar plant and the return on investment.

Whatever the climate and markets are doing, it feels good to deliver results. Results that you asked for and initiated. Customer Innovation is exciting and a Kipp & Zonen constant. It brings spirit into our company and, most of all; I hope you are pleased with our new products. There is more to come in 2016!

# The man behind the AirShield® DNI

Earlier this year Kipp & Zonen acquired Black Photon's Airshield® DNI for pyrhemometers. The technology has been transferred to give Kipp & Zonen the exclusive rights to manufacture and offer a complementary new accessory for its pyrhemometers that greatly reduces soiling of the instrument optical window. In an interview with our marketing manager we get to know a bit more about Black Photon and the AirShield®.



**Please introduce yourself.**

I'm Dr. Joachim Jaus, CEO and founder of the company Black Photon Instruments. I live in Freiburg in the southern part of Germany, which is also the city where Black Photon is located and all our products are developed and produced.

**What is the AirShield® DNI? And how does it work?**

Airshield® DNI is a system that can prevent dust, dirt and insects from affecting the measurement of direct normal irradiation (DNI). DNI is usually measured with a pyrhemometer such as the CHP1 or SHP1 from Kipp & Zonen. The Airshield® system has two parts. One is the air supply cabinet where clean pressurized air is generated. The other is an injector head that is directly mounted onto the pyrhemometer and releases the pressurized clean air so that dust and dirt can be hindered from settling on the entrance window of the pyrhemometer.



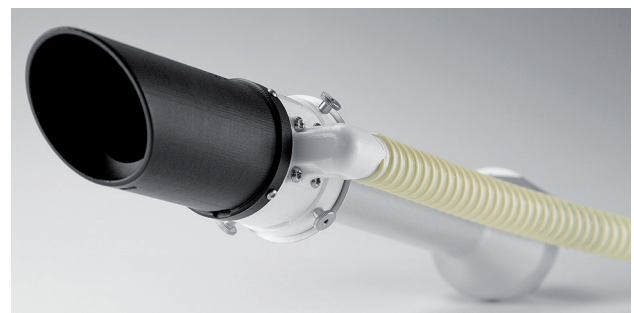
**Why would one use the AirShield®, and what are the main benefits?**

To get good DNI measurements in dusty environments, very frequent manual cleaning is required, normally several times a week. However, manual cleaning is quite costly. The great thing about the Airshield® is that it allows users to increase the interval between cleanings and still get the same high quality DNI measurements. It is therefore a great addition to high performance pyrhemometers, such as

the CHP1, as it maintains the excellent basic accuracy in everyday measurements in harsh environmental conditions without high cleaning costs.

**Can you describe a typical application of the AirShield®?**

A typical application of the Airshield® is in areas with high dust loads in the air, such as deserts. As many of the regions on this planet with the highest potential for solar energy are also dry and dusty, the Airshield® is well suited to bring solar energy measurements to exactly these areas. Especially, if there are no permanent staff on the site that could frequently clean instruments, the Airshield® can help a great deal in reducing long and costly trips by maintenance staff to the site.



**Can you share some details about the development of the AirShield®?**

Airshield® was first developed for a Circumsolar Radiation sensor of Black Photon for an application in Oman a couple of years ago. This type of measurement is extremely sensitive to any kind of dirt or dust on the instrument. As the location in Oman where the system was to be operated has harsh desert conditions, we needed a system that would prevent dust from settling on the instrument. As no system like that was available, we decided to develop a system that was both compact as well as rugged and provided exactly the constant flow of pressurized clean air that we needed.

**Please describe your company Black Photon.**

Black Photon was founded in 2010 as a spin-off from Fraunhofer ISE. We develop and manufacture specialized equipment for the solar industry and meteorological services. Our first technologies that we offered were isotope spectral sensors and tracking accuracy sensors for the concentrated photovoltaics (CPV) industry. Our latest products include the Sunscanner, a tracking platform for solar instruments, and of course the Airshield®. [www.black-photon.de](http://www.black-photon.de) ■

Passion for Precision

# Local Pyranometer Calibrations in Germany

Kipp & Zonen recently installed an automated calibration facility at Gengenbach Messtechnik e.K. near Stuttgart in Germany. Pyranometer users in Germany and Switzerland can now benefit from faster calibrations to Kipp & Zonen factory standards.



Previously, Gengenbach Messtechnik had to send customer pyranometers to Kipp & Zonen in the Netherlands for inspection, service and calibration; thus causing longer turnaround times and extra transport costs.

