

VAISALA

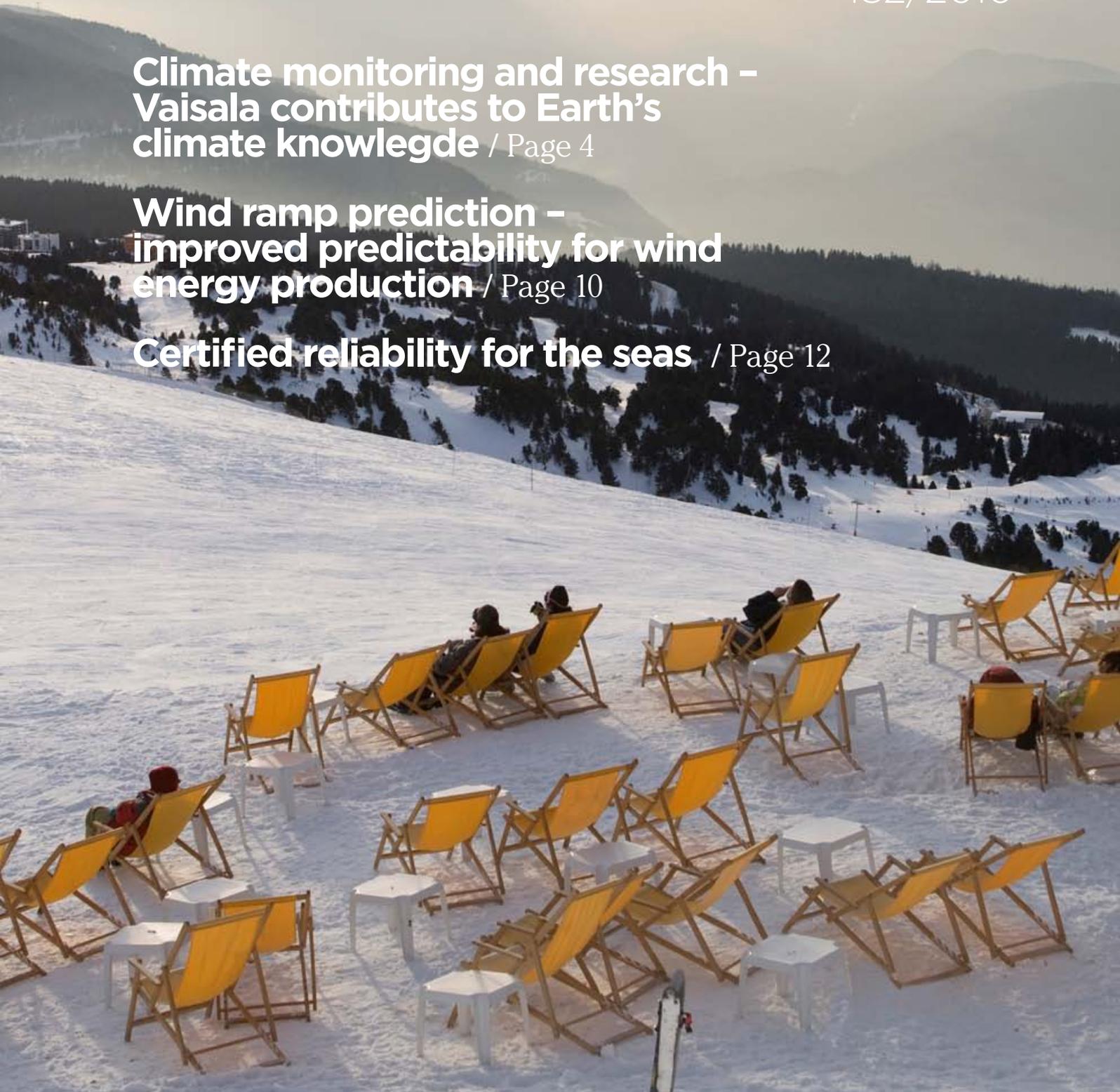
# NEWS

182/2010

**Climate monitoring and research –  
Vaisala contributes to Earth's  
climate knowlegde** / Page 4

**Wind ramp prediction –  
improved predictability for wind  
energy production** / Page 10

**Certified reliability for the seas** / Page 12



# VAISALA NEWS

## Contents 182/2010

- 3** How to measure change?
- 5** Climate monitoring and research
- 8** Vaisala Guardian goes global
- 10** Wind ramp prediction
- 12** Certified reliability for the seas
- 15** Vaisala's runway visual range system cleared for air traffic control use in the USA
- 16** Weather analysis for the 2010 Winter Games
- 18** Quality control - critical in assisted reproductive technology
- 21** Making sense of Demand Control Ventilation
- 23** Assured data continuity for radiosounding time series
- 24** Voltree Power leading the way with bio-energy harvesting technology
- 26** Briefly noted

### Vaisala in brief

Vaisala is a global leader in environmental and industrial measurement. Building on more than 70 years of experience, Vaisala contributes to a better quality of life by providing a comprehensive range of innovative observation and measurement products and services for meteorology, weather critical operations and controlled environments. Headquartered in Finland, Vaisala employs over 1,200 professionals worldwide and is listed on the NASDAQ OMX Helsinki.



*Climate change is a major scientific, societal and political challenge worldwide. The need for an accurate and representative record of atmospheric changes is fundamental to all facets of the debate. [Page 4](#)*



*New wind observing and forecasting system aims to improve the reliability of wind power generation. [Page 10](#)*



*Measuring humidity, moisture, dewpoint, temperature and pressure improves the performance of a ship's onboard machinery. As of fall 2009, the complete line of Vaisala's industrial transmitters are formally certified for ship instrumentation. [Page 12](#)*

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# How to measure change?

The only kind of certainty in the world these days is uncertainty. Things change – often for the best. But there are also changes that have far-reaching negative effects on us all. Like climate change, which I consider the most important challenge of our time.

Climate change is threatening to devastate our planet, and it cannot be stopped without unprecedented cooperation between the world's leading nations. As I write this, the UN Climate Change Conference in Copenhagen is just beginning. If the two-week talks resulted in international commitment to a new climate accord, it would be one of the greatest achievements in international politics in the history of humankind.

In the corporate world we use the term “burning platform” to describe an issue that finally makes everyone understand that change is needed. To me, climate change is the mother

of all burning platforms. Still, I find it hard to believe that the Copenhagen negotiations could end in true consensus. I'm afraid that an extensive natural catastrophe – the worst case scenario – is going to happen before the world agrees that fundamental changes are needed.

Estimates on how fast climate change will progress are based on modeling. The problem with the models is that we do not know for certain how all the variables in play interact and influence one another. Extremely accurate, precise and representative information about all atmospheric changes is needed to enhance this understanding.

If you turn the page, you'll find an article describing how Vaisala contributes to the battle against climate change. Clearly, our most important effort is the development of the reference radiosonde, a measurement device specifically developed to help



the international science community measure and understand the dynamics of climate change.

We do not expect commercial gain from the reference radiosonde, but regard the project as a corporate responsibility contribution. As the leader in environmental measurement, Vaisala is in the best position to provide the kind of demanding measurement solutions climate change research needs, and we are proud to see our competence put to exceptionally good use.

The 19<sup>th</sup> century American essayist Charles Dudley Warner once said: “Everyone talks about the weather, but no one does anything about it.” Let's all do something now, before it's too late.

A handwritten signature in blue ink that reads "Kjell Forsén". The signature is written in a cursive, slightly slanted style.

Kjell Forsén



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# Climate

## monitoring and research

Vaisala contributes to Earth's climate knowledge

*Climate change is a pressing scientific problem and a major societal and political challenge worldwide. The need for an accurate, precise and representative record of atmospheric changes is fundamental to all facets of the climate debate.*

Over the past 130 years, the Earth's surface has warmed at an alarming rate – about 0.9°C (1.6°F) when averaged over the global oceans and land masses. As a consequence, sea level is rising, glaciers are retreating

and the extent of Arctic sea ice is shrinking. Nations are seeking to respond with effective and affordable mitigation and adaptation strategies.

Fundamental to all facets of the climate debate is the need for an extremely accurate, precise and representative record of atmospheric changes – especially temperature, water vapor and precipitation, which need to be measured over multi-decadal timescales and on geographical scales ranging from local to regional and global.

On the climate forcing side, the record must include the amount and distribution of greenhouse gases (GHGs) such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), water vapor, chlorofluorocarbons (CFCs) and sulfur hexafluoride (SF<sub>6</sub>), the changes in solar forcing, anthropogenic GHG emissions and natural particulate emissions from volcanic eruptions, as well as carbon fluxes from biomass burning, to cite just a few.

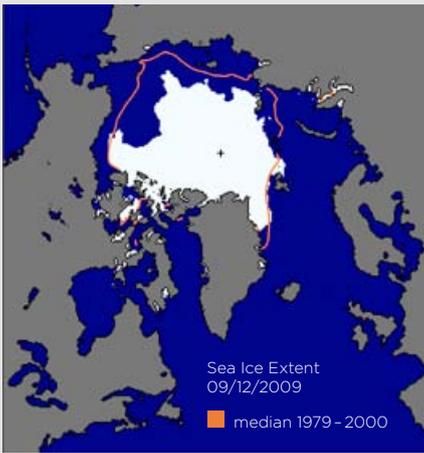
As part of its corporate social responsibility commitment, Vaisala is developing new and improved measurement devices and systems to help meet the special needs of the long-term climate record – a climate reference radiosonde, a truly global lightning detection network,

affordable in situ CO<sub>2</sub> sensors, and an improved precipitation gauge.

