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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@kipzonen.com

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Kipp & Zonen B.V. - 2011

Summer is here, and so is the LAS MkII!

We are now half-way through 2011, and with Summer well on its way we are proud to announce a new product to you in this newsletter.

During the 3rd International Scintillometer Workshop in Wageningen, the Netherlands, on 18th and 19th of April Kipp & Zonen introduced the new LAS MkII Large Aperture Scintillometer. The new instrument has been designed using the latest state of the art technology, and with feedback from customers, to eliminate the few weaknesses of the previous instrument and it is performing above expectations.

The development of the solar energy market continues to amaze. The growth is still very rapid, driven by the need for more, and cleaner, electrical power and the security of energy supplies. During the Hannover Fair this spring you could see an enormous growth in electric-powered vehicles; however, this really only makes sense if the electrical power is generated in a CO₂-free and sustainable way.

Wherever I go on my business trips it is interesting to see, during the landing approach to an airport, the increasing number of solar panels on roof tops and, sometimes, enormous fields of panels forming solar farms. The growth is visible, I see it each year that I visit.

Solar energy as a power source will be become more competitive as the generating efficiency and operating lifetimes increase and the costs reduce. This is good news for Kipp & Zonen! We supply high quality instruments with the best accuracy available. This provides the customer with the best insight into energy availability and system performance, which really influences the financial bottom line of the power plant. Choosing lower cost and accuracy products may turn out to be an expensive choice in the long term.

Please enjoy reading this newsletter.

Thank you and best regards,



Ben Dieterink, President
Kipp & Zonen B.V.



3rd Scintillometer Workshop

By Victor Cassella, Kipp & Zonen USA Sales & Marketing Manager for Scientific Markets

“In April 2011, I was able to attend the 3rd Scintillometer Workshop at Wageningen University, the Netherlands. Not only, was the weather perfect for early spring in Holland, so was the workshop. All of the applications, talks and papers were very interesting and well presented.

At the end of the first day, Kipp & Zonen co-hosted dinner and drinks in the new meteorological field at the University. Before dinner, the much-anticipated introduction of Kipp & Zonen’s new LAS MkII Large Aperture Scintillometer was presented in a live demo by Martin Veenstra. The additions and improvements to the Scintillometer that Kipp & Zonen has implemented were very well received.

I wish to thank the hosts of the workshop, Doctors Hartogensis and Moene and also Anneke van de Boer, Daniëlle van Dinther, and Miranda Braam for taking care of all the logistics.”

The workshop was visited by 69 people from Germany, France, United States of America, Spain, Czech Republic, United Kingdom, Belgium, Bolivia, China, Finland, Portugal, Suriname and of course the Netherlands.

More information at www.met.wau.nl/scintillometerworkshop2011.



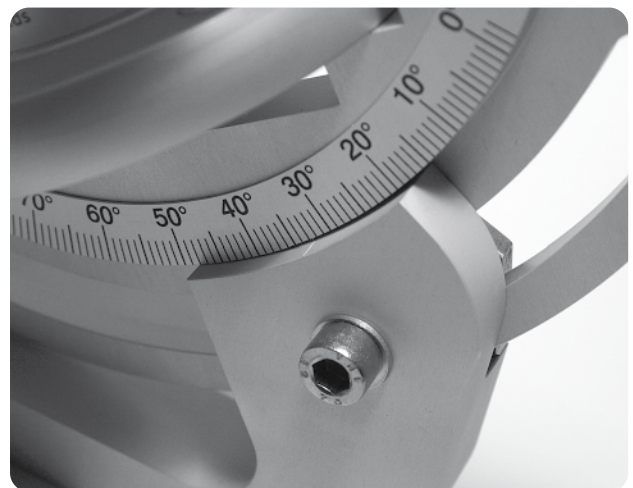
LAS MkII in the sunset at Wageningen University

You can find out more about the new LAS MkII, the Next Generation Large Aperture Scintillometer, in this Newsletter or on our website ■

Measure Tilted Global and Diffuse Solar Radiation

The position and angle of fixed photovoltaic panels make a big difference to the performance and return on investment of a solar energy power plant.