Rolf Gengenbach, director and owner of Gengenbach Messtechnik, says, “It was sometimes frustrating that I couldn’t serve my customers more. Now I’m in control of the turnaround time and at the same quality level as Kipp & Zonen requires for its factory and office calibrations. I can now provide a faster service with less measurement downtime for my customers.”

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“We prepared a special black-painted and air-conditioned room for the facility to create the required controlled environment and we were trained extensively by Kipp & Zonen specialists to completely understand the procedures and system.”

One of our key corporate values is Passion for Precision and Kipp & Zonen pyranometers are recognized as the best and most reliable solar radiation measurement instruments. However, some maintenance is required; primarily cleaning the dome and the replacement of desiccant in some models. Recalibration every two years is strongly recommended to maintain optimum measurement accuracy.

Pyranometers are calibrated according to the ISO 9847:1992 standard, which refers to the ‘Kipp & Zonen device and procedure’. The sensitivity of the test pyranometer is determined by comparing it to a traceable reference instrument of the same type and under stable conditions.

“We sometimes see pyranometers calibrated at other laboratories, which have significantly different sensitivities when compared to using our facilities.” says Clive Lee, Customer Services Specialist at Kipp & Zonen. “Since we have a history of thousands of instruments recalibrated in-house, we can conclude that the quality of other calibrations in the market is not always perfect.”

All instrument calibration information and history is logged in a central database and quality checked. Sensitivity changes can be monitored and Kipp & Zonen pyranometers are proven to be very stable through time.

Rolf Gengenbach shares this Passion for Precision, “It is a great pleasure for me to be able to serve my customers locally to Kipp & Zonen standards. I’m proud to have the ‘Kipp & Zonen Approved Calibration Facility’ stamp on my website”.

Rolf Gengenbach and Kipp & Zonen have a special relationship going back over 20 years. “This first automated calibration facility outside Kipp & Zonen offices is an expression of our mutual trust. Kipp & Zonen acknowledges the high level of experience and knowledge at Gengenbach Messtechnik e.K. by this next step in our distribution relationship.” says Xander van Mechelen, CCO of Kipp & Zonen.

All local Kipp & Zonen automatic calibration facilities provide the same high quality as at the factory. The facility at Gengenbach Messtechnik is identical to the existing facilities at the Kipp & Zonen offices in the USA, Singapore and France.

The calibration software and server in Delft manages the entire calibration process remotely and stores all the data and records, providing consistency and preventing operator mistakes.

The facilities are fully supported by the Customer Services and Research & Development departments of Kipp & Zonen. The support team remotely monitors calibration performance, and audits all calibration facilities bi-annually to verify the procedures and technical systems.

Local calibrations are part of a range of new service concepts at Kipp & Zonen, bringing support closer to our customers. The next local facility will soon be installed at Equinox Instruments Limited, bringing faster calibration services to our customers in the UK and Ireland ■

Gengenbach Messtechnik e.K. was founded in 1991 by Rolf Gengenbach to provide measurement solutions, and is the exclusive distributor of the Kipp & Zonen portfolio in Germany and Switzerland.

For local calibrations of Kipp & Zonen pyranometers in Germany or Switzerland, please call +49-(0)7153-9258-0 or e-mail to [info@rg-messtechnik.de](mailto:info@rg-messtechnik.de)



# Our Innovative New Development: RaZON<sup>+</sup>

## The most affordable ALL-IN-ONE Solar Monitoring Station



We are proud to announce a ground-breaking new Kipp & Zonen development, the RaZON<sup>+</sup>. Visitors to Intersolar Europe in June will be the first to check-out this new all-in-one system for accurate measurements of both direct normal irradiance (DNI) and diffuse horizontal irradiance (DHI) from the sun and sky. This set-up enables the system to provide reliable values of global horizontal solar irradiance (GHI), sunshine duration and total energy.

RaZON<sup>+</sup> is not just new, it's also very user-friendly and affordable. If you are involved in CSP or PV solar energy projects RaZON<sup>+</sup> can help you to prospect for new locations, calculate performance ratios, maximise operating efficiency, schedule maintenance and monitor plant performance; all with a minimal soiling effect. For meteorological studies RaZON<sup>+</sup> provides a very cost effective solution for the measurement of solar irradiance.

Decades of scientific knowledge, engineering experience and customer feedback have been the inspiration for this radical development. RaZON<sup>+</sup> uses a new and unique design of integrated Smart pyrhelimeter and shaded Smart pyranometer with quartz diffuser that both meet ISO 9060 requirements. The innovative features of the pyrhelimeter minimise the effects of soiling when operated unattended in remote locations, without compromising the high accuracy of the instrument. "The first prototype tests already confirmed that we were heading in the right direction" says Ilja Staupe, the leading Physicist of this development. "We quickly found out we had something really innovative at hand and applied for a patent".