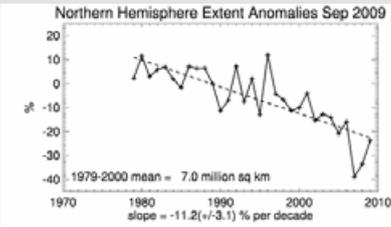
### **Climate reference radiosonde helps assess climate change**

In 2007, the World Meteorological Organization's (WMO) Global Climate Observing System laid out the need for a Global Reference Upper-Air Network, or GRUAN. They concluded (WMO, 2007) that shortcomings in the current upper-air measurement network do not satisfy the accuracy and detail of observations needed to specify climate variability and changes above the Earth's surface. This deficit greatly impacts the ability to accurately assess and predict climate change, and hence has potentially serious consequences in areas of high relevance to society.

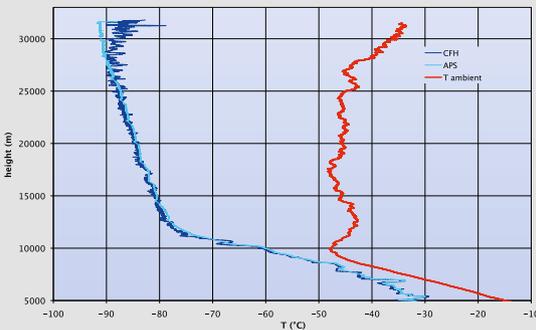
The overall goal of GRUAN is to establish 30–40 stations that will use reference grade radiosondes in addition to other instrumentation to represent climate around the world (Seidel, 2009). While the current radiosondes support normal weather observation needs well, they do not provide sufficiently accurate information for climate and climate-change needs. An improved radiosonde is



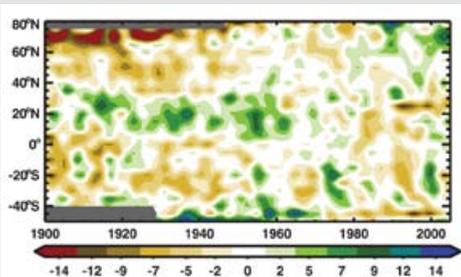
National Snow and Ice Data Center, Boulder, CO



Arctic sea ice extent for September 12, 2009 (the estimated annual minimum for the year) compared with the median extent for 1979–2000. Also shown is the trend in annual minima for 1979–2009. Source: National Snow and Ice Data Center, Boulder, Colorado.



Upper atmosphere humidity (frost point temperature) measured with Vaisala APS sensor and CFH, a state-of-the-art chilled mirror hygrometer. Ambient temperature is also shown. Sounding was done at Sodankylä, Finland on July 17, 2007. (Balloon borne chilled mirror hygrometers are considered the most accurate instruments for upper atmospheric humidity measurements, but are too expensive and complicated for routine soundings).



Latitude-time section of zonal average annual anomalies for precipitation (% average departure) over land from 1900–2005 relative to their means from 1961–1990. Gray areas indicate missing data. (Trenberth et al. 2007.)

needed to meet GRUAN’s upper-air climate requirements of precision and accuracy.

Water vapor is the most abundant and most important greenhouse gas in Earth’s atmosphere. However, it is also one of the most difficult parameters to measure with high precision and accuracy, especially in the upper troposphere and stratosphere where conditions are extremely cold and dry. Therefore, the program is focusing initially on improved upper-air measurements of humidity.

In January 2009, Vaisala launched an internal program to develop an operational reference-grade radiosonde that could be used in GRUAN and other applications where enhanced radiosonde sensor performance is required. The program is being implemented in close collaboration with the meteorological research community, and the benefits will be shared equally with all countries.

The first version of the operational reference radiosonde is based on the Vaisala Radiosonde RS92 sensors and Vaisala’s Advanced Polymer Sensor (APS), a new capacitive sensor capable of measuring extremely low dewpoints. The APS is designed to observe humidity at altitudes to 30 km. It has dewpoint range from  $-30^{\circ}\text{C}$  to  $-90^{\circ}\text{C}$ , thus supplementing well the conventional RS92 sensor by providing an independent humidity measurement.

Following internal field trials, external testing began in autumn

2009 in cooperation with several international research partners. The first test results were reported at the Annual Meeting of the American Meteorological Society in January 2010 (Turtiainen et al., 2010).

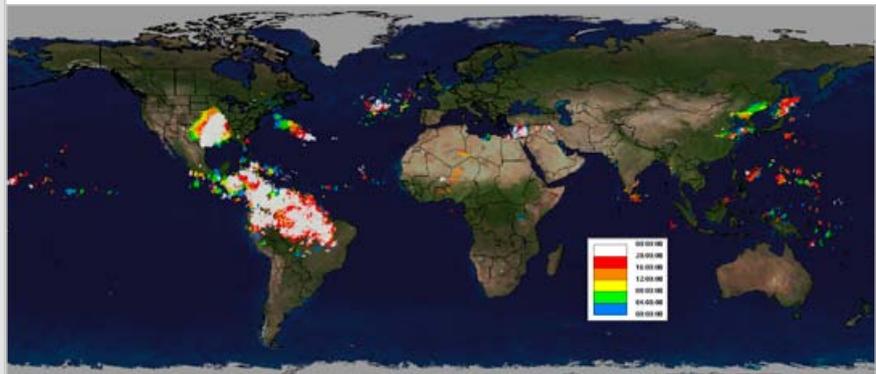
In parallel with field testing of the APS, the program is also proceeding to develop and test more precise measurements for other atmospheric parameters. Development will continue until the climate science needs (including lower tropospheric requirements) are satisfied for humidity, temperature, pressure and wind soundings.

### Global lightning activity vs. convective precipitation intensity

Global lightning data offer great promise for monitoring the impact of climate change on regional-to-global scale convective precipitation and possibly even temperature. Global lightning data also enable climate scientists to study the relationship between regional and larger-scale patterns, thus facilitating the development and evaluation of climate downscaling methodologies.

Although a high performance global lightning dataset did not exist until 2009, regional differences in lightning activity have been found during recent warming in the tropics (Petersen and Buechler, 2008). Pessi and Businger (2009) recently reported on a strong relationship between lightning rates and convec-

Lightning detected by Vaisala’s GLD360 for the 24-hour period ending at 00 UTC 30 October 2009.



tive rainfall rate over the North Pacific Ocean, which may be further applied to examine changes in convective precipitation frequency and intensity associated with climate change. Changes in global lightning frequency have also been proposed as a possible proxy for global temperature change (NRC, 1998).

Historically, the creation of a high performance, accurate, and reliable global lightning dataset has presented a substantial challenge to the lightning detection and research communities. Vaisala, however, made a major breakthrough in this area through collaboration with Stanford University, which enabled the deployment of the Global Lightning Detection Network (GLDN).

The GLDN consists of a number of sensors strategically placed around the world for optimal detection of cloud-to-ground (CG) lightning strokes. These wideband sensors detect CG lightning using magnetic direction finding and time-of-arrival methodologies combined with proprietary lightning recognition algorithms in the VLF (Very Low Frequency) band. Signals captured by these sensors are transmitted to Vaisala's Network Control Center (NCC) in Tucson, Arizona where they are combined with other sensor data to optimize the location estimate of the CG stroke.

Derived from the GLDN, Vaisala Global Lightning Dataset GLD360 is a high performance, accurate, and reliable dataset that provides an opportunity for the climate community to continuously monitor relationships between climate change and regional-to-global scale lightning activity and convective precipitation.

### **CO<sub>2</sub> monitoring facilitates the study of soil respiration**

There are several methods for measuring the exchange or flux of CO<sub>2</sub> between terrestrial ecosystems and the atmosphere, the most common being the eddy covariance

method. While the eddy-covariance method measures net ecosystem production resulting from photosynthesis and respiration, it cannot provide unique information such as autotrophic and heterotrophic respiration.

Soil respiration is a major component of the terrestrial carbon cycle, constituting up to approximately three-quarters of the total ecosystem respiration (Law et al. 2001). Soil CO<sub>2</sub> measurements are needed to better understand soil gas processes and their eventual impact on climate.

Soil respiration has been traditionally studied using the chamber based method; however the soil CO<sub>2</sub> vertical gradient method, where CO<sub>2</sub> probes are buried at different depths in the soil, is becoming increasingly popular (Tang et al. 2003, Pumpanen et al. 2008, Pingingtha et al. in press). The gradient method is valuable for clarifying how the CO<sub>2</sub> flux from the soil to the atmosphere varies with season, light conditions, temperature, moisture, and soil properties. It is especially useful in arctic and boreal regions where snow cover lasts for several months, making it difficult for chamber based measurements.

Vaisala manufactures the only CO<sub>2</sub> measuring instruments that can be buried in the soil. The probes use silicon-based, non-dispersive infra-red (NDIR) Vaisala CARBOCAP® sensors for the measurement of CO<sub>2</sub>. Their working principle – single-beam dual-wavelength NDIR – is the same method used in expensive high-performance analyzers. However, the traditional rotating wheel is replaced with a tiny, electrically controlled Fabry-Perot Interferometer.

### **In situ monitoring provides data on precipitation patterns**

While temperature change is perhaps the most obvious indicator of climate change, patterns and intensity of precipitation vary as well. Differences in radiative forcing affect the

heating of the earth's surface and consequently also evaporation and sensible heating. In addition, higher temperatures enable air to hold more water vapor. As a result, precipitation patterns have changed in many regions of the globe over the past century (Trenberth et al. 2007).

Figure on page 6 shows zonal anomalies in precipitation observed from 1900 to 2005. In the extreme northern latitudes, upward trends have been detected as indicated by negative anomalies in the early 1900s and positive anomalies in the late 1900s and early 2000s. By contrast, downward trends are seen in the subtropical regions of the northern hemisphere.

Climate scientists have focused on quantifying regional precipitation patterns because of the difficulties in obtaining accurate and representative precipitation measurements, especially over remote land and oceanic regions as well as during snow and ice events. These challenges underscore the need for quality instrumentation and careful network design. Accurate and reliable datasets with broad geographical coverage will enhance our understanding of the changes in precipitation patterns that accompany climate temperature changes.