A horizontally mounted pyranometer measures the global short-wave radiation from the sun and sky in a way that is easily comparable with other sites and with solar energy database information. However, for fixed angle (non-tracking) PV panels it is important to know the energy available within the ‘view’ of the panel. This ‘tilted global radiation’ is measured using a pyranometer inclined at the same angle as the panel.



Detail of Adjustable Tilt CMP Mounting Kit

The best way to determine this in prospecting for sites and in performance assessment is by measuring solar radiation with both horizontal and tilted pyranometers. Kipp & Zonen now offers an accessory to tilt a CMP 3, 6, 11, 21 or 22 pyranometer to your preferred angle; the Adjustable Tilt CMP Mounting Kit (as shown on the cover of this newsletter).

The kit can be fixed to a horizontal surface and has a clear scale in degrees, and a secure locking device, for easy adjustment of the angle of a pyranometer from horizontal to vertical. It can also be fitted to the CMF 2 mounting fixture for simple attachment to walls and poles using the CMB 1 mounting bracket.

The mounting kit fits our two sun trackers, the 2AP and SOLYS 2, and can be used with the shading ball assembly to measure the tilted diffuse solar radiation ■

Passion for Precision

Barchan Dunes: Silent Travelers of the Desert

By Michel Louge, Cornell University, Ithaca, USA

Sand dunes are ubiquitous features of many deserts. During the day, they reflect and absorb solar energy and re-emit copious amounts of heat at longer wavelengths. At night, they lose as much as 100 W/m^2 to clear skies, dropping the ambient temperature and creating an inversion (cold air near the ground and warmer above) that damps atmospheric turbulence.



NR Lite2 at sunset over the desert

4 On the flat, hard desert floor crescent-shaped barchan dunes form wherever winds originate from a predominant direction. Such mobile dunes advance relentlessly, a few centimeters a day, eventually covering roads or infrastructure that lie in the way. Our objective is to devise ways to keep this motion in check by enhancing sand cohesion.

A natural way to do so is to exploit moisture that forms small bonds at sand grain contacts, producing the cohesion that permits the building of sand castles. Moisture naturally permeates dunes after rain or as dew forms on their colder surface at dawn.

In two recent field campaigns with an international team of scientists from France, the USA, Qatar and Mauritania, we recorded time-histories of temperature and humidity profiles just below the surface of desert barchans. Time-lapse animations of these profiles can be found at <http://grainflowresearch.mae.cornell.edu/geophysics/dunes/dunes.html>

A crucial input to understanding temperature variations was to record simultaneously the net-radiation flux to and from the dune surface, regardless of wavelength. This is why we turned to the Kipp & Zonen NR Lite2, which constitutes a relatively inexpensive instrument for broad-band net radiation measurements.

The NR Lite2 output signal was amplified by a factor of 100 using a battery-powered custom amplifier to accommodate the input range of a National Instruments CompactRIO data acquisition system. This allowed us to operate autonomously for up to 60 hours at a stretch on Lithium-Polymer batteries. Simultaneously, we recorded signals from a temperature probe and a unique capacitance instrument that we created to measure depth profiles of extremely low humidity levels.

Our modeling of sand heat transfer near the surface confirmed that the principal contribution to the heat flux at the dune surface is radiative. With its well-documented sensitivity, the NR Lite2 allowed us to model the temperature profile accurately without further calibration.

This work is sponsored by the Qatar National Research Foundation. Participants include Anthony Hay, Alexandre Valance, Ahmed Ould el-Moctar, Renee Richer, Christopher Ogden, Patrick Chasle, and Sara Abdul-Majid ■



Group picture in Akjoujt

LAS MkII: the Next Generation Scintillometer

Setting up a measurement station for a research project or validating remote sensing of heat fluxes and evapo-transpiration can be very laborious. For example Eddy Covariance towers require regular maintenance, advanced data acquisition, data processing, and relatively large amounts of power to yield measurement data over a limited footprint.

The new Kipp & Zonen LAS MkII Large Aperture Scintillometer provides continuous measurements of sensible heat fluxes over path lengths from 100 m up to 4.5 km. The measurement process is very straight forward and yields much faster results. And, since only limited power is required, in most cases a simple solar charged battery is sufficient.



