

Newsletter **45**

Kipp & Zonen pyranometer enables solar yield forecasting

Understanding the future for glaciers in the Himalaya

New weatherproof data and power hub for Smart instruments



Content

July 2018

P2: Column

P3: Kipp & Zonen pyranometer enables solar yield forecasting

P4: Understanding the future for glaciers in the Himalaya

P6: New weatherproof data and power hub for Smart instruments

P7: New member of our APAC team - Yucheng Mei

Fairs & Events

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

© All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, without permission in written form from the company.

Kipp & Zonen B.V. - 2018

Solar energy plant monitoring solution from one source

At Intersolar Europe 2018 in Munich Kipp & Zonen took the stage. We presented for the first time a complete suite of instruments for monitoring irradiance and the environment of solar power plants. Not as an integrator, which is a role dedicated to our business partners, but acting together with our colleagues from Lufft as a single source manufacturer for all the weather related instruments our customers may need.

Synchronized R&D development on the complete instrument set using open, yet integrated, communication protocols and no more worries about instrument compatibility. That is a requirement of many operating customers, especially multinationals, that we can now fulfil. The first multinational contracts have been agreed and we invite you to follow, if this solution suits your needs as well.

Of course many eyes were once again focused on DustIQ, as the newest production release was on display at Intersolar. The two soiling sensors have been joined by a small PV cell that enables the user to make an on-site dust calibration in a simple 15 minute process, fully covered by technology instead of a human assessment of the dust colour. It is the objectivity of technology that improves the accuracy of our measurements.

The latest DustIQ is presently on test with a number of well-known institutes to build up the knowledge base. In addition, the most important solar plant monitoring companies are integrating the DustIQ data into their systems. This illustrates that DustIQ is rapidly becoming the industry standard to measure the soiling ratio and its impact on plant performance. A position that will only get better as test results accumulate and algorithms improve. DustIQ is now shipping to customers worldwide and we will soon catch up on the backlog of orders created by the high demand. DustIQ is expected to be freely available by the end of July 2018.



Erik Valks

Kipp & Zonen pyranometer enables solar yield forecasting



Fulcrum3D is a technology company in New South Wales, Australia that adds value to wind and solar investments by providing inventive, robust solutions for remote sensing and dependable data delivery. Fulcrum3D's CloudCAM™ is providing short term solar yield forecasting in Australia and internationally. A Kipp & Zonen SMP11 pyranometer enables real-time irradiance calibration and is an essential component of the system.

CloudCAM detects clouds, predicts cloud movement and provides cloud, solar irradiance and solar power forecasts from seconds to 15 minutes. The system was originally conceived to assist stability in off-grid solar-diesel hybrid systems and has been further developed to provide irradiance and power forecasting for grid-connected PV power plants.

Off-grid application

CloudCAM with the Kipp & Zonen pyranometer has been deployed in a number of applications. One is at three remote solar-diesel hybrid micro-grids for the communities of Ti-Tree, Kalkarindji and Lake Nash in Australia's Northern Territory. Solar power stations of around 300 kW provide up to 85% instantaneous penetration into each of the Power and Water Corporation (PWC) micro-grids.

Ramp rate control is required so that the diesel generators do not stall when clouds quickly reduce the solar power supply and the load falls on the diesels. This grid stabilization was initially provided solely by large banks of lead acid batteries. In 2015 CloudCAMs were installed at Ti-Tree and Kalkarindji, and integrated into the real-time control systems at each power station as the batteries neared the end of their useful life.

CloudCAM predicts cloud events and signals a system that ramps down the PV supply via the inverter, allowing the diesel generator to ramp up at a rate that avoids stalling and engine damage. This reduced battery usage by approximately 30% and deferred future battery capital expenditure.

This ramp rate control also increased the average energy yield of the solar power stations into the micro-grids by about 5%, through reducing the ~20% losses associated with charging

and discharging the batteries. Battery round-trip efficiency is ~80% and reducing the amount of solar power required to charge the batteries meant more was available to be sold into the PWC micro-grids. Fulcrum3D's in-house technicians and engineers completed the installation and integration and provide ongoing support. Their unique expertise has enhanced the project outcomes.