Vaisala's All Weather Precipitation Gauge VRG101 and related accessories have been designed for remote automated measurement and to withstand icy, snowy and freezing conditions. For example, the Kentucky Mesonet in the USA utilizes the VRG101 as the primary precipitation measuring device at each of its 37 mesonet stations.

The text is abridged from an original article first published during the United Nations Climate Change Conference in Copenhagen last December. The full text including references can be accessed online at [www.vaisala.com/vaisalanews](http://www.vaisala.com/vaisalanews).

# Vaisala Guardian goes global



*Vaisala's non-invasive road weather information system advances road safety and with it, reduces allocation of maintenance resources. As of this winter, it's doing it worldwide.*

Rachel Adams / Marketing Manager / Vaisala / Birmingham, UK

For the last few years Vaisala's customers have had the opportunity to benefit from non-invasive sensors that measure the temperature and current state of a road's surface. The Vaisala Guardian Road Weather Information System, newly developed to serve customers globally, integrates the non-invasive sensors with a traffic weather camera, a data management system and a display. The result delivers a substantial improvement in the level of weather information for all kinds of roads from compact city and town networks to national highways.

In addition to the benefits delivered by the technology, the system is also cost effective, thanks to its easy-to-install design. Guardian can be quickly and easily mounted on existing structures above or beside

the road, such as masts, poles, and buildings, without having to stop traffic and cut into the road.

Non-invasive installation also means that the system can be easily relocated whenever necessary.

## Clearing the streets of Chicago

Chicago, the third largest city in the United States, is well-known for its snowy winters – on average, the city receives 39 inches (100 cm) of snow each year.

The Snow Command Center has a whole fleet of salt spreaders and plows in its service to keep Chicago's streets free of ice and snow. Timing the dispatch of the fleet, however, is no easy task, when there are 261 different routes to cover.

The Center has access to cameras, radar and Global Positioning Satellite information as well as road weather sensors. For a long time, their weather information needs were served by data generated from a network of embedded pavement sensors in various locations, but over the course of the years these turned out to be expensive to both install and maintain. As a result, the city now chooses Vaisala's non-invasive pavement sensors.

The sensors are deployed at key locations throughout the city, mainly on bridge decks, which have a tendency to freeze well before the surrounding roads. By utilizing existing light columns, the sensors were installed at a fraction of the time and cost of traditional pavement sensors.

## Real-time information to aid decision-making

The Guardian system uses laser spectroscopy to gauge pavement condition during all types of weather. The data it provides enables instant assessment of the road conditions and gives the maintenance authorities lead time to take appropriate actions before the conditions dete-

riorate. As guesswork is eliminated, road safety improves and maintenance resources can be allocated more effectively.

The system measures a variety of parameters: amount of accumulated water, frost, ice, slush, snow, and humidity as well as air and pavement temperature. For the first time ever for non-contact sensors, Guardian also derives a measurement of grip.

Grip is a valuable metric to gauge the need for winter maintenance actions. Together with temperature and state measurement, it helps decision-makers to determine 'just in time', how slippery the road is, which will directly impact on driver safety.

All Guardian data is presented in an easy-to-understand way that assists decision-making. The data can be accessed from anywhere over the internet. The system can also send automatic alerts to a PC, cell phone or PDA when detected conditions meet the thresholds specified by the user. The system also offers the potential to access shared information with neighboring systems to assist advanced decision-making.

## Modular and easy to install

The entire Guardian system is designed to be so straight-forward that customers may install it themselves, following easy to use step-by-step instructions. No complex connections or calibration of sensors are needed – once mounted and connected to power, just a hit of a switch is needed for the system to



*Vaisala Guardian can be quickly and easily mounted on existing structures above or beside the road. Non-invasive installation also means that the system can be easily relocated whenever necessary.*

start transmitting data. As a part of the service, Vaisala provides 24/7 helpdesk support in many regions during winter to assist with any questions the user might have.

Guardian is designed to be modular, so it can be installed as a complete solution or as a starting point to develop a relatively low-cost broader system. It can also be smoothly integrated into other technologies strengthening the backbone of traffic management systems.

Building on the success of current installations, Guardian is now available for worldwide installation. Contact your local sales manager to find out more.

### Further information:

[www.vaisala.com/guardian](http://www.vaisala.com/guardian)



Richard Pyle / Segment Director / Vaisala / Boulder, CO, USA

# Wind ramp prediction

– improved predictability for  
wind energy production

*Vaisala and Xcel Energy are developing a new wind observing and forecasting system to provide critical decision-making support for balancing wind power with traditional fossil fuel generation.*

Wind energy is one of the strongest contenders for the position of the fastest growing form of renewable energy today. The World Wind Energy Association ([www.wwindea.org](http://www.wwindea.org)) expected double digit growth and a record amount of over 30,000 Mega Watts of newly installed capacity for the global wind energy market in 2009.

As the market takes leaps forward, developing ways to more effectively integrate the growing wind energy production with other means of energy generation is gaining more and more importance. One of the greatest operational obstacles facing wind energy production is the so called 'wind ramp' – or 'wind integration' – problem. The term refers to the measures energy system operators must take when winds change rapidly, causing a sudden increase or decrease in wind power generated by turbines.

Electric utility companies usually have a specific generation configuration consisting of a mix of coal, oil, gas, hydro, wind and nuclear power.

When winds pick up, the amount of power generated by the wind turbines increases rapidly, causing excess power to be injected into the generation system.

As the system is not capable of handling endless amounts of power, the utility company must quickly ramp down generation from other sources and route excess electricity to neighboring utilities, or risk a system collapse. And just as the system is reconfigured for the wind power ramping up, the winds may fade away, causing a sudden need to import power and turn gas turbines on in minutes.

To mitigate the potential 'ramp-down' issue, operating utilities must frequently keep a spinning reserve of gas turbine generators running ready to fill the gap. This, however, is not an ideal solution to the problem as the spinning reserve increases the cost of wind power and often decreases the carbon savings otherwise possible to achieve.

## New wind observing and forecasting system in the works

To tackle the issue of wind ramp detection, a major US energy provider Xcel Energy joined forces with Vaisala and the US-based National Center for Atmospheric Research (NCAR) to develop a new wind observing system and a supporting decision support solution.

In the framework of a joint pilot project, scheduled to run for 18 months, Vaisala and Xcel Energy will develop new ways to detect and predict pending wind ramp events. Vaisala's role is to tackle the real-time, 0-3 hour timeframe aspect of the issue by installing and operating an in situ observation network, and developing, together with NCAR, a short-term modeling system feeding a Vaisala-developed, real-time operational decision support system.

The project also provides data from the wind observing system to NCAR to be used in their work on

solving longer-term wind energy predictability issues by refining a forecasting system, with an emphasis on the 3 to 72 hour time horizon.

When completed, the new system will provide critical decision-making support for balancing wind power generation with traditional generation in the zero to three hour time-frame. Being able to better anticipate changes in wind energy output in this short time horizon will improve the reliability of power generation while at the same time reducing operational costs.

### Notification 15 minutes to 3 hours in advance

The foundation of Vaisala's approach is a concept involving installation of a high resolution observing network around the wind park of interest to carefully observe the atmosphere. The pilot network consists of ten surface weather stations, a wind profiler, other test instrumentation and data from the US National Lightning Detection Network.

The surface wind stations comprise of eight 10 meter full atmospheric stations and two 60 meter towers with multiple instrumentation levels. A lower atmosphere wind profiler system is utilized to examine winds up to and through the boundary layer.

The observation data will be fed into specially configured mesoscale modeling system collaboratively developed with NCAR. The modeled data will be coupled with statistical modeling and pattern recognition systems, to provide advanced notification of wind ramps with about 15 minutes to 3 hours lead time.

The observations and the results of the various modeling systems will be portrayed within a decision support system designed to provide electrical utility operations staff with visual information about impending wind ramp events including timing, magnitude and type (up or down ramp).

The system is expected to begin prototype operations in mid



*High resolution observing systems are a key element in the management of wind ramp events.*

2010, and it will be operated and maintained by Vaisala on behalf of Xcel Energy during the initial phases of deployment. Working interactively with Xcel Energy, Vaisala will continue to refine the system during 2010 in order to optimize its performance.

#### Further information:

[www.vaisala.com/weather/applications/windturbines.html](http://www.vaisala.com/weather/applications/windturbines.html)

Senja Paasimaa / Regional Market Manager / Vaisala / Helsinki, Finland

# Certified reliability for the seas

*Vaisala's industrial transmitters are now formally approved for the needs of ship instrumentation and automation.*



Improving the performance of ship onboard machinery is an ongoing challenge for ship builders and shipping companies. When precise and detailed information on system and ambient conditions is continuously available, it helps solve the challenge by minimizing maintenance costs and machinery downtime. At the same time, the information can also be utilized to optimize system performance and energy efficiency.

Vaisala's humidity, dewpoint, moisture in oil and barometric pressure transmitters have been used in ship instrumentation for

years. Now the products have received a formal type approval certificate for use in marine applications from Det Norske Veritas, one of the world's leading certification and classification societies.

## **Reliability, accuracy, and repeatability required**

The newly acquired certificate applies to the complete line of Vaisala's humidity, dewpoint, moisture in oil and barometric pressure transmitters serving measurement needs in versatile applications from ship

machinery rooms to bridges. The approval guarantees that the instruments can withstand the extremely harsh conditions in ship machinery rooms.

The products were approved to comply with Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft, and Det Norske Veritas' Offshore Standards. The classification is a special type of certification particularly applied to confirm that maritime structures and facilities comply with set requirements.

Vaisala's transmitters were tested according to DNV's Standard for



Certification No. 2.4 – Environmental Test Specification for Instrumentation and Automation Equipment. As part of the classification, DNV certifies all materials, components and systems relevant to the safe operation and quality of ships.