The new LAS MkII Large Aperture Scintillometer

The measurement technique is based on the scintillation phenomenon. Heat fluxes cause variations in the refractive index of the atmosphere. The scintillometer detects these variations using a pulsed beam of infrared light which is emitted by the transmitter and detected by the receiver. From the scintillation measurements the sensible heat flux and evapo-transpiration can be derived.

In this age of wireless communication and the internet, being able to monitor and control your measurements remotely is of increasing importance. Thanks to our data acquisition systems with telemetry solutions this is now made easy. LAS MkII has internal digital processing that automatically computes all relevant parameters, such as C_n^2 and the sensible heat flux. The built-in data logger stores several months of measurements.

A digital interface allows for remote real-time display of data and full control over the instruments operational settings. In addition, analogue outputs are available to connect the instrument to almost any type of data acquisition system. This allows for easy integration into new or existing measurement networks.

Carrying instruments around for field deployment is already labour intensive enough, without having to think about laptops, interface cables, etc. LAS MkII can be installed and configured using its built-in display and key-pad without the need for a laptop, PC or software. Real-time measurement data is also available on the display so that you can easily see the status of your experiment.

The updated and improved Evation software suite is included as standard to view real-time data numerically and graphically as well as to carry out advanced data post-processing.

The optional meteorological sensor kit can be used to offer even easier automatic processing of measurement data. This plug and play kit consists of a wind speed, temperature and pressure sensors and connects directly to the scintillometer receiver.

To monitor Evapo-Transpiration, Kipp & Zonen offers the turn-key LAS MkII ET system. This provides all the instrumentation and software necessary to measure evapo-transpiration and other surface flux parameters ■

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Passion for Precision

Moldova's Solar Monitoring Station

Collecting accurate, long-term solar radiation measurements can help increase scientific understanding of the Earth's climate, and researchers in the Republic of Moldova are doing just that through their country's solar radiation monitoring station.



“All radiometric and ozone data acquired at the monitoring station are freely accessible to research centers and universities worldwide.” says Dr. Alexander A. Aculinin, a senior scientist with the Atmospheric Research Group (ARG) at the Institute of Applied Physics of the Academy of Sciences of Moldova.

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The ARG team is carrying out monitoring of solar radiation, aerosol optical properties and total ozone content (TOC) at the ground-based station located at the IAP in Kishinev, Moldova. The station was completed in 2003 and is situated in an urban part of Kishinev City. It was equipped using financial grants from the Civilian Research and Development Foundation (CRDF Global, USA) and the Moldovan Research and Development Association (MRDA) and under support from the AERONET project, NASA/GSFC.

The station has state-of-the-art instrumentation that consists of three principal automatically operated units; radiometric complex, Skye Instruments MiniMet automatic weather station, and a Cimel-318 sun photometer.

The radiometric complex is a key element of the whole station and it consists of the set of nine broadband radiometric sensors from Kipp & Zonen. The sensors are connected to the “brain” of the station - to the datalogger CR10X SM 4M running under remote control from PCs. Continuous measurements of direct, diffuse and total solar radiation are fulfilled within the wavelength range from UV to IR with broadband sensors such as CM 11 pyranometers, CH 1 pyrliometer, and SP Lite, PAR Lite, UV-B and UV-A sensors. These sensors are mounted at the stationary (for total radiation) and rotating (for direct and diffuse radiation) platforms.

The monitoring station has been in operation since 2003 and is registered as a regional fixed station by the World Meteorological Organization (WMO). It is installed on the roof of the Institute of Applied Physics and is equipped with state-of-the-art radiometric instrumentation, an automatic weather station and an ozonometer.

“Since the measurement program started we have the opportunity to carry out complex researches, such as interconnection between solar radiation and optical properties of atmospheric aerosols, long-term variability of these parameters and total column ozone content, to use these measurements to validate satellite observations. We've chosen Kipp & Zonen simply because it's very reliable, of course, if it is used reasonably and efficiently.”