The initial success at Ti-Tree and Kalkarindji (approximately one-year payback through higher yield and deferred battery capex) led to a CloudCAM installation at Lake-Nash in 2016 where the same performance improvement was achieved. The three CloudCAMs have been operating continuously since installation and continue to deliver demonstrated savings:

- To the solar power station owner through deferred battery capex, reduced maintenance and increased solar yield into the micro-grid.
- To PWC through reduced diesel consumption and spinning reserve requirement.

CloudCAM near-term forecasts can be nested with satellite data to make longer-term predictions.

Why choose Kipp & Zonen?

"The Kipp & Zonen SMP11 Pyranometer was the obvious choice for our CloudCAM system" said Dr Colin Bonner, Fulcrum3D's Technical Director "the high speed, accuracy, and quality of the SMP series meets the needs for Fulcrum3D's most demanding applications"

Go to www.fulcrum3d.com/cloudcam to find out more about CloudCAM™ ■

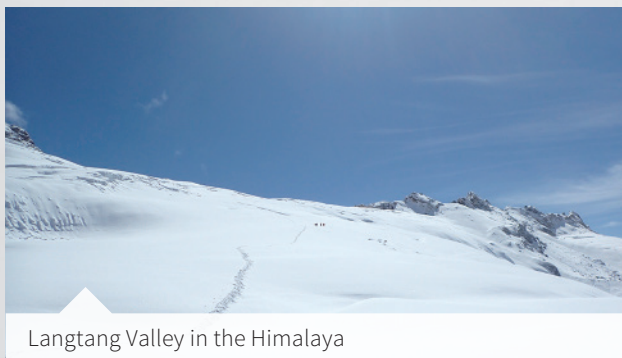
Understanding the future for glaciers in the Himalaya

By Jakob F. Steiner | PhD candidate | Faculty of Geosciences | Utrecht University

4

After the polar ice caps, the Himalaya ('abode of snow' in Sanskrit) has the largest number of glaciers; more than thirty thousand square kilometers of the mountain range is covered by glacial ice. These glaciers are a focus of public and scientific debate related to the effects of climate change.

Prevailing uncertainties are of major concern because some projections of their future have serious implications for water resources. One of the most closely studied areas is the Langtang valley, a catchment of nearly 600 km² on the border with China and a quarter of which is covered by glaciers. The highest point is the Langtang Lirung, at 7,234 meters a peak feared and revered by mountaineers because of the difficulty in reaching the summit.



Most of the rain falls in summer when the monsoon hits the Indian subcontinent and the Langtang region is on its northern frontier, before the Tibetan Plateau. During winter, in the areas above 4,000 meters, many meters of snow accumulate each year and most of it is melting at very fast rates.

Weather stations across the Nepalese Himalaya

Studies of precipitation and melt in the valleys of the Nepalese Himalaya is a collaboration of the International Centre for Integrated Mountain Development (ICIMOD), the Nepalese Department of Hydrology and Meteorology, Kathmandu University and Utrecht University in the Netherlands.

Our work here has been going on for many years, currently funded by the Norwegian Government, European Research Commission and the Netherlands Organisation for Scientific Research. We are an international team comprising Nepali, Dutch, Belgian, Finnish, Norwegian, German and Austrian co-workers studying the local climate, glaciers, snow cover and how it all relates to water resources.

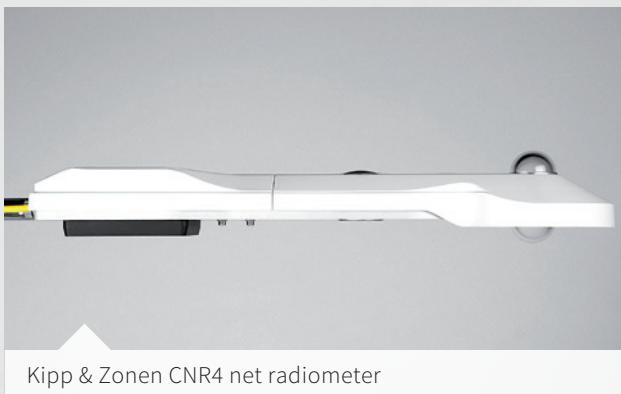
The project team maintains a number of automatic weather stations in the Langtang River catchment on the border with China that help us to judge the quality of larger datasets derived from satellites. We visit twice every year to maintain our stations and conduct field experiments and we use the data to make very detailed studies of melt and precipitation in the valley.