### **Online measurements minimize machinery downtime and maintenance costs...**

An obvious challenge for all marine machinery applications is the constant presence of water. In

lubrication and hydraulic systems, for example, water deteriorates oil performance, causes corrosion and ruins the oil additives. In fact, water contamination in oil has been identified as one of the main maintenance challenges by marine engine manufacturers, and they are now setting strict requirements for on-line measurement of oil moisture.

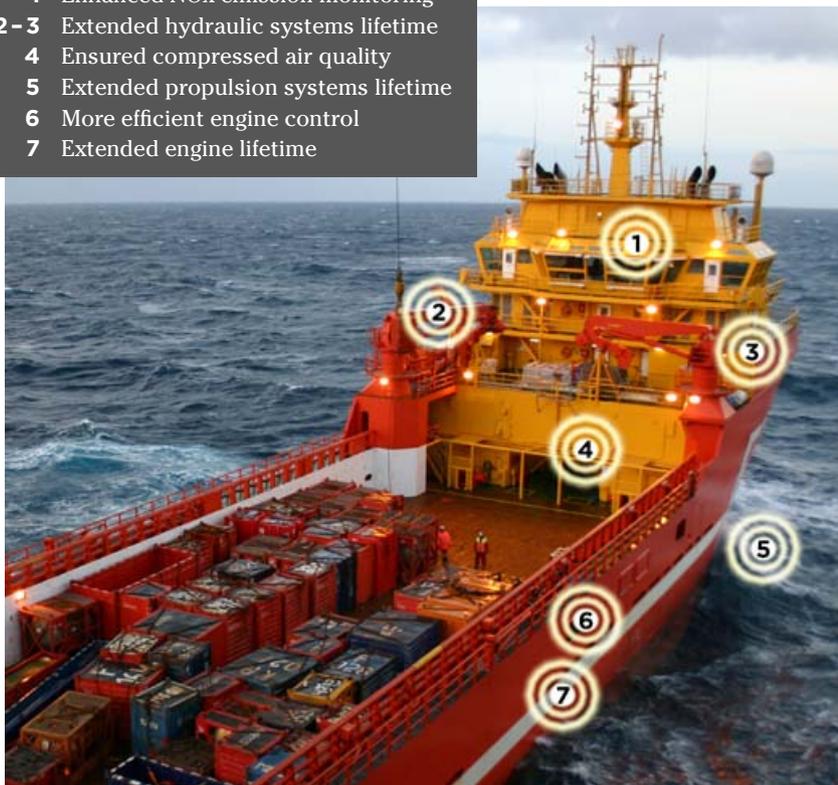
The ability of oil to hold water in solution depends on the oil type, its age, and what additives are present. When the water content in oil reaches saturation point, it separates out and free water is formed, which

quickly causes problems in the lubrication system and increases the risk of engine failure.

By continuously measuring moisture in oil, the risk of free water formation can be assessed accurately. In addition, when the moisture is measured online instead of relying on the traditional sampling methods, real-time indication is always available on how saturated the oil is.

As a consequence, corrective actions can be taken immediately, significantly reducing the wear and corrosion water can cause. Continuous measurement data also

- 1 Enhanced NOx emission monitoring
- 2-3 Extended hydraulic systems lifetime
- 4 Ensured compressed air quality
- 5 Extended propulsion systems lifetime
- 6 More efficient engine control
- 7 Extended engine lifetime



Real-time measurements improve onboard machinery performance.

helps plan preventive maintenance activities; unscheduled machinery downtime can be prevented by optimizing service activities.

In the same manner, the level of moisture in the ship's compressed air systems can be used to trigger maintenance actions, before the air gets so moist it starts to condense, causing corrosion or freezing of the system. Compressed air is used for many different purposes in ship automation from starting the main propulsion engine to blowing the ship's whistle.

### ...and maximize system performance and emissions control

Measuring the moisture, temperature and pressure of engine inlet air helps to control the engines and improves the system's energy efficiency. At the same time, emissions can be cut.

Moisture in the intake air lowers the peak burning temperature in the engine's cylinder, improving the

engine's efficiency and reducing thermal nitrogen oxide (NOx) emissions. However, water condensation must be avoided here as well, creating a need for accurate moisture information.

Information on ambient air conditions is also needed in emission monitoring systems to correct emissions to standard conditions. The need to monitor and report NOx emissions is increasing as emission restrictions are tightening in the marine sector, just like in every other industry all over the world. The International Maritime Organization is currently enforcing stricter criteria for the allowed NOx emissions, and some ports and countries already restrict ships from coming to their waters unless they meet certain emission requirements.

#### Further information:

[www.vaisala.com/shipinstrumentation](http://www.vaisala.com/shipinstrumentation)



### Complete product platform certified

Vaisala HUMICAP® Moisture and Temperature Transmitter Series MMT330 provides a true, real-time picture of the oil's condition and feeds an alarm signal to ship automation system, if alarm level of water contamination is exceeded.

Vaisala DRYCAP® Dewpoint and Temperature Transmitter Series DMT340 features industry leading accuracy and long term stability for demanding dewpoint measurement in compressed air lines.

With its unprecedented ability to measure the moisture accurately in air that is close to saturation, the Vaisala HUMICAP® Humidity and Temperature Transmitter HMT337 provides optimal solution for the engine control system.

Vaisala Combined Pressure, Humidity and Temperature Transmitter PTU300 provides accurate and reliable pressure, temperature and humidity data on ambient air to the ship emission monitoring system to perform correction calculations to standard conditions used in reporting.



# Vaisala's runway visual range system cleared for air traffic control use in the USA

Tapani Laine / Program Manager / Vaisala / Boulder, CO, USA

*Vaisala's new runway visual range system has been approved for air traffic control use by the FAA. Improved estimation of runway visual range has a positive impact on both flight safety and airport capacity.*

The US Federal Aviation Administration (FAA) has approved Vaisala AviMet® PC-Based Runway Visual Range (RVR) system for air traffic control use in airports across the country. The primary users of the system are air traffic controllers who access RVR data through an improved display application, also developed by Vaisala.

Runway visual range (RVR) is a calculated estimation of the distance that a pilot can see down a runway. Prevailing weather conditions have the most impact on RVR, but ambient light levels and runway light settings also play an important part in the equation. Vaisala's PC-based RVR system uses state-of-the-art sensor technology to gather a host of readings from meteorological optical range to the intensity settings of runway lights.

The first prototype of the RVR system was installed at Wilkes-Barre/Scranton International Airport in Pennsylvania in August 2007. Since the installation, the system has undergone extensive operational testing in real-life conditions. Soon it will be the first airport in the world with the PC-based RVR system in official operational use.

## **Airports better equipped for poor weather**

The Vaisala RVR system is an integrated, PC-based system that provides fully automated runway visual range assessment and reporting for airports. In addition to having an obvious impact on flight safety, improved runway visual range estimation also impacts airport capacity as runways can safely be

kept open longer under diminishing weather conditions.

The FAA currently operates two older generation RVR systems in the National Airspace System (NAS), both of which are becoming harder to maintain and more unreliable as they age. Vaisala's PC-Based RVR system is designed for maximum mean-time-between-failures (MTBF) and minimum mean-time-to-repair (MTTR), minimizing the amount of time during which runways cannot be kept in operation.

Vaisala has worked with the FAA for more than three decades already, supplying e.g. weather radar signal processors and software, ceilometers and different kinds of visibility instruments.

# Weather analysis for the 2010 Winter Games



Edwin Campos / Cloud Physics & Severe Weather Research Section / Environment Canada / Toronto, ON, Canada; Chris Doyle / Chief Meteorologist / Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games / Vancouver, BC, Canada; and Herb Winston / Senior Sales Manager / Vaisala / Boulder, CO, USA

*The city of Vancouver is the host of the 2010 Olympic and Paralympic Winter Games. Environment Canada's Meteorological Service – the official weather-information provider for both events – decided to expand its observational network to support weather forecasting during the Games.*



Several outdoor venues of the 2010 Winter Games are located along a u-shape valley carved out by glacial action (a fjord). This is called the Sea-to-Sky corridor, and it includes the towns of Squamish and Whistler, in British Columbia. High winds, reduced visibility and mixed-phase precipitation are some of the forecasting challenges for the outdoor Games venues, all enhanced by the complex terrain conditions.

To support weather forecasting operations during the Games, Environment Canada expanded its observational network along the Sea-to-Sky corridor. The strategy included deployment of advanced meteorological sensors typically used at airports, because of their design to provide rapid updates of high-impact weather events. However, most of the Olympic network sites are not airports, but remote locations with large telecommunications challenges.

## **Data benefits both forecasters and researchers**

The Sea-to-Sky observational network consists of a host of weather measurement instruments, such as



2010 Olympic and Paralympic Winter Games venues.



Wind profiler located at Squamish airport, in British Columbia.

different kinds of weather sensors, ceilometers and wind profilers. The observations are compiled and disseminated in real-time by several computers at Environment Canada.

The data are primarily used by the 35 official weather forecasters supporting the Winter Games. The forecasters were selected from the Meteorological Service of Canada, the US National Weather Service, and Canada's Weather Network.

The data are also being used by researchers from the SNOW-V10 program, whose focus is on forecasting wintertime events in complex terrain. The acronym stands for Science and NOWcasting of Olympic Weather for Vancouver 2010. Vaisala is a commercial partner for the program, which is primarily comprised of researchers from seven countries. It operates under the World Meteorological Organization's World Weather Research Programme.

### Insight on the topographic influence on local winds

The newly extended network incorporates several Vaisala instruments, including dozens of pressure, temperature and humidity sensors. For example, monitoring of the precipitation intensity and present weather at the base of Whistler Mountain – the Alpine Ski venue – is done by a FD12P weather sensor.

