



Royal Meteorological Society

**Meteorological Observing Systems
Special Interest Group**



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Front Cover Photo- Figure 1 from the article *A New Heated Snowgauge* on page . The prototype rain collectors on test near Wallingford (*Photo © Ian Strangeways*).

Introduction

As you will read on page 3, Jonathan Shanklin has decided to step down from the Chair of our Group after many years of service and I am sure every member of the SIG will join with me in thanking him for his hard work. Much of the work of Chairman is unglamorous (Jonathan might ask for clarification as to which part *is* glamorous) but all of it is essential. Hours spent at the RMetS Meetings Committee on our behalf usually contain a good amount of content which is of little concern to the Group but without interjection and suggestion at appropriate points the members there would struggle to know how best to help us and provide the best support for us to pursue our interest. It is in no small part due to Jonathan's work that the Group has maintained a high profile within the Society in recent years and been viewed as one of the more active and successful SIGs. I would draw particular attention to the way in which he has encouraged involvement in the SIG by amateur meteorologists interested in instrumentation and observing, arguably one of the last areas in which amateurs can make a meaningful contribution to our science. There has been an encouraging attendance at our recent meetings by members of this community, giving a good mix along with professionals and academics.

And a good mix is what we need within the SIG. It is perhaps timely to say that a bigger committee would not be unwelcome and with many of the present incumbents having served for some time now, fresh faces would certainly ease transition when people decide to step down. In particular, representation from the academic community is sparse to say the least and as we are encouraging students to join our Group some representation from that demographic would not be unwelcome. It can be very hard for the same brains to think up new ideas for meetings and fresh faces amongst us would certainly help. We would welcome new links with the academic institutions involved in the atmospheric sciences. The committee meets only twice per year at RMetS HQ in Reading, plus the AGM. Some members are frequently unable to attend due to other commitments but this is no obstacle to participation, as a great

deal of the business is conducted on an ongoing basis between meetings by email discussion. Anyone who could make one meeting per year would fulfil their obligations without question. People are loathe to volunteer for work of this kind owing to the fear of it taking up a great deal of time but honestly, within the SIG this fear is ungrounded. If you can spare a little time I do hope that you will consider coming forward as we do need to look to the future and ensure we maintain our healthy position. If you wish to discuss things before reaching a decision do feel free to contact any of the officers of the Group, without obligation - details on the back page of your Newsletter. Or arrange to come along to a committee meeting and see what we get up to - the sandwiches are very good!

Andy Overton, Newsletter Editor

Group Website

Members are encouraged to regularly check the Group's pages on the RMetS website at <http://www.rmets.org/groups/SIG/detail.php?ID=10> for details of meetings and booking information, including on-line registration for meetings. Whilst every effort is made to publicise meetings via the inserts in Weather magazine and the Newsletter the website is the quickest medium of communicating with you.

Have Your Say

This is your Group and your Officers are always happy to receive feedback about what is being done on your behalf. If you have any comments or suggestions on matters relating to the Group and our activities please do not hesitate to get in touch with any Officer. Contact details are shown on the last page of the Newsletter. Suggestions for future meetings and speakers are always very welcome.

Material For Publication

Written material must be in electronic format, preferably in MS Word or Excel, although PDF format can be accepted. Short news items as email are acceptable. Material can be sent as email attachments to andrewkovertont@tiscali.co.uk, or on floppy disk, CD or DVD to 58 Zetland Road, Town Moor, Doncaster, South Yorkshire DN2 5EJ. Please say if you would like disks returning. In all cases please include your name, address and email or telephone number with submissions. **Publication deadlines** are 1st March for Spring Newsletters and 1st September for Autumn Newsletters.

Whilst every effort is taken to ensure accuracy, responsibility for the accuracy of material published and opinions expressed lies with individual authors. The Editor is always pleased to receive correspondence on published items which provides correction, clarification or additional detail. This may be included in future editions of the Newsletter.

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Committee Changes

Welcome to Steve Colwell

Mr. Steve Colwell, a scientist with the British Antarctic Survey (BAS) based at Cambridge, has joined the Committee and a warm welcome is extended to him. Steve started with BAS in 1991 and spent a winter at Halley research station (75.5S 26.4W) as a meteorological observer. He now works within the Meteorology and Ozone Monitoring Unit (MOMU) and is responsible for maintaining a suite of meteorological instruments in Antarctica, testing and installing new meteorological instruments and collecting and archiving meteorological data from Antarctica. He is also the chairman of the Scientific Committee on Antarctic Research (SCAR) Expert Group on Operational Meteorology in the Antarctic. Some of you may remember Steve as he has organised SIG meetings and tours at BAS in the past.