RaZON<sup>+</sup> measures the diffuse horizontal solar irradiance with a shaded Smart pyranometer mounted on top of the housing. Kipp & Zonen made the choice to measure DNI and DHI and calculate GHI because this minimises the effects of thermal offsets in the pyranometer and provides an accurate and reliable measurement, with a much lower uncertainty. RaZON<sup>+</sup> capabilities can be extended easily by connecting a compact weather station or other Modbus<sup>®</sup> sensors, such as PV panel temperature.

After simple installation and alignment, RaZON<sup>+</sup> uses its GPS receiver information to track the sun from dawn to dusk and automatically stores the measured and calculated data. User-friendliness was a key target in the development. Installation is simple and so is the collection of accurate solar irradiance data.

Thanks to the integrated data logger and the Smart sensors with internal temperature correction, accurate stored and real time data is available. This data includes DNI, DHI, GHI, sunshine duration, energy in kWh/m<sup>2</sup>, sun position, GPS time and system status; all accessible digitally via Ethernet and RS-485 ports.

RaZON<sup>+</sup> offers a complete interface with data, graphs and status information. You can easily check this on the spot with a smartphone, tablet or laptop via its integrated Wi-Fi.



RaZON<sup>+</sup> will be ready to order from September 2016. Subscribe to our e-news online to learn the details of this exciting technical innovation and its additional capabilities such as onsite calibration and automatic soiling detection ■

Passion for Precision

# Using Scintillometry for Assessment of Evapotranspiration in the Seasonal Tropics of Panama

By Mario Bretfeld, Smithsonian Tropical Research Institute - Accurately quantifying evapotranspiration in the seasonal tropics of Panama poses several challenges. During the rainy season, from early May to late December, frequent cloud cover hampers acquisition of remotely sensed data and results in considerable data gaps. In addition, Panama's landscapes typically comprise a dynamic mosaic of mature forest fragments, pastures and agricultural land, and re-growing secondary forests, necessitating ground-based measurements at smaller spatial and temporal scales.

## Increasing demand for water

This is true for the Panama Canal Watershed (PCW) in central Panama, which supplies water for the operation of the canal, domestic and industrial uses, and for generation of hydroelectricity. An increasing demand for water due to urbanization and the expansion of the Panama Canal, along with a predicted transition into a dryer climatic period, necessitate a better understanding regarding the effects of land use on energy fluxes and hydrological processes.

## Development of an improved hydrological model

As part of a collaborative research supported by the National Science Foundation with the overarching goal "to assess the feedback between hydrology and humans by developing an improved hydrological model coupled with a model of socio-economic behaviour", we have taken several approaches to measure evapotranspiration across different types of land uses in the Panama Canal Watershed.

These approaches include in-vivo photosynthesis and sap flow measurements in secondary forests of different ages and a shaded coffee plantation, an eddy flux tower in a pasture environment, and two first generation Kipp & Zonen Large Aperture Scintillometers (LAS) measuring across a mosaic of pasture and re-growing secondary forest patches.

Our research sites are located in the 15 km<sup>2</sup> Agua Salud study area. Established in 2008, the Agua Salud project is a collaboration between the Smithsonian Tropical Research Institute, the Panama Canal Authority, Panama's Environment Authority and other partners.



Post-doctorate Mario Bretfeld and intern Laura Lyons during LAS alignment

## The use of LAS scintillometers

The main objectives of the scintillometers are: 1) to test the agreement between devices over an identical, long-distance transect spanning multiple land cover types and complex terrain in a high humidity environment, and 2) to provide an additional method and measurement scale to assess evapotranspiration, complementing sap flow and eddy flux measurements.

In February 2016, we installed two scintillometers in parallel, with a receiver and transmitter at each end of a 4217 m transect. Although signal strength was expectedly low, measurements on dry, clear days agree well between the devices (~5% difference) and a comparison of preliminary data for sensible heat flux between scintillometers and the nearby eddy flux tower further confirm the applicability of scintillometers during the dry season in the Panama Canal Watershed, with the added benefit of generally requiring less maintenance than eddy flux systems. However, expectedly, once the rains started in late April, signal strength frequently approached the noise levels of the instruments.

## Next steps

Our next objective is to relocate one scintillometer and measure across a shorter transect (~ 2000 m) that traverses a 7 ha watershed currently covered by 25 year old secondary forest, which will be deforested in the next dry season, with the aim to get reliable rainy season data and to detect changes in fluxes from the forest-to-pasture conversion.