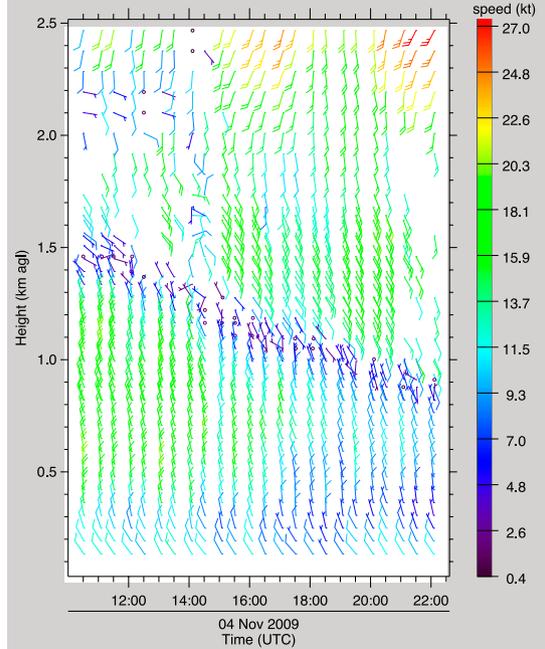
In addition, cloud-base observations are being measured by Vaisala's ceilometers both at this venue as well as near the Snowboard and Free-Style Ski competitions to be held at the Cypress Mountain. Five other Vaisala ceilometers and three other FD12P sensors are also part of the network.

A 915MHz wind profiler equipped with a Radio Acoustic Sounding System has been sited at the Squamish airport, down slope of the Whistler venues. The radar supplies hourly vertical profiles of virtual-temperature, 30-minute vertical wind profiles, and vertical profiles of precipitation signals about every five minutes.

Among the most important applications from the wind profiler is the insight gained on the topographic influence on the local winds, and the large scale inflow over the Sea-to-Sky corridor. Information on temperature transport can also be derived from the wind profiler readings by combining winds and virtual temperature profiles. Magnitudes of the vertical Doppler velocity and backscatter signals offer guidance for analysis and nowcasting of precipitation phase and intensity at some outdoor venues.

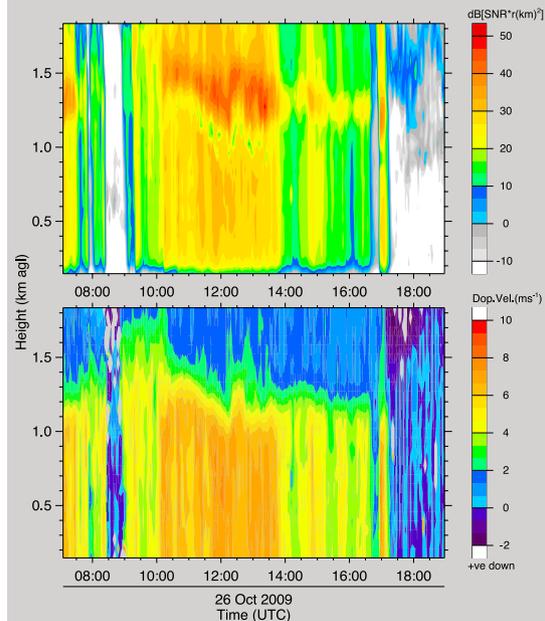
### Further information:

[www.weatheroffice.gc.ca/2010/](http://www.weatheroffice.gc.ca/2010/)



Consensus winds from UHF wind-profiler radar: Squamish Airport located at 52m asl  
Environment Canada - STB/MRD/ARMP - Edwin.Campos@ec.gc.ca

*Vertical profile of winds over Squamish. These observations were taken during a descending temperature inversion, with a warm front approaching the site from the west. The wind boundary descends from 1.5 km to 0.8 km (above ground level) during a 12h period. The local-scale flow (north-northwest windbarbs) is descending the Sea-to-Sky corridor, and the large-scale flow, aloft, is arriving at the site from the opposite direction (from the south east).*



Vertical short (417ns) pulses from UHF wind-profiler radar: Squamish Airport XSK located at 52m asl  
Environment Canada - STB/MRD/ARMP - Edwin.Campos@ec.gc.ca

*Precipitation phase analyzed from pseudo-reflectivities (from Signal-to-Noise ratios) and Doppler vertical velocities. A melting level is identified when the velocities are just larger than about 2 meters per second, and when the pseudo-reflectivities are enhanced (i.e., at the bright band).*

# Quality control

– critical in assisted reproductive technology



*Vitrolife uses Vaisala's carbon dioxide meters to monitor CO<sub>2</sub> concentration in incubators as a part of its quality control and customer service programs.*

Assisted reproductive technology (ART) is continually improving to offer successful treatment of human infertility with the most desired outcome – a healthy baby. Success rates in ART depend on many factors, including the quality of products used, making quality control a top priority for manufacturers of ART products.

One such company, Vitrolife, is a global leader in the preparation, cultivation, and storage of human cells, tissues, and organs. In its ART business area, Vitrolife designs and produces nutrient solutions used by in vitro fertilization (IVF) clinics worldwide for the handling, culturing, and storing of human embryos.

These nutrient solutions – called IVF media – contain amino acids, vitamins, and other additives designed for each phase of ART. To ensure the quality of its IVF media products and to assist its fertility clinic customers in the field, Vitrolife

has chosen Vaisala's hand-held carbon dioxide meters to measure CO<sub>2</sub> concentration in incubators. The CO<sub>2</sub> concentration is critical since it has direct effect on one of the most important sources of environmental stress to human embryos: pH fluctuation.

## **Minimizing stress on embryos by maintaining specified pH**

Incubators simulate one important function of a human body – providing a constant environment.

“Incubators are vital to the overall success of IVF. They create the optimal, constant environment for embryo cultures,” explained Michael Baird, Vitrolife Embryologist, adding, “Fluctuation causes stress and IVF labs want the least stress.”

Near the top of the list of stress factors are unwanted fluctuations in

pH. These fluctuations can be caused by incubators not maintaining the specified environment, exposure to external variables when opening the incubator doors, and by the biological processes of the cells.

CO<sub>2</sub> is used to regulate the pH level, thus pH is measured and maintained by monitoring and adjusting the concentration of CO<sub>2</sub>. CO<sub>2</sub> and pH have an inverse relationship; as the concentration of CO<sub>2</sub> increases, pH level decreases. According to Baird, IVF media are “designed and buffered to maintain specific pH at specific CO<sub>2</sub> levels where CO<sub>2</sub> dissolves in and out of the media to maintain the correct pH.”

## **Upgrading CO<sub>2</sub> measurement technology**

Maintaining constant, specified pH is critical to Vitrolife's strict quality control program. At its production

facility in Colorado, Vitrolife tests the quality of its IVF media in its mouse embryo assay (MEA) lab before the product is shipped to customers.

The MEA lab measurement practices include monitoring the incubators' digital displays and independent verification with portable measurement devices. Like many bioassay and IVF labs, the MEA lab had used blood gas analyzers that report chemical absorption rates of a fluid that is selective of CO<sub>2</sub> absorption to meet their independent measurement requirements, but was dissatisfied with the level of accuracy and unreliability due to user variability.

According to Vitrolife MEA Laboratory Manager Brett Glazar, "The standard was using fluid-based gas analyzers, but the readings were not specific enough at plus or minus a half of a percent. And we had repeatability issues. Two operators using the same device on the same incubators could produce completely different readings. Overall, the devices were not accurate enough for us."

Vitrolife sought to lower the error by improving accuracy and repeatability. They selected Vaisala CARBOCAP® Hand-held Carbon Dioxide Meter GM70 because – according to Baird – it was the "most accurate, consistent, and easy to use". After implementation, Glazar reported that the accuracy and automatic calculations of variables of the GM70 provided the "tighter range and higher repeatability" needed to meet their quality control standards.

### Expanded use at customer sites

Vitrolife's successful use of the GM70s in their own MEA lab led to their use during customer site visits. ART product suppliers like Vitrolife are often called on to help diagnose the source of the problem if embryo cultivation rates do not meet the IVF

clinic's standards. As part of his diagnostics, Baird measures CO<sub>2</sub> concentrations using the GM70 to make sure the incubators are operating within specification.

Baird observes that while IVF labs check CO<sub>2</sub> daily, many labs still rely on the less accurate, fluid-based gas analyzers. "Once we started using GM70s on service calls to double check their CO<sub>2</sub> levels, we were surprised to see how inaccurate many of their readings were."

Baird attributed common sources of inaccuracies to the lab's use of older equipment, ranging from function loss of older digital displays on the incubators to outdated measurement technology that can be resolved with an upgrade plan for lab equipment.

### Repeatable measurements advancing reproductive technology

The GM70 uses infrared (IR) technology that is more accurate, stable, and repeatable than fluid-based gas analyzers. It does not require any calculations for pressure and temperature compensation. The temperature and pressure of the environment at the measurement point can be easily set using the graphical GM70 interface. Compensations are made internally and the instrument displays the corrected measurement.

Advances in the design and quality of ART products are improving the treatment of human infertility. Vitrolife's experience shows how accurate, stable, and repeatable measurements can enable tighter control and less fluctuation of a critical environmental variable such as pH, in both a production environment and in IVF incubators.



*Vaisala's hand-held carbon dioxide meter GM70 uses infrared technology that is more accurate, stable, and repeatable than fluid-based gas analyzers.*

### Vitrolife AB

Vitrolife designs and manufactures systems for the preparing, cultivating and storing human cells, tissues and organs outside the body. The company was developing in vitro fertilization (IVF) media in Sweden in the early 1990s. By the end of the decade, it offered a full line of IVF-media products and lung preservation solutions and changed its name from Scandinavian IVF Science to Vitrolife.

The 2000s have seen Vitrolife expand its product portfolio in its three core business areas: providing nutrient solutions for embryo cultures used to treat human infertility, solutions and systems for transporting organs for transplantation, and media for stem cell development for therapeutic use.