Chairmanship of the Group

The Group Chairman, Jonathan Shanklin, has given notice that he intends to step down at the end of his term at the 2009 AGM and all members of the Group are hereby given notice that the election of a new Chairman will take place. There are no current members of the Committee in a position to take on this role full time and a new Group Chairman is needed. Steve Colwell, who has recently joined the Committee, has indicated a willingness to take on this role. The Committee, including Steve, have spent some time discussing this issue and everyone agrees that the Group Chairman needs to be an established member of their number, fully up to speed with business. The Committee therefore give notice to the membership of their intention to propose at the 2009 AGM the following motions to take us forward:

1. That Mike Brettle, Group Membership Secretary and Treasurer, be elected as interim-Chairman of the Group for the 2009-10 term of office, with the intention that Steve Colwell will take over as full-time Chairman at the 2010 AGM. A vote in favour of this motion in 2009 will authorise both appointments. The Committee believe that the stability that this joint appointment will give will be in the long-term interests of the Group.
2. That the Group adopt the following policy - *A Nominee for Chairmanship of the Observing Systems SIG must be a member of the Group Committee and have served a continuous period of at least 12 months prior to nomination.* Anyone is eligible to come and serve on the Committee and it is felt that it would be very difficult for anyone to lead the Group effectively upon stepping straight into the Chairman's role from outside the Committee.

The Committee ask for the support of the membership in passing these motions.

However, if there are any other nominations for the position of Chairman, under the existing arrangements, these should be sent to the Group Secretary, John Prior (address on back page) to arrive no later than 15th June 2009. Nominees must be proposed and seconded by members the Group and nominees must be members. Nominations should include a supporting CV. If other nominations are received then their full details, along with those of Mike Brettle and Steve Colwell, will be circulated to members prior to the AGM and the Chairman will be elected by a show of hands from those present on the day.

Forthcoming Meetings

Comparing Observations With Models

A joint meeting to be held with the RMetS Data Assimilation SIG and ECMWF on Tuesday 5th May 2009 at ECMWF, Reading

Programme

1030 Registration

1100 Welcome and Introduction

1110 Jon Shanklin, British Antarctic Survey - *Surface based observations*

1150 Bruce Ingleby, Met Office - *Improved assimilation of surface observations*

1230 Lunch

1330 John Edwards, Met Office - *Boundary layer modelling and screen level diagnostics*

1400 Lars Isaksen, ECMWF - *Accounting for non-Gaussian observation error*

1430 Jonty Rougier, Bristol University - *Data assimilation into a simple model for glacial cycles: the relationship between models and reality*

1500 Tea/coffee

1530 Catherine Gaffard, Met Office (Reading University) - *New developments in ground based remote sensing*

1600 Stuart Goldstraw, Met Office - *EUCOS - development of an integrated European observing network*

1630 Martin Best, JCHR & Met Office - *Towards benchmarking for a land surface model*

1640 Discussion

1700 Close

ECMWF is at Shinfield Park, Reading, Berkshire RG2 9AX and is about 3 miles south of the town centre on the A327. Location details and travel options are given at <http://www.ecmwf.int/about/location/>

There is no meeting charge, lunch/drinks can be purchased from the ECMWF restaurant.

If you intend to come to the meeting please let one of the meeting organisers know: john.prior@metoffice.gov.uk ; tel 01392-886206 (for Observing Systems group) or bruce.ingleby@metoffice.gov.uk ; tel 01392-884430 (for DA group).

Group AGM and Summer Visit

Students' Union, Palmer Building, University of Reading
on 1st July 2009 from 1000hrs

The Group's AGM will this year be held during the RMetS Conference at the University of Reading. The AGM will commence at 1100 and lunch will be taken in a local pub at 1230 (attendees to purchase their own refreshments). Proceedings will recommence back at the University at 1400, when there will be a tour of the manufacturers' exhibition and poster displays until 1600. The meeting will then conclude with tea and coffee.

There is no charge for the meeting and RMetS have kindly arranged for attendees to gain access to the Conference to attend the SIG visit free of the usual registration charge. However, please note that this only includes participation in the SIG programme. Those wishing to attend will need to register **by 13th May** to obtain the necessary passes to gain access. A registration form has been included as the last page of this Newsletter for you to print off and send to John Prior, further copies of the form can be obtained from <http://www.rmets.org/events/detail.php?ID=471> . Please contact John Prior, Met Office, Fitzroy Road, Exeter EX1 3PB, Tel: 01392 886206, Email: john.prior@metoffice.gov.uk if you have any other questions.

Data Transmission and Presentation

A Workshop to be held at the British Antarctic Survey, Madingley Road, Cambridge
Autumn 2009

Details of this meeting, which is likely to be held in early October 2009, will be sent out to members nearer to the meeting.