Our highest automatic weather station is located at 5,200 meters above sea level on the Yala Glacier. Bi-annual glacier mass balance measurements there are among the most detailed in the Himalaya making it one of the most important sites to



help understand the future of glaciers in the region based on field measurements. Our AWS measures air temperature, relative humidity, wind speed and direction, snow depth, as well as all four radiation components with a Kipp & Zonen CNR4 net radiometer.

This data helps understanding the local meteorological drivers of glacier mass change. Yala Glacier overall is losing mass due to intense solar radiation and dry and windy conditions that facilitate snow and ice melting and sublimation (the phase change from solid to gas without going through the liquid state).



Kipp & Zonen CNR4 net radiometer

Maintenance on site, twice a year

Maintenance of the automatic weather station at this high elevation can be tricky; temperatures in winter fall below -20°C and wind speeds can be very high. Our team visits the station twice a year, before and after the monsoon, to read out data and check equipment functionality.

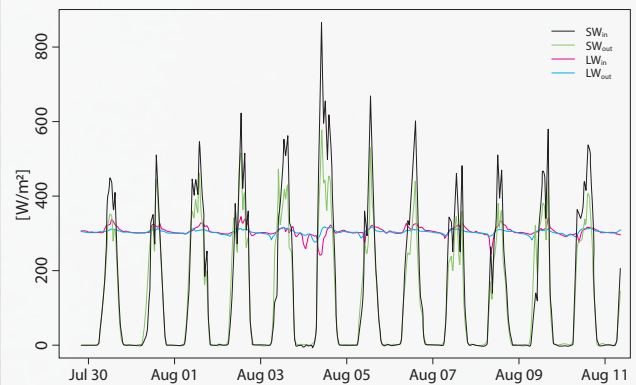
On clear days, solar radiation at this altitude is fierce and the reflection from the white snow feels like a grill even when air temperatures are just above the freezing point. When ablation of snow and ice is very strong in summer the metal poles of the weather station often need to be re-drilled into the ice by three to four meters to prevent it from melting out and falling over, and potentially damaging sensors like the CNR4 in the process.

Getting data from these stations is not technically difficult, but the local conditions are a challenge. Oxygen levels are 50% lower than here in my office in the Netherlands, and that has an effect on one's concentration. Combine this with freezing temperatures in the morning and the beating sun in the afternoon and you have quite difficult operating conditions.

How the CNR4 comes into play

The CNR4 is an essential centre-piece of our measurements, and we have it running on three of our weather stations. It allows us to measure incoming short-wave radiation, the major driver for ice and snow melt. At the same time it also records the out-going shortwave radiation, from which we then deduce the albedo of the ice or snow cover, a variable that is essential to understand melt events.

While short-wave radiation is measured on many stations and can also be relatively easily modelled, the CNR4 provides insights into a much more challenging variable - long-wave thermal radiation, coming from the atmosphere, clouds and the surrounding terrain. The data analysis is ongoing and in future will hopefully help us to better understand the processes leading to runoff in a changing climate.



CNR4 irradiance measurements over snow and ice during the monsoon season

Future work

After installing new sensors for so many field seasons our main focus now lies on maintaining these setups and analysing the data. Future endeavours will hopefully also lead us into other areas to see whether insights gained here over the years are applicable elsewhere. Collaborations with local and international partners are key to that, an effort that takes much time in meetings but makes work on these stations even more exciting.

Find out more about ICIMOD at www.icimod.org and the Utrecht University mountain hydrology projects at www.mountainhydrology.org ■

New weatherproof data and power hub for smart instruments

By Donald van Velsen | Kipp & Zonen Product Manager

In response to customer demand for an easy way to connect together and power several of our digital Smart instruments, we have developed a new device specifically for this purpose; the Smart Hub. It comes in two versions, one to pass through power from an external DC supply and a 'Powered' version with a built-in high quality AC to DC power unit. Both are fully weatherproof for outdoor use.



6

What does it do?

The Smart Hub has input connections for up to six 2-wire RS-485 instruments and combines them into one output cable for connection to a host; such as a data logger, SCADA system or internet gateway. This reduces the number and length of cables needed. The Smart Hub also distributes power to the instruments and the host (if required) from an external 12 VDC or 24 VDC power supply.

The Smart Powered Hub operates from 100 to 230 VAC, 50 to 60 Hz, and provides 24 VDC at up to 2.2 A internally to the connected instruments. This is sufficient to power a RaZON⁺, SOLYS2 or SOLYS Gear Drive sun tracker and measurement devices. These can be our SMP, SGR, SUV or SHP models, and compatible Modbus[®] RTU devices; such as a Lufft WS-UMB all-in-one weather station or a Ingenieurbüro Mencke & Tegtmeier MB-type PV module temperature sensor.