Vitrolife serves a global market with production facilities in Sweden and the United States with subsidiaries in Australia, France, Italy, China and Japan.



# Making sense of Demand Control Ventilation

*When occupancy varies in buildings, good indoor air quality can be maintained using CO<sub>2</sub> as the control parameter. In fact, the quality of the CO<sub>2</sub> measurement can be considered an indicator for the quality of the whole ventilation system.*

For nearly 20 years now the HVAC industry – Heating, Ventilation, and Air Conditioning – has been talking about the use of Demand Control Ventilation (DCV) as a means of controlling ventilation in buildings. Essentially this is a process in which the amount of outside air entering a building is varied based on the amount of carbon dioxide inside that space. Carbon dioxide levels are a reliable indicator of indoor pollution originating from a building's occupants.

## CO<sub>2</sub> levels indicate ventilation rate

Most people spend 90 percent of their time in different indoor environments. Therefore the quality of indoor air is vital for our wellbeing. The ventilation system takes care of introducing adequate amounts of fresh air into the building spaces – a process that needs to be accom-

plished as energy efficiently as possible these days.

Demand-controlled ventilation improves the energy efficiency of the ventilation system by optimizing fresh air supply based on true need. For example, a meeting room in an office facility can be crowded for a couple of hours in the morning and empty for the rest of the day, thus increasing the need for fresh air during the morning hours.

The indoor CO<sub>2</sub> level has shown to be a good general indicator for poor air exchange in a building. As it also serves as an indicator for human presense and unpleasant or unhealthy pollutants, it can be used to determine if increased ventilation rate is required.

The National Institute for Occupational Safety and Health in the United States suggests that indoor air CO<sub>2</sub> concentration exceeding 1,000 ppm is a marker for inadequate ventilation. Increased CO<sub>2</sub> levels cause

a feeling of stuffyness, tiredness, headache, and as a result of these, lowered concentration and working efficiency.

## Accurate measurements top priority

Given the undoubted benefits of DCV, both in terms of energy savings and human wellbeing, it is not surprising that the DCV market has shown years of steady growth. However, concerns persist about the accuracy of the sensor technologies, which the DCV systems use to monitor carbon dioxide concentrations.

Such sensors are based on Non-Dispersive Infra Red (NDIR) technology, which essentially involves an Infra Red (IR) light source and an IR detector. However NDIR sensors are prone to drift. Too high carbon dioxide readings can lead to costly over-ventilation, and too low readings to underventilation



and unhealthy concentrations of carbon dioxide and other indoor air contaminants within occupied spaces.

The poorest performance is offered by single-beam single-wavelength devices, which are based on one optical channel and one wavelength. Many of the devices on the market are fairly unstable, as aging of the lamp, contamination or changes in the reflecting properties of the optical path easily affect their stability. Moreover, temperature changes have an adverse affect on their short-term stability. On the plus side, the structure of the single-beam single-wavelength devices is simple, and they are mechanically reliable and inexpensive.

Dual-beam single-wavelength configurations utilize one lamp for measurements and a second one for a reference. The first lamp typically pulses at a rate of 3 Hz, whereas the other pulses at a much lower rate, for example once a day. The second lamp ages more slowly and can therefore be used as a reference for light intensity.

Dual-beam dual-wavelength devices have two optical channels, two detectors and two interference filters. These devices are more accurate and stable than the single-beam single-wavelength or dual-beam single-wavelength solutions, but they

are also more expensive. Moreover, the detectors must form a perfectly matched pair to achieve good performance over a larger temperature range.

### One beam, two wavelengths – increased accuracy

Single-beam dual-wavelength sensor technology behind Vaisala CARBOCAP® sensors eliminates the drift problem and provides very accurate real-time CO<sub>2</sub> measurements.

The Vaisala CARBOCAP® sensor comprises a light source, an IR detector and an interferometer. The light source is positioned to shine at the IR detector in such a way that the light travels a fixed distance to the detector, where the light intensity is measured. A Fabry-Perot Interferometer (FPI) positioned just in front of the IR detector acts as a tuneable filter.

The FPI only allows certain wavelengths of light to pass through to the detector. As carbon dioxide absorbs certain wavelengths of light and not others, the FPI is designed to pass light both at a carbon dioxide absorption wavelength of 4.26 µm and – crucially – at a nearby, non-absorbing wavelength, too.

When the sensor is operating, the FPI is regularly tuned back and forth between the measurement and reference wavelengths. At the carbon dioxide absorption wavelength, the intensity of detected light is reduced in proportion to the concentration of the gas in the optical path. In this way, the light intensity measured at the non-absorbing wavelength serves as a baseline for comparison.

As the concentration of carbon dioxide varies, the difference in detected light intensities also varies. The exact relationship between IR light intensity and carbon dioxide volume concentration is determined when the instrument is calibrated using pure nitrogen and a known concentration of carbon dioxide during manufacturing.

### Stable solution with simple and robust design

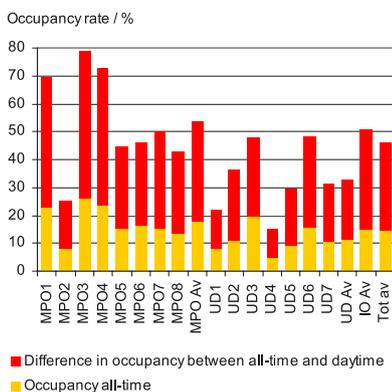
As the Vaisala CARBOCAP® sensor includes only three main components, its design is simple and robust. This eliminates errors caused by slight differences in the multiple components used in competing dual-beam sensor designs. In addition, because the FPI used in the sensor is micro-machined from silicon and has no moving parts, it is more reliable than traditional mechanical ‘chopper wheel’ designs.

Performing the measurements using two different wavelengths, as described above, make the Vaisala CARBOCAP® solution vastly more stable than other NDIR solutions, which only measure on the carbon dioxide absorption wavelength, trying to manage the drift by adding corrective actions in the software.

The problem with software corrections is that they necessitate the assumption that the background carbon dioxide concentration remains constant, when in reality the background level is not always ventilated to the atmospheric background level. Correcting the sensor reading level to an assumed background level in an environment where the actual concentration could be higher results in under-ventilation and lowered human comfort.

### Further information:

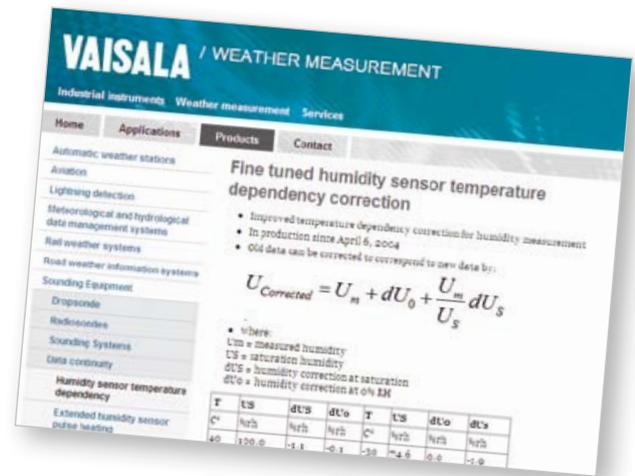
[www.vaisala.com/instruments/products/carbondioxide](http://www.vaisala.com/instruments/products/carbondioxide)



Occupancy patterns in three different office buildings (Johansson, D. Modelling Life Cycle Costs for Indoor Climate Systems, PhD Thesis, Lund University 2005).

# Assured data continuity for radiosounding time series

Sanna Nyström / Editor-in-Chief / Vaisala / Helsinki, Finland



*In order to guarantee data continuity for sounding observations, Vaisala has established a website providing radiosonde-related information that could have an effect on the interpretation of climatological time series.*



*Finnish Meteorological Institute's observatory in Sodankylä northern Finland celebrated its 60th anniversary in October. The station has performed soundings with Vaisala's radiosondes for the whole duration of its existence, building up a six decade long time series of continuous observations.*

Vaisala's sounding equipment is used by meteorological organizations worldwide to measure weather in the upper atmosphere. Quality, accuracy and reliability have been the key drivers behind efforts relating to both the performance of the sounding products and the services offered in support of them since the very first Vaisala radiosonde in the 1930s.

In addition to day-to-day meteorological activities such as forecasting, sounding observations are a major resource for climatological research. Data continuity within the observations time series is especially important to researchers, who need to be able to adjust and correct any information that could have a misrep-

resentative effect on the long-term trends within the series.

To better respond to the needs of the climatological research community, Vaisala decided on establishing a public website providing information on product modifications and further developments of the Vaisala Radiosonde RS92 product family and the related ground equipment, dating back to their release to the market. The website lists all changes that could affect the climatological time series.

In all the cases, the effect of the changes on measurement outcome

is small, but documenting them in detail ensures that the data remains comparable and representative of actual real-life phenomena. For the same reason, changes that don't appear to have any effect on the time series have also been listed, marked with 'no data continuity effect'.

Similar information will be provided for the climate reference radiosonde that Vaisala is currently developing.

## Exact numerical information and conversion formulas provided when available

At the moment, the service describes changes in temperature and humidity sensors, sensor boom, solar radiation correction table and data processing. The information includes identification data, listing of affected parameters and a description of the change in question. When available, exact numerical information and a possible conversion formula are provided.

To be able to use the data continuity documents, the types and serial numbers of the radiosondes and software versions of the ground equipment used within the studied timeframe have to be known.