News From the Manufacturers

Campbell Scientific - Internet Forum

A new web-based forum has been initiated for the purposes of sharing field based and application specific knowledge amongst users of Campbell Scientific products. The forum is, however, open to everyone and can be accessed via www.campbellsci.com/forum

Campbell Scientific - New Leaf Wetness Sensor

Decagon's leaf wetness sensor is now available. This device, designed to be hung in the tree canopy or on an AWS mast, imitates the performance of a leaf and measures the dielectric constant of the sensor's upper surface. It is compatible with all the company's dataloggers. See www.campbellsci.co.uk

Campbell Scientific - New Datalogger Operating System Download Available

A new operating system is being used in loggers in current production, which aims to remove previously identified bugs, provide new instructions and make connection to GPS systems, and synchronisation with a GPS clock, easier. Older loggers synchronised to within 10ms but with the new system the GPS can drive the logger clock, allowing synchronisation to within a few microseconds. The download includes a

patch which upgrades the CRBasic editor with all necessary files. Downloads are available at www.campbellsci.com/downloads

Campbell Scientific - Vibrating Wire Interfaces Discontinued

The introduction of the new AVW200 model has led to the older AVW1, AVW4 and AVW100 being discontinued.

Campbell Scientific - Rain Detector RD01

Added to their range of products primarily for road monitoring, the RD01 sensor provides an on/off, voltage analogue and frequency output and an integrated heater to remove snow and frost, as well as drying the sensor after cessation of rain. However, it can be used for a wide range of other applications. Details at www.campbellsci.co.uk

Kipp & Zonen - Firmware Update for 2AP Sun Tracker

The original algorithm used in the 2AP sun tracker can lead to a build-up of errors in the calculated sun position, requiring correction every few years. A new memory chip is now available for the 2AP controller board and fitting instructions to eliminate this problem. See www.kippzonen.com

Kipp & Zonen - Extra Solys 2 Shading Ball

If a third shaded radiometer is to be mounted on the Solys 2 assembly an additional rod and ball to be fitted on the existing crossbar can be supplied as an accessory. See www.kippzonen.com for ordering information.

Kipp & Zonen - New CNR 4 Net Radiometer

April 2009 sees the launch of Kipp & Zonen's new integrated 4-component net radiometer. It will feature a meniscus dome giving a field of view of near 180°, it is much lighter than previous models and has an integrated sunshield, reducing thermal effects on both long-wave and short-wave measurements. The CNR 4 will be equipped with sensors to measure housing temperature and an optional ventilation unit with heater. The price will be the same as the CNR 1. For details see www.kippzonen.com

Kipp & Zonen - New Datalogger LOGBOX SD

This new logger which includes a bracket for fitting to all masts is compatible with all Kipp & Zonen solar radiation instruments. For more details see www.kippzonen.com

Mierij Meteo - New Optical Rain Sensor 205

A new solid state rain sensor operating in the infra-red and near infra-red wavelengths is now available. The sensor detects only dynamic changes on the glass surface of the sensor, so dust, dirt or pollution do not affect it and it is usually mounted at an angle of 30° so that precipitation does not build up. It provides two outputs (no precipitation is 4mA, precipitation gives 20mA) with an open collector output switching to ground on precipitation detection. A built in heater is provided for fast response and recovery. For more details see www.kippzonen.com

Muir Matheson - Vaisala Milos 500 Life Extension

Muir Matheson are now able to integrate a Campbell Scientific measurement and control unit into this system, utilising the existing sensors and hardware and avoiding replacement of the entire package upon failure. For more details contact Muir Matheson on +44(0)1224 791222 or email sales@muirmatheson.com or visit their website www.muirmatheson.com

Vaisala - New Reference Radiosonde Development

Vaisala have just embarked on the development of a new high-quality radiosonde for upper air measurements for climate change studies, designed to provide superior data to that provided by existing sondes.

A New Heated Snowgauge

Ian Strangeways - TerraData Limited, Wallingford

Mark Dutton and Terry Jenkins - Environmental Measurements Limited, Sunderland

Abstract

Rainfall measurement errors are dominated by the aerodynamic loss of drops due to the speeding up of the wind over the gauge, but this problem is much greater with snow. The best exposure for a raingauge is with its orifice at ground level, but in the many situations where this is not practicable an aerodynamically-shaped gauge is the best alternative. Such a gauge was developed in a joint collaborative project between TerraData Ltd and Environmental Measurements Ltd.. As an extension of this work, the rain collector has now been equipped with electrical funnel and chamber heating to enable it to melt falling solid precipitation. Rain, or melted snow, is measured by a tipping bucket in 0.1mm steps, giving a good resolution of intensity as well as total fall. It is considered that this approach to solid precipitation measurement is preferable to the use of antifreeze and weighing mechanisms, for reasons that will be explained. Gauges have now been tested in the Scottish Highlands and the Antarctic.

1. Introduction

The instrument described here is the result of collaboration between TerraData Limited (TD Ltd) and Environmental Measurements Limited (EM Ltd) in which a proven aerodynamic raingauge (Strangeways 2004) has been adapted to produce an automatic precipitation gauge able to measure both liquid and solid precipitation.