Data centers with which the team is cooperating include the World Ozone and Ultraviolet Radiation Data Center (WOUDC) and the World Radiation Data Center (WRDC) ■



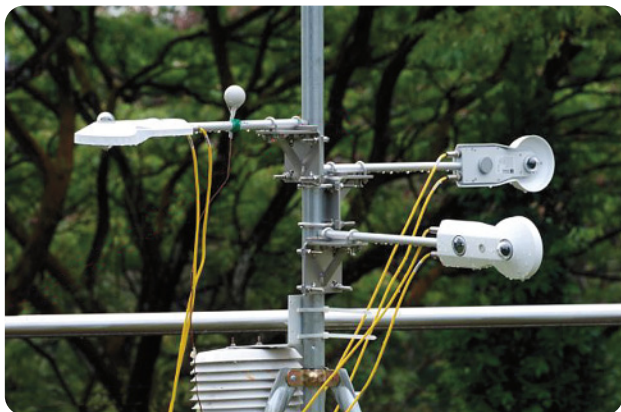
UV and Solar radiation monitoring at the ground-based station in Kishinev, Moldova

Singapore measures radiation in 3D

“The mean radiant temperature (Tmrt), which sums up all the short and long wave radiation fluxes (both direct and reflected) to which the human body is exposed, is one of the most important meteorological parameters governing human energy balance and the thermal comfort of man.” says Dr. Steve Kardinal Jusuf of the Centre for Sustainable Asian Cities (CSAC) at the National University of Singapore.

He further explains that; “There are several methodologies to measure the Tmrt. However, the most accurate way of determining the outdoor Tmrt is to measure the three-dimensional short-wave and long-wave radiation fields, along with the angular factors, before calculating the Tmrt.”

To achieve this, Dr. Kardinal and his team have installed on the rooftop of the School of Design and Environment (SDE) at NUS an experimental setup of three CNR 4 net radiometers.



3D measurement with three CNR 4 net radiometers

Each CNR 4 measures the four radiation components separately in a different orientation. One is mounted horizontally looking up and down, as usual. The two others are mounted on their sides, vertically. One looks North and South and the other looks East and West.

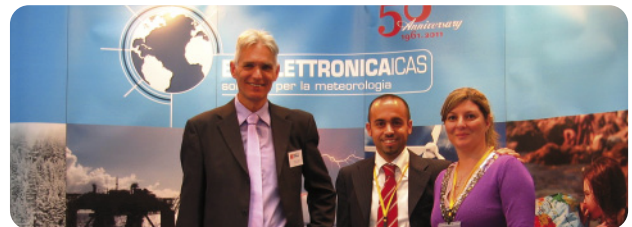
With this research into mean radiant temperature, CSAC will be able to develop and validate the global Tmrt equation for the tropics, which can subsequently be used to develop outdoor thermal comfort models.

The Centre for Sustainable Asian Cities serves as a platform to develop cutting-edge urban planning and design solutions as well as building technological innovations for high density environments that will be applicable not only to Singapore but also to many cities in Asia and other developing countries ■

Eurelettronica ICAS at SOLAR EXPO

By Maria Rita Leccese, Managing Director of Eurelettronica ICAS, Kipp & Zonen's distributor for Italy

Between 4th and 6th May 2011, Eurelettronica ICAS exhibited at SOLAR EXPO in Verona, in co-operation with Kipp & Zonen.



SOLAR EXPO is Italy's leading trade fair for renewable energy and distributed generation, totally dedicated to sustainable energy and the green economy. It was the first time for us at SOLAR EXPO and the experience was very intense and successful; during the three-day event a large number of experts visited our stand. Many of them showed a good understanding of the importance of solar radiation measurements for the proper functioning of a photovoltaic system and also recognized the importance of having a Kipp & Zonen pyranometer for a proper running of a PV system.

Through the dialogue with the involved people, we can conclude that the photovoltaic sector in Italy is still growing, even though a more stable and clear policy from the government would be good for the sake of future investments planning, both in the medium and long term.

Having Kipp & Zonen instruments on display - the SOLYS 2 sun tracker, the CMP pyranometers and the AMPBOX signal converter - combined with the experience of our engineers and the presence of a Kipp & Zonen specialist, allowed us to interact with visitors and explain the characteristics of Kipp & Zonen's range of products as well their usefulness and importance for photovoltaic applications ■

Fairs & Events

11 th EMS Annual Meeting Berlin, Germany	12 - 16 September 2011
3 rd iLEAPS Science Conference Garmisch-Partenkirchen, Germany	18 - 23 September 2011
Solar Power International 11 Dallas, Texas, USA	17 - 20 October 2011

Passion for Precision

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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