**Further information:**  
[www.vaisala.com/weather/products/datacontinuity.html](http://www.vaisala.com/weather/products/datacontinuity.html)

# Voltree Power leading the way with **bio-energy** harvesting technology

Stella Karavas / CEO / Voltree Power / Canton, MA, USA

Theresa Mary Fischer / Communications Manager / Vaisala / Tucson, AZ, USA

*Operating on converted metabolic plant energy, Voltree Power's Climate Sensor Network collects environmental data to predict forest fires.*

In September 2009, Voltree Power announced its first Climate Sensor Network contract with the United States Department of Agriculture (USDA) Forest Service and Bureau of Land Management at the National Interagency Fire Center in Boise National Forest, Boise, Idaho, USA. Voltree has been collaborating with these governmental agencies and Vaisala for nearly two years to integrate their breakthrough technology to create a low-cost, low-maintenance way to collect a new level of detailed environmental data.

The Climate Sensor Network complements the USDA Forest Service's Remote Automated Weather Stations (AWS) network which includes Vaisala solutions. Voltree Power's patented Bio-energy

Harvester technology converts metabolic plant energy into usable electricity by collecting the energy that is naturally produced by living trees and other large plants and using low-power radio transceivers, sensors to trickle charge and run low-power circuit. This pioneering alternative eliminates the impracticality of battery replacement in extensive mesh networks. The University of Washington has independently confirmed the viability of operating low-power circuitry from tree power.

## **Environmentally sound solutions to real world problems**

Voltree provides a reliable and cost-effective method of collecting



*Stella J. Karavas with a demonstration system installation.*

microclimate, 'under-the-forest-canopy' weather data that serves as a valuable tool for weather and climate modeling as well as climate change research. Voltree's wireless mesh network of low-power sensory nodes transmits data signals from one unit to another until they reach a Vaisala-built central monitoring station. These stations subsequently provide a satellite microwave uplink connection that allows the collected information to be shared with numerous government agencies and many other users worldwide.

Vaisala's technology enhances the network system because of its reliability and the company's global presence. This is why Vaisala was chosen to be a strategic partner in

providing environmentally sound solutions to real world problems.

The Climate Sensor Network's predictive approach will enable government land agencies strategically prioritize and provide better pre-positioning resources to maximize public and firefighter safety as well as reduce losses and lower costs. The data can be used to assist in the prediction of areas in the forest at higher risk for fires at the time the information is collected.

Voltree's collaboration with the Bureau of Land Management project includes a Vaisala HydroMet™ Automatic Weather Station as well as assistance from Vaisala for software integration. The automatic weather station is portable and specifically developed for temporary installations. It includes a lightweight aluminum tripod with adjustable legs for use on uneven terrain.

The product line is field-proven in a wide range of application with a basic suite of sensors typically measuring wind, pressure, temperature, relative humidity, and precipitation. In addition, measurements can be taken of e.g. multi-level soil temperature, soil moisture, global and net solar radiation, water level, and temperature.

## Patented technology with a variety of applications

The USDA Forest Service and the Bureau of Land Management are not the only major entities to recognize the potential of Voltree Power's patented technology. Applications range from ultra local, short-latency, microclimate data collection and delivery for wildfire prediction and monitoring to climate research and agricultural sensing to covert security and defense solutions for motion and ionizing radiation early warning systems.

Voltree Power researches, designs, manufactures and maintains energy harvesting modules, low power radios and other elements of mesh-networked telemetry systems for a variety of customers. The company received the 2009 Best of What's New Award from Popular Science in the Green Tech category for their Javelin product and was also awarded the Green Energy TV "Two Green Thumbs Up" for their energy innovation and green inventions.

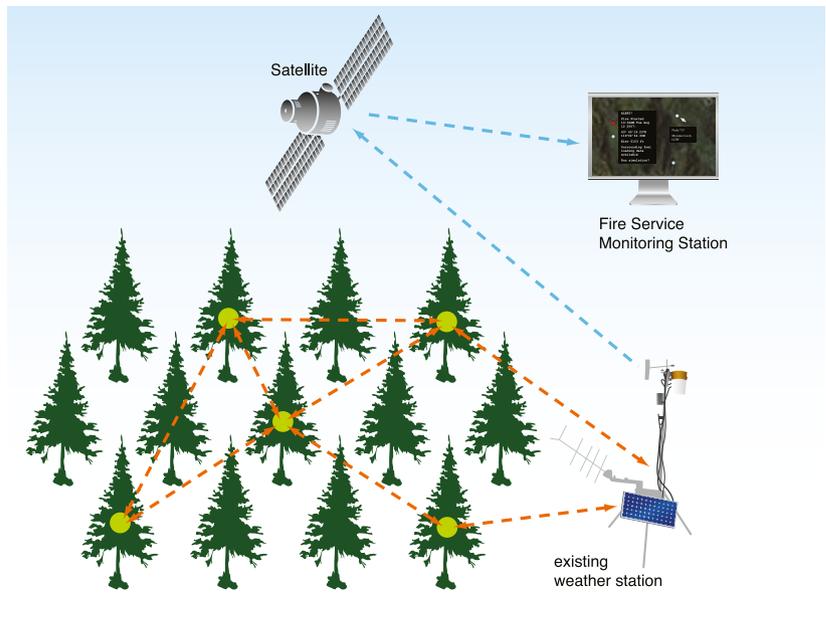
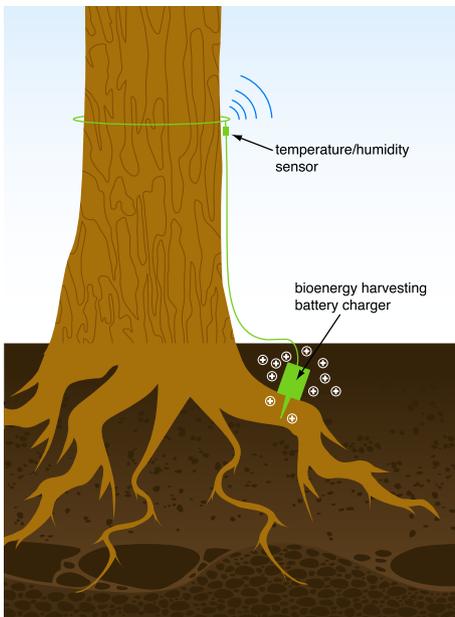
Formed in 2005, Voltree Power has a market focus of low-power wireless sensing networks and automation systems for homeland



*Eric Keith of Vaisala (left kneeling) with Voltree Power's Project Manager Scott Keller (right kneeling) and Science Advisor Dr. Andreas Mershin integrating a portable automatic weather station from Vaisala with Voltree's demo system.*

security, environmental and agricultural monitoring, meteorology and climate science, residential and commercial fire detection and prevention, and other security applications.

**Further information:**  
[www.voltreepower.com](http://www.voltreepower.com)



## Global customer satisfaction surveying started

Customer focus is one of Vaisala's values. We want to be proactive with our customers, to understand their needs both now and in the future, and to develop solutions that respond to those needs.

In addition to everyday dialogue with customers, Vaisala has now started a corporate-wide customer satisfaction surveying process. We want to have an objective and global view of our customers' requirements as well as of our performance in the areas that matter most to our customers. The results help us to focus and prioritize development actions.

The customer satisfaction surveying was started in the spring 2009 by interviewing 200 customers representing our Meteorology/Established Markets, Weather Critical

Operations/Airports and Roads, and Controlled Environment/Clean rooms and Chambers market segments. The results have already impacted the prioritization of Vaisala development actions for 2010 – improvement priorities will focus on quality, reliability and the ability to respond to customer needs.

The remaining market segments were surveyed during autumn 2009. The results and corresponding actions will be communicated in more detail after the analysis on all segments is completed.

The customer satisfaction survey is a very important activity for Vaisala. We want to warmly thank all customers who have contributed to the survey – the feedback is truly valued.

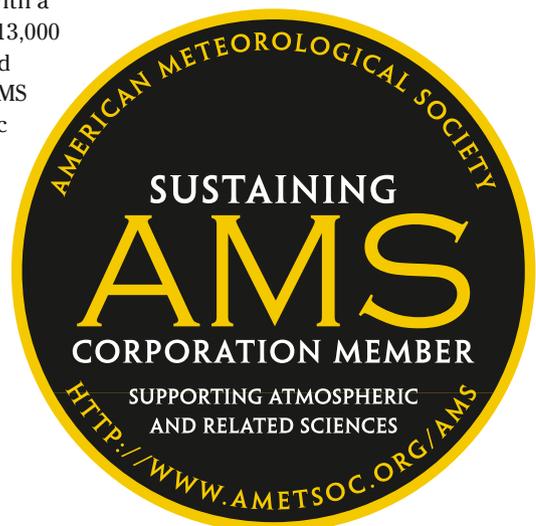


## AMS's newest Sustaining Member

Vaisala is a Sustaining Corporation & Institutional Member in the American Meteorological Society (AMS) in 2010. Participating at this membership level allows Vaisala to more actively contribute to and support the efforts of the Society. The Sustaining Corporation & Institutional Membership is the most prestigious class of AMS memberships and establishes an organization as a leader in the field.

The American Meteorological Society, founded in 1919, is the pre-eminent scientific and profes-

sional organization for scientists and practitioners in the atmospheric sciences and related oceanic and hydrologic sciences. With a membership of more than 13,000 professionals, students, and weather enthusiasts, the AMS publishes nine atmospheric and related oceanic and hydrologic journals, sponsors more than 12 conferences annually, and offers numerous programs and services.



## Vaisala's TLP100 and TLP200 lightning processors available on Linux®

The central processing software for Vaisala's lightning detection sensors is now available also on a Linux® operating system. For the user, this means added flexibility, ease of use and lower ownership costs.

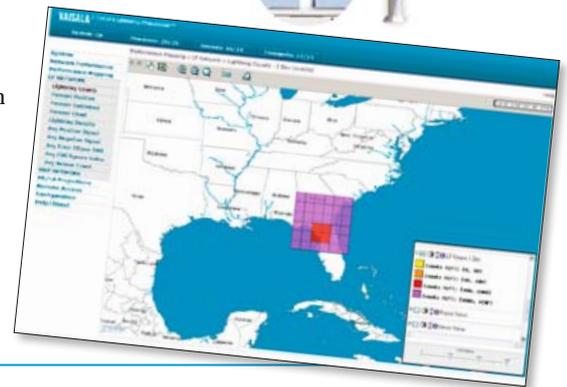
The Vaisala Total Lightning Processor™ TLP100 and TLP200 Series on Linux® central processing technology computes and displays information from raw data provided by lightning detection sensors. It also monitors network performance continuously, allowing the user to validate that all sensors are operational and functioning to specification.