2. The wind effect

The effect of wind on the catch of a raingauge is the largest source of error in measuring rainfall, the speed-up of the wind over a gauge causing small drops to be carried beyond the gauge and lost. Circulating turbulence within the gauge can also result in drops being lifted out and lost. Up to 50% of the rainfall can be lost in drizzle and high winds in this way. The most effective method of minimising this loss is by exposing the raingauge at ground level (Robinson and Rodda 1969). This has been known for a century or more, yet few gauges are exposed in this way, resulting in most rainfall measurements being low by 5 to 10%; higher under some conditions. Where ground level exposure is not possible windshields such as those designed by Nipher and Tretyakov are sometimes used (Strangeways 2007).

An alternative to shields is to design the gauge to be aerodynamic in profile and a mathematical treatment of this was described by Folland (1988) in which a 'first guess' aerodynamic design was proposed. Over the ten year period from 1994 to 2004 TD Ltd undertook raingauge developments,

including five years of field tests, starting from Folland's basic theoretical work, resulting finally in a practical, modified design that has good aerodynamic performance while not suffering from out-splash in heavy rain, which all shallow-funnelled gauges are prone to (Strangeways 2004). The design also meets the new British Standard for raingauge funnels. Two models were tested, the smaller having a funnel area of 500 cm², the larger 1000 cm² (Figure 1, Front Cover).

During field trials under rainfall conditions these aerodynamic gauges have, on average, produced around 6% more catch than the equivalent straight-sided gauges, resulting in closer agreement with pit gauges. These designs are now manufactured by EM Ltd under licence to TD Ltd and the design is registered with the UK Patents Office. The gauges measure the collected water with a tipping bucket, the smaller funnel producing a tip for each 0.2 mm of rainfall, the larger 0.1 mm per tip.

The problems of wind-loss, however, are much greater when measuring snowfall with a conventionally-shaped cylindrical raingauge due to the considerably greater mobility of snowflakes. To shield snow-gauges from the wind, the Alter screen was developed, with its swinging leaves to prevent the accumulation of snow within it (which can occur with the Nipher screen). The WMO recommend the Double-Fence Intercomparison Reference (DFIR). This is extremely large (12 metres in diameter and 3.5 m high) making it impracticable for general use, its primary purpose being as a reference (Strangeways 2007).

3. Melting of solid precipitation

At attended sites, the snow caught by a conventional raingauge can be melted manually, provided the falls are not so heavy as to over-cap the funnel. At unmanned sites, the funnel section can be omitted and the snow allowed to fall directly into an open container, which is weighed periodically with load cells. Antifreeze is used in some designs to melt the snow as it falls into the container, but capacity is limited unless there is some means of emptying the container such as by periodic siphoning (or a valve) allowing the snow/antifreeze mix to run off, either into the ground or into a container to minimise pollution of the environment. In such a design it is necessary to replenish the antifreeze automatically following emptying. Evaporation from the melted snow in some open designs is prevented by introducing a thin layer of oil on the surface, in others the evaporation is simply recorded (as weight loss) and allowed for.

The alternative is to heat the collecting funnel. This also allows a conventional tipping bucket mechanism to measure the melted snow, which is cheaper and simpler than weighing it. The aerodynamic gauge (Fig 1, Front Cover), which was developed for measuring rainfall, also has the capacity to reduce the aerodynamic loss of snow, and in cooperation with EM Ltd a heated model of the larger collector was developed. While some gauges that melt the snow use bottled gas as the heat source, this would not be possible with an exposed aerodynamic funnel. A simpler and more controllable method is to use electrical heaters. This, of course, requires the presence of mains electrical power at the site, but where this is available, electrical melting is a reliable, finely-controllable and clean solution.

The heated snow-gauge uses electrical heating pads fixed to the outside of the metal funnel, protected with a metal-spun cover having the same aerodynamic profile. Some heat is allowed to pass through the cover to prevent snow building up on the outside. The heater pads cover the entire surface of the funnel giving an even distribution of gentle heat to all of the collecting area. The temperature of the funnel is sensed and controlled by four thermocouples spaced equally around it, while a separate thermocouple controls the temperature of the tipping bucket in the lower cavity. The heaters are run off 24 volts DC for safety; there is no mains power in the gauge. Two control outputs from a Campbell Scientific data logger are used to turn the heaters on when the temperature falls below + 3°C and off again when it rises above + 3°C. This is done independently for the funnel and for the bucket heaters. Because the temperature is never raised higher than this threshold by the heaters, evaporative losses from the funnel and from the tipping bucket are avoided.

During rainfall, the gauge performs as an aerodynamic raingauge, the heaters being inoperative. The gauge is thus suited to measuring all forms of precipitation (because of this ability, the gauge has been named the 'Universal Precipitation Gauge'). Tipping bucket raingauges are sometimes criticised for not measuring precipitation intensity very well, but having a large collecting area, of 1000 cm², and tipping in 0.1 mm steps, a good indication of intensity is obtained.