SOLYS Smart Hub system

The Smart Hub allows you to build a fully digital SOLYS2 or SOLYS Gear Drive solar monitoring station; fitted with a SHP1 pyrheliometer for DNI, two SMP pyranometers for GHI and DHI and a SGR pyrgeometer for long-wave thermal radiation from the atmosphere and sky. An ideal host is the LOGBOX SE data logger to locally acquire and store measurement data.

UV Smart Hub system

Our new SUV range of instruments to measure ultraviolet radiation from the sun and sky are digital. A Smart Hub and LOGBOX SE with SUV-A, -B and -E (UV Index) radiometers will monitor and record all three types of UV radiation.

What does it look like?

The Smart Hub enclosure is similar to the LOGBOX SE, but larger. Both versions are 240 x 160 x 90 mm and have IP 65 ingress protection rating for dust and water. There is an accessory mounting to attach the enclosure to a pole.

Want to buy one?

If you have a need to concentrate your RS-485 measurement data and power the devices outdoors, then the Smart Hub could be just what you are looking for. All you need is an external DC power supply, AC for the Smart Powered Hub. Both versions are available to order now.

Please go to www.kippzonen.com/smartpoweredhub to get the specifications and request a quote ■

New member of our APAC team

Yucheng Mei



“Hi, this is Yucheng Mei from Singapore. I am originally from China but I have been living in Singapore for 14 years and my education background is in Mechanical Engineering. I had been working as an engineer in the marine boiler industry and then as a pre-sales and post-sales specialist in additive manufacturing (industrial 3D printing).

I only got to know Kipp & Zonen’s name when I applied for my current position via LinkedIn. But soon, after a bit research, I found myself fascinated by the products and the long history of excellence in the market. So I applied for the job without any hesitation!

I now work as the Technical Sales & Service Manager at Kipp & Zonen Asia Pacific. My role is to provide technical support in the Singapore office and to all of our distributors, resellers and customers in the APAC region. On the other hand, I will also do service such as calibrations and site visits to customers.

I like to help people with my technical knowledge, so this job is a good fit to me as I will be communicating with people most of the time and helping them to solve technical

problems. I feel that keeping focused on quality is important for this job, as this helps maintain the spirit of ‘Passion for Precision’; thus customers can constantly receive precise measurements from their Kipp & Zonen products.

I travelled to the head office in the Netherlands in May and it was very fruitful to be in Delft for a week and receive training from the experts. I have been introduced to all the main products of Kipp & Zonen and I believe this training has provided me with an excellent starting point for my job.

Together with partners and distributors in the region, I look forward to strengthening the regional technical support to our valuable customers and to maintaining the high quality service standard of Kipp & Zonen.

Please feel free to contact me by phone (+65 6749 3228) or via email (yucheng.mei@kippzonen.com) if you have technical and service related questions in the APAC region” ■

Fairs & Events

EMS Annual Meeting • Budapest • Hungary	03 - 07 September
Renewable Energy and Energy Efficiency Exhibition Ho Chi Minh City • Vietnam	11 - 13 September
Renewable Energy India Expo • New Dehli • India	18 - 20 September
Solar Power International • Anaheim • USA	24 - 27 September
All Energy Australia • Melbourne • Australia	03 - 04 October
Meteorological Technology World Expo Amsterdam • Netherlands	09 - 11 October
Solar Asset Management Europe • Milan • Italy	23 - 24 October

follow us



f

Nice application of our pyranometers and pyrgometers on a buoy in China to monitor solar irradiance at sea. Thanks Leo for sharing!



in

At Intersolar Europe in June you had the opportunity to learn all about our new DustIQ to measure soiling or our solar monitoring solutions by registering for one of the workshops. Look out for the workshop invitations for our next events on LinkedIn



ig

The team is ready for day 2! #kipponenteam #intersolar2018 #intersolareurope #smarter we are at B2.420



tw

Small zenith angle and clear skies, excellent calibration conditions! #pyranometers #calibration #absolutecavity



yt

A beautiful recording of the SOLYS2 sun tracker at a concentrating solar power plant, from sunrise to sunset.

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@kipponenteam.com
www.kipponenteam.com