Both TLP™ Series include Vaisala's patented location algorithm

with propagation correction services, locating lightning activity with a precision range of 250 meters or less. The location accuracy has been scientifically validated in cooperation with third parties.

Additionally, the TLP™ provides for a user-friendly web-based interface with performance tools, which can save up to 80% of the user's time in analyzing raw data and overall network performance – resulting in substantial returns on investment.

**Further information:**  
[http://www.vaisala.com/  
weather/products/tlp.html](http://www.vaisala.com/weather/products/tlp.html)



## Vaisala is Bright Green at the UN Climate Change Conference

As the United Nations Climate Change Conference (COP15) assembled world leaders in Copenhagen, climate-friendly technology companies from all around the world gathered there as well. The reason was Bright Green Expo business event, organized in parallel with the COP15 on 12–13 December.

During the two full-packed Bright Green days, more than 160 companies showcased a broad spectrum of environmental technologies under the four main themes of the exhibition – Cities, Energy, Business, and Living. Vaisala participated in the event as a part of a collective exhibition organized by Cleantech Finland®, an association that supports the growth of Finland's environmental business sector.

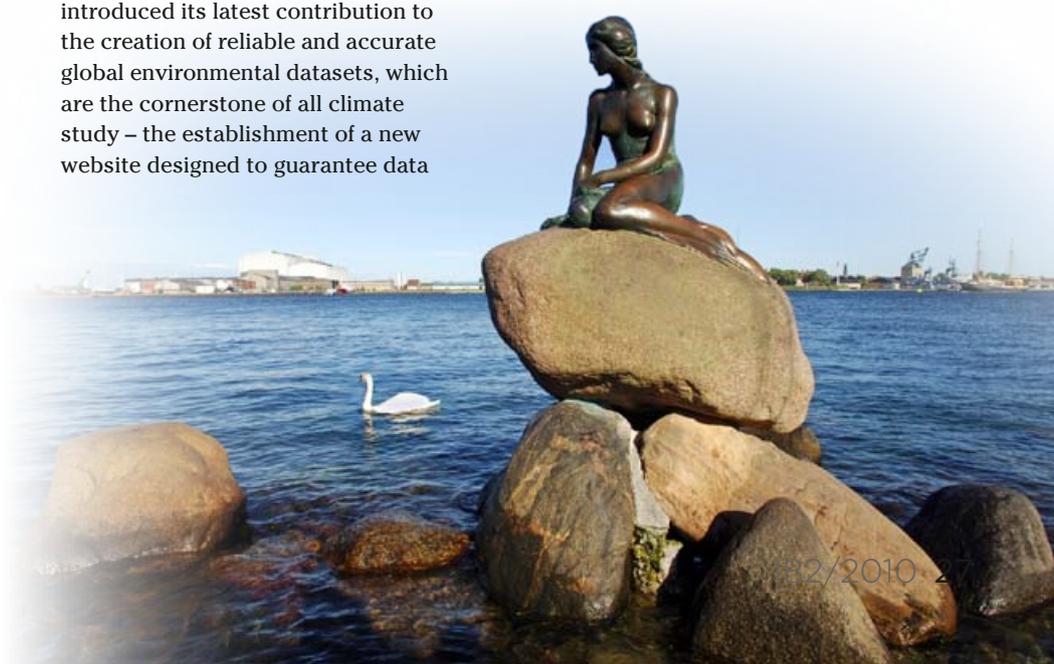
Bright Green was a natural opportunity for Vaisala to highlight our solutions and services

that contribute to climate change research, like the reference radiosonde, global lightning detection data, CO<sub>2</sub> measurement equipment and weather stations for ecological research.

During the event, Vaisala also introduced its latest contribution to the creation of reliable and accurate global environmental datasets, which are the cornerstone of all climate study – the establishment of a new website designed to guarantee data

continuity for sounding observations (see p. 23 for more information).

**Further information:**  
[www.brightgreen.dk](http://www.brightgreen.dk)  
<http://en.cop15.dk/>



A nighttime photograph of a city skyline with several illuminated skyscrapers. A bright lightning bolt strikes one of the buildings on the right side of the frame. In the foreground, there is a body of water reflecting the city lights and a bridge structure.

To register for the conference or  
for more information please visit  
[www.vaisala.com/newsandmedia/events/ildcilmc](http://www.vaisala.com/newsandmedia/events/ildcilmc)

## Register today for Vaisala's 21st ILDC/3rd ILMC

Vaisala presents – the 21<sup>st</sup> International Lightning Detection Conference (ILDC) and 3<sup>rd</sup> International Lightning Meteorology Conference (ILMC) on 19-22 April 2010 at the Buena Vista Palace in Lake Buena Vista, near Orlando, FL, USA.

The conference theme for 2010 is "Lightning's Impact on Society". Data from the new Vaisala Global Lightning Dataset GLD360 product will be

streaming live during ILDC and ILMC. A presentation on the global lightning data applications and success of the program will be provided.

The ILDC forum will include discussion of lightning physics, lightning network performance, and innovations in the field of lightning detection. The ILMC will provide a valuable forum for discussion of all cloud-to-ground and cloud lightning

applications that impact society, including hydrometeorological applications, nowcasting and forecasting, lightning data assimilation into numerical weather prediction models, thunderstorm growth and dissipation, severe weather, and tropical cyclones.



## New ceilometer and related application software from Vaisala

Vaisala's new cloud height detector, the Vaisala Ceilometer CL51 made its first public appearance during the American Meteorological Society's Annual Meeting in Atlanta in January. As the new high range ceilometer is designed to measure cloud base height and vertical visibility no matter what the weather, it is an ideal instrument for applications where reliable cloud detection is important.

The CL51 utilizes advanced optical single lens technology for high range measurement, which makes its performance during precipitation and low cloud conditions unsurpassed. Thanks to the strong and stable signal over the whole measurement range that the single lens technology enables, CL51 reports high altitude cirrus clouds, but performs very well also at low altitudes.

Its cloud measurement range extends from ground level to 43,000 feet (13 kilometers). In addition, the CL51 is able to provide a backscatter profile over the full measurement range up to 49,200 feet (15 kilometers), which provides a possibility for advanced boundary layer and atmospheric analysis.

The CL51 is based on a similar platform than Vaisala's existing ceilometers with robust and affordable diode laser technology. It also includes the emulation messages of Vaisala's earlier ceilometers, which makes it easy for the user to transfer from the other ceilometers to the CL51 or use both side by side.

### New software enables air quality forecasting

Another novelty coming to the market is the BL-View, new application software for Vaisala's ceilometers. Thanks to its ability to report planetary boundary layer (PBL)



structure parameters like mixing layer height and residual layer height, the software opens up new application areas for ceilometer measurements, such as air quality measurement, forecasting and dispersion models. All data can be exported from the software for advanced analysis and research purposes.

BL-View displays and logs data from one or more ceilometers in a user-friendly interface with a variety of selections. The user can view previously logged data while logging and displaying real-time measurements and running other Windows applications at the same time.

Combining the BL-View with Vaisala Ceilometers CL31 or CL51 enables real-time 24/7 PBL structure reporting. The software is capable of generating online graphics for PBL evolution and details of the PBL structure, functions that are highly applicable in air quality forecasting in particular.

Both Vaisala Ceilometer CL51 and the BL-View software will become available later this spring.

## Walter F. Dabberdt chosen to co-chair NOAA's EISWG



Walt Dabberdt, Vaisala's Chief Science Officer, has been chosen to serve as a co-chair for the US National Oceanic and Atmospheric Administration's (NOAA) newly formed Environmental Information Services Working Group (EISWG). He co-chairs with Nancy Colleton, President/Executive Director of the Institute for Global Environmental Strategies & Alliance for Earth Observation.

The EISWG advises the NOAA Science Advisory Board (SAB) on the condition and capabilities for improving communications among public, private, and academic entities engaged in environmental information matters. The group will submit

formal reports to the SAB that identify current issues, deficiencies, recommendations for remedial action, and proposed initiatives, as well as provide advice on incorporating scientific and technical capabilities to enhance NOAA's products and services.

The initial approach of the EISWG will focus on interaction between the various NOAA line offices and the National Weather Service. As experience is gained with this approach, the group may broaden its approach to include other NOAA elements as well.

**Further information:**  
[www.sab.noaa.gov](http://www.sab.noaa.gov)

## New weather radar signal processing platform from Vaisala

Vaisala has launched a new signal processing platform for its weather radar product family. The Vaisala Sigmet Digital Receiver and Signal Processor RVP900™ is now available for both new weather radar instal-

lations and upgrades for existing radars.

The RVP900 consolidates all of the earlier model's hardware and functions into one single package. Computational power has been increased, allowing the use of multiple, advanced processing algorithms simultaneously to improve output data. Comprehensive digital IF and signal processing functions as well as PCI bus-less architecture with direct Ethernet linking provide further enhancements in terms of usability.

All in all, the RVP900 has substantially improved capabilities for dynamic range, sensitivity and sampling rate. It can be integrated into existing software or purchased with Vaisala's IRIS software for Linux® workstations.

Vaisala's Sigmet product line has a 28 year history of developing innovative, high-quality signal processing products to the weather radar community. The predecessor of the RVP900 was the first digital receiver/signal processor on the market to be based on open hardware and software architecture.

**Further information:**  
[www.vaisala.com/weather/products/rvp900.html](http://www.vaisala.com/weather/products/rvp900.html)



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