4. Field Testing and Evaluation

Two test sites have been, and are being, used to assess the performance of the gauge. One site is in the Scottish Highlands, the other at Rothera in Antarctica operated by the British Antarctica Survey (BAS). The Scottish trials extended over two winters, 2006/7 and 2007/8. The Antarctica tests started in December 2007 and are ongoing.

The data logger used at the two test sites, to collect the data and to control the heaters, is the Campbell Scientific CR800 data logger. The number of bucket tips are logged at an interval of 15 minutes, along with the maximum, minimum and mean temperatures of the funnel, of the bucket and of the logger, together with the battery voltage. These additional pieces of information allow the performance of the system to be monitored precisely.

4.1 Tests in Scotland

The prototype gauge was tested during the winters of 2006/7 and 2007/8, with an unheated raingauge alongside for comparison (Figure 2). A manual gauge was also operated nearby to make periodic comparative checks. While the latter was intended only to provide a rough comparison, to make sure the heated snowgauge was indicating the right order of precipitation, agreement turned out to be close, as the following table shows.

<u>Date/time</u>	<u>Manual records</u>	<u>UPG1000 records</u>
(2008)	(mm)	(mm)
24 January, 0945 – 1545	0.4	0.2
1 February, 0700-1100	5.2	6.4
1500-2100	3.1	2.8
1 March, 2300 - 2 March 0900	6.1	5.9
4 March, 0715 - 0915	0.4	0.5
18 March, 1015 – 19 March, 10.15	0.9	1.4
20 March, 2130 – 21 March, 0930	2.5	2.4
21 March, 2000 – 22 March, 0800	2.3	2.0
22 March, 2000 – 23 March, 0800	3.3	3.1
5 April, 2000 – 6 April, 0800	3.4	3.0
6 April, 2000 – 7 April, 0800	6.6	6.8
7 April, 2000 – 8 April, 0800	3.1	2.8
11 April, 0545 – 0845	0.8	0.4
Totals	38.1	37.7

Difference = 0.4 mm (1.1%)



Figure 2 - Tests of the heated snowgauge (left) alongside an unheated collector (right) in Scotland (Photo © Jo & Mollie Porter).

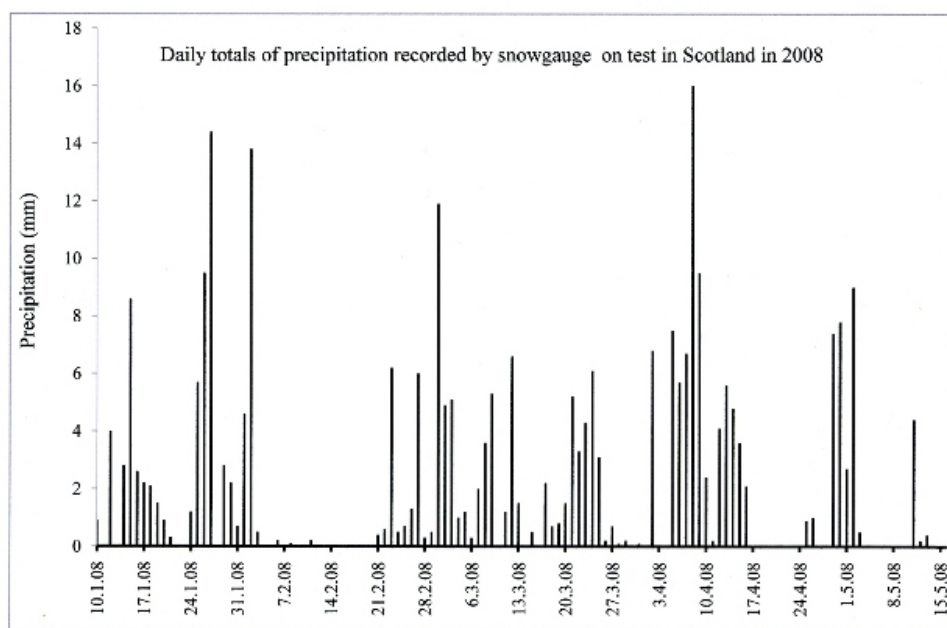


Figure 3 - Graph of daily precipitation from the snowgauge at the test site in Scotland.

Figure 3 shows the daily totals measured by the gauge, some precipitation being as rain, some as snow. If natural melting occurred after the snowfall had stopped, the raingauge would measure its catch slowly over the next few hours. Where melting did not occur naturally, it was melted manually. Over the full test period, the snowgauge caught 281.1 mm and the raingauge 274.0 mm, but without manual melting of the snow in the unheated raingauge this amount would have been considerable lower or delayed in time.