[www.ctfs.si.edu/aguasalud](http://www.ctfs.si.edu/aguasalud) ■

# We would like to introduce you to our new colleague Donald van Velsen

I'm Donald van Velsen, a new product manager at the Kipp & Zonen headquarters in Delft.

My background is in electronics and computers and, for the 'experienced ones' among us, I started with the DEC PDP11, Sinclair ZX81 and noisy line printers. However, I soon discovered that my passion was for customers, service and sales and not so much for pure R&D. Thus I made the move to product management for - at that time leader of the copier and printer world - Xerox.

The world changed and so did I, running my own company for four years, importing and selling high quality scanners and printers. This led to working for the biggest printer company, Hewlett-Packard, for fourteen years in sales support, field sales and partner management.

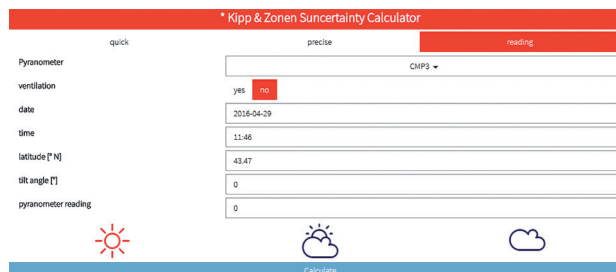
My need for change, and a sales management opportunity, made me switch to Nikon Instruments. Amazing cutting edge technologies combined with very interesting customers, made me love my job there. It isn't often one can have lunch with a Nobel Prize winner or discuss the power of a motor protein within our cells.

It's now to Kipp & Zonen that I bring my curiosity, passion for the customer, technical background, commercial experience and fondness of change. A large part of my job will be helping my colleague Ruud Ringoir with product management, such as forward looking activities in new product development and portfolio growth. The remaining part of my time is dedicated to improving the services for our offices and distributors even further.

I'm looking forward to working with and for you ■



# Suncertainty: Measuring the Power from the Sun



For monitoring the generating performance of solar power plants it is necessary to measure the amount of solar radiation arriving at the surface locally in real-time. When using this data to calculate bankability, efficiency, profitability, compliance with contractual targets and return on investment it is essential to know the uncertainty. Is it  $\pm 2\%$  or  $\pm 5\%$ ? It can make a big difference to the bottom line.

In order to make a better estimate of the site-specific uncertainty in solar radiation measurements Kipp & Zonen has designed an application for IOS and Android tablets and smartphones. It has a database of our pyranometer models and their specifications.

A simple 'quick' mode uses date, time, latitude, whether a ventilation unit is fitted, tilt angle and cloud conditions as input information. An algorithm calculates sunrise and sunset times, solar zenith angle and air mass throughout the day. A more detailed 'precise' mode allows for the input of specific parameters, such as the long-wave net radiation.

Suncertainty is a new, unique, and free application and an invaluable tool for all those involved in using solar radiation data in solar energy applications. You can easily see the improvement in measurement uncertainty by upgrading to a better pyranometer. Go to the Google Play Store or the Apple App Store to download the Suncertainty app for free ■

## Fairs & Events

EMS Annual Meeting • Trieste • Italy	11 - 16 September
Solar Power International • Las Vegas • USA	12 - 15 September
Intersolar Summit Middle East • Dubai • UAE	19 - 21 September
Meteorological Technology World Expo • Madrid • Spain	27 - 29 September
WETEX • Dubai • UAE	04 - 06 October
Intersolar India • Mumbai • India	19 - 21 October
Solar Asset Management • Milan • Italy	09 - 10 November

# 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.

## HEAD OFFICE

**Kipp & Zonen B.V.**

Delftechpark 36, 2628 XH Delft  
P.O. Box 507, 2600 AM Delft  
The Netherlands

+31 15 2755 210  
info@kippzonen.com  
www.kippzonen.com

## SALES OFFICES

**Kipp & Zonen France S.A.R.L.**

88 Avenue de l'Europe  
77184 Emerainville  
France

T: +33 (0) 1 64 02 50 28  
F: +33 (0) 1 64 02 50 29  
kipp.france@kippzonen.com

**Kipp & Zonen Asia Pacific Pte. Ltd.**

10 Ubi Crescent Lobby E  
#02-93 Ubi Techpark  
Singapore 408564

T: +65 (0) 6748 4700  
F: +65 (0) 6748 6098  
kipp.singapore@kippzonen.com

**Kipp & Zonen USA Inc.**

125 Wilbur Place  
Bohemia  
NY 11716  
United States of America

T: +1 (0) 631 589 2065  
F: +1 (0) 631 589 2068  
kipp.usa@kippzonen.com

Go to [www.kippzonen.com](http://www.kippzonen.com) for your local distributor or contact your local sales office.