4.2 Tests in Antarctica

A gauge has also been on test at the British Antarctic Survey base at Rothera Point, Adelaide Island, on the Antarctic Peninsula since December 2007 (See Autumn 2008 Newsletter, Figure 6, page 19), figure 5 showing monthly totals up to September 2008. Some data were lost after September due to the mains power protection circuits occasionally tripping out (The power line to the met site, and thus to the gauge,

is on a spur from the main buildings some distance away). It is not known if the tripping occurred because the trip was set too finely, or if there was an intermittent problem with the power unit. A new gauge is en-route to Rothera at the time of writing this article (February 2009) with additional monitoring facilities, including a record of when the heaters are on and off. Apart from the mains-tripping, the gauge performed well and it is leading to some of the first records of annual precipitation from the Antarctic Peninsula.

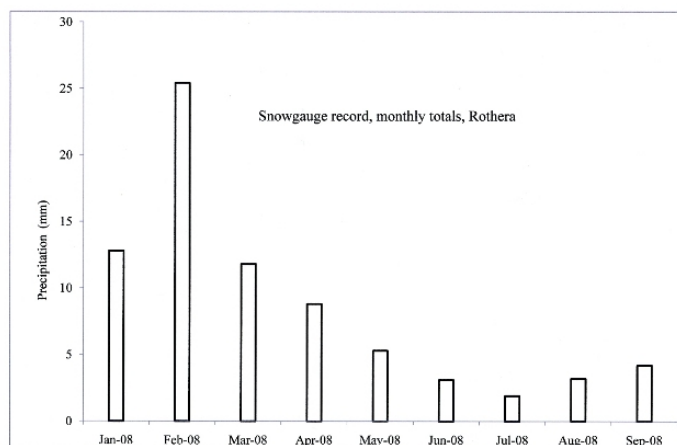


Figure 5 - Graph of monthly precipitation totals from the gauge at Rothera

5. Conclusions

The development of a heated model of the aerodynamic raingauges developed jointly by TerraData and Environmental Measurements offers the possibility of measuring precipitation, both liquid and solid, all year round in all climates. Tests in Scotland have now been completed, having shown that the gauge performs well compared with manual measurements of snowfall. The tests in Antarctica are ongoing and will enable direct precipitation measurements to be made in this extremely harsh environment all year round for the first time.

6. Acknowledgements

The field tests in Scotland were carried out by Jo and Mollie Porter at Easter Cottartown. Their careful notes, photographs and observations have allowed much to be learnt about the performance of the gauges. The authors also wish to thank the British Antarctic Survey (BAS) for carrying out the installation of the gauge at Rothera, for monitoring the gauge's performance and for downloading and forwarding the logged data.

References

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Meeting Report

Observations for Transport Applications

Held at Manchester Metropolitan University on 20th November 2008

Twenty-eight people gathered on a fine day in Manchester to hear a variety of presentations from operators and service-providers in the John Dalton Building of the Metropolitan University on Oxford Road. Opening proceedings was *Michael Wall* of Vaisala Ltd. who spoke on *Observations to Support Road Transport*. The company office in Birmingham specialises in weather services to support road and rail transport, with an emphasis on winter weather for the former. Michael's presentation dealt with services to highway engineers.

The ultimate aim was explained to be, naturally enough, keeping roads open but the environmental and financial constraints allied to this were pointed out. Legislation places a duty on highway authorities to keep roads safe and clear from snow and ice, within reason, and it was pointed out that a good deal of the value of having robust systems in place was to ensure that, in case of litigation, the authority concerned could defend its position in a court of law. These systems need to show that forecast information is used well. It is not practicable to treat all roads and those roads which are treated need to be tackled in advance of freezing, prevention being better and more effective than cure. To do this highways engineers need to know what weather to expect and its timing, the preceding weather and location-specific factors. Treating roads is expensive and environmentally damaging so needs to be targeted to where and when it is needed, rather than used indiscriminately. Vaisala's system to meet these challenges deals with three questions and each was dealt with at length.

The first issue is the question *If*. Generic weather forecasts are of limited value, lacking both the detail and information specific to road surfaces. The forecasts are verified for specific locations and the generic data extrapolated to the road network by using specific data from roadside Automatic Weather Stations (AWSs) to produce models to warn of highway-specific adverse conditions. The AWSs are positioned close to the carriageway and measure the usual range of meteorological parameters, plus the road surface temperature by one of two techniques: sensors embedded in the road surface, or remote sensing. 90-95% of AWS currently use embedded sensors but these are expensive to install, difficult to maintain and are liable to destruction by resurfacing operations. The present movement is towards replacing these with remote sensors, which merely need recalibrating when the road surface is disturbed and can be easily accessed for maintenance.

Next the question *When* was addressed. The generic forecast provides the basis for timing the onset of adverse weather and this is turned into a 24-hour forecast graph of, for example, the expected temperatures at roadside locations based on modelling. The roadside AWSs are then used to verify the forecast. Where departures from forecast are observed, these are incorporated into the model to improve the highway-specific forecast.

Finally *Where*. The generic forecast is likely to cover the whole of a highway authority's area and conditions may vary considerably vis a vis the need for road treatment within that area. The specialised forecast graphs are produced specific to each AWS location, however these are well spaced for financial reasons and it is necessary to know what to expect between them. A lot of factors have an influence between sites, such as the type of road surface, the aspect ratio to sky (affected by the presence or otherwise of buildings, trees, over-bridges), recent rain etc.. This information is improved by thermally mapping the road surface by vehicle-mounted ground survey equipment and comparing sites. Temperatures can vary by as much as 10 degC between sites. The survey gives graphical information of modifications between sites, allowing the site specific forecasts for the AWS locations to be extended to cover the locations between them. Thermal mapping has been shown to be consistent in all weather conditions - while the amplitudes of variations change, the pattern is preserved - allowing forecast modification by thermal mapping techniques to be used in all circumstances. The thermal mapping gives information about specific sites that may require treatment when the larger network does not and vice versa, allowing resources to be accurately targeted. At the current time 80-85% of highway authorities are using thermal mapping techniques in their road treatment systems.

The second presentation, by *Lee Chapman* of the University of Birmingham entitled *Transport Applications of 'Upside-down Remote Sensing'*, robustly challenged thermal mapping techniques. Lee positioned himself so as to question the fundamental validity of applying thermal map generated modifications to forecasts to all conditions, especially those not encountered during the mapping process. He advocated a new technique based on the sky-view factor – literally the amount of sky visible to each location - which he asserted was far more relevant. This technique also requires a land survey to produce a map and model, which is also influenced by the sort of site-specific factors discussed with thermal mapping, but here the survey sensor is looking up, not down. The generic forecast is again modified but this time taking into account the sky-view factor specific to each location. Applications of this technique also include rail. The type of equipment used in this technique was then discussed in detail.

The sky is viewed by using a fish-eye lens, giving a 360 degree picture. The visible wavelengths are mapped to give the sky-view factor, as this has the major control on the energy budget and surface temperature. The survey has to take place in homogenised cloud conditions but the resultant model can give forecasts modified for variable cloud, which is in effect a modification of the sky-view factor. Obstructions to sky-view reduce the amount of incoming short-wave solar radiation falling on the road / railway surface leading to a cooling from forecast temperatures during the day, whereas these same obstructions at night reduce the amount of outgoing long-wave radiation and keep temperatures up. The application of the resultant models is the same as with thermal mapping systems discussed above but it was also shown that the models could be used to assign the cost to operators of various temperatures, which may have applications in risk-based budget decision making.

Moving forward, several developments of this system were discussed which took advantage of mapping in other than the visible wavelengths using, in some cases, modified digital cameras. The near-infra-red wavelengths, which can be used to measure vegetation cover, could produce models of use to the rail industry in tackling leaf-fall. The infra-red wavelengths are of use to automated cloud-monitoring and also provide a bigger window for surveying of the sky-view factor, which then need not be carried out in homogenised cloud conditions. Ultra-violet wavelengths can also be used in mapping, although as yet no application for this data has been identified.

After the lunch interval Vaisala Ltd. again took the stage, this time concentrating on their rail industry business, explained by *Joanne Farrar* speaking on *Observations to Support Rail Transport*. Joanne gave an overview of the issues facing the rail industry, a transport system which was described as being more susceptible than others to the effects of extreme weather. Although the data previously described as having been gathered to assist mitigation on the road network were used to help with rail modelling, they are generally not specific enough to help greatly, requiring dedicated AWSs to be installed lineside instead. The weather affects both safety and performance and the effects of relevant parameters were described in detail. The two important issues are high winds, and temperatures of both extremes.

High winds affect the railway in two main ways: in extreme circumstances on exposed sections of track (particularly when crossing bridges and viaducts spanning large rivers or valleys) trains can be blown over; on lines electrified by the overhead line system the lateral movement of the conductor wire due to wind, coupled with the usual displacement caused by the current collecting pantograph of the train, can be enough to cause the wire to pass over the edge of the pantograph - when this happens the pantograph becomes tangled in the supporting wires and structures causing great damage to both (dewirement). This is a particular issue on the East Coast Main Line (ECML) (London King's Cross to Edinburgh Waverley), which overhead line system was constructed using a wire supporting system less able to withstand high wind displacement than other routes (e.g. the West Coast Main Line - London Euston to Glasgow Central). The traditional way of dealing with high winds has been to issue general speed restrictions or ban movements over bridges based on forecast wind speeds but extreme winds are localised and may exceed forecast speeds, or be less severe leading to unnecessary delay (*Editor's Note* - the point of speed restrictions is two-fold: firstly, it reduces the amount of natural movement of the contact wire caused by the pantograph, this reduction compensating in some degree for the displacement caused by wind action; secondly, if dewirement does occur the train can be stopped in a shorter distance, minimising the amount of damage to the infrastructure and impact force on the train by displaced

equipment). Vaisala Ltd. have installed anemometers on the ECML at 22 sites, chosen through modelling studies to be high-risk areas of extreme winds. These anemometers operate alarms in control centres when threshold speeds are exceeded and speed restrictions are then imposed.

High temperatures cause rails to buckle through thermal expansion. A certain amount of expansion can be compensated for (*Editor's Note* - this is a particular issue with continuously welded rail, which does not have the regular bolted joints of 'old-fashioned' rails. Rails are pre-stressed on installation- stretched, basically - and expansion takes up some of the stress. Extreme heating and expansion which exceeds the pre-stress by too great a degree - the critical rail temperature (CRT) - causes buckling. Sometimes, newly installed track is not pre-stressed for some weeks owing to time constraints and CRT will consequently be much lower). If the CRT is likely to be exceeded speed restrictions will be imposed, as these both reduce the loading stress on the rail (which combined with heat stress may cause buckling under the train) and minimise the consequences of any train derailment. The traditional way of establishing CRT is based on air temperatures but there can be great differences in temperature between that of the ambient air and the temperature of a steel rail in full sun on a bed of granite chippings at ground level. Joanne described temperature sensors which have been affixed to rails and which operate alarms in control centres when CRTs are exceeded, leading to the more efficient imposition of speed restrictions. Data from these sensors are also fed into models which compare rail temperatures with forecast temperatures and lead to better prediction of extreme CRTs.

Extreme low temperatures also cause problems for the rail industry and, again, it is electrified lines which suffer but this time also those using the conductor rail system. The problem here is mainly one of performance not safety, ice on the conductor rail inhibiting the ability of the train to collect current. Chemicals can be applied to the conductor rail to reduce / remove the formation of ice and these need to be well targeted and pre-scheduled, preferably in advance of freezing - there are parallels here with road icing. The last aspect of Joanne's presentation dealt with the measures introduced to help mitigate these problems, which also included the application of a sensor in the rail. In this application, however, practicalities necessitate the sensor being installed in a dummy rail nearby owing to the high voltage present in the real conductor rail! (*Editor's Note* - conductor rails are of different metallurgical composition to the actual track so installation of a sensor in the track would not give temperatures representative of the conductor rail). The application of these techniques is similar to that employed in road icing, with conductor rail temperatures being fed into models to improve forecasting. This is a relatively new application and during trailing positive results were obtained leading to better forecast conductor rail temperatures. The technology can also be applied to lines electrified by the overhead line system (*Editor's Note* - although in this case chemicals cannot be employed but special locomotives can be run ahead of scheduled services to knock off accumulations of ice from the wires - this is far easier to do to a thin film of ice on a flexible wire than a sheet on a fixed rail).

The rail theme was continued with the next presentation, given by *Alex Hadnum* of Network Rail. Alex concentrated on the forecasting angle and pointed out that, owing to logistical requirements, although real-time monitoring could improve localised forecasting, safety and performance depended on accurate prediction at least 48 hours ahead. Some mitigation measures for extreme weather involve the implementation of speed restrictions resulting in a reduction in the number of trains, extended journey times and extra coaches on remaining services. Emergency timetables are available to deal with this disruption but notice is required to enable everything to be put in place, passengers warned before their journeys begin and freight customers advised of delay in timely fashion. In the case of snowfall, time is needed to 'crew up' and position trains fitted with snow-plough apparatus, as well as dedicated snow clearance vehicles, from their strategic locations around the network to lines expected to be worse affected. Examples of snow clearance apparatus were illustrated.

Alex then described the forecasting system provided by the Met Office for Network Rail. Problems had been experienced in the past with subjective interpretation by railway personnel which impacted on performance. In order to deal with this a two-tier warning system has been adopted, the rail network being split into areas and routes with forecasts tailored to each. For each element the Met Office forecast is first split into three categories of warning: Level 1 - No problem, Level 2 - Be aware, Level 3 - Put Mitigation in Place. Next, a confidence level is assigned to this forecast on a scale of 1 to 3,

increasing with confidence. Tables have been produced and those responsible for implementing mitigation compare the warning level and confidence level of each forecast with tables and implement the action plan which matches, removing the element of subjectivity. This system is applied to forecasts for all of the elements which impact on performance, several of which had been described in detail in Joanne Farrar's presentation.

The problems of leaf-fall, currently costing the rail industry £35 million over a 10 week period each year, were described in detail, along with the measures to counter it. Leaves cause problems for trains when they fall on the rail-head and are crushed by the wheels. The organic film left behind is slippery, leading to poor acceleration and braking. The film acts as a very good electrical insulator and can interrupt the low voltage circuit which runs through the rails and which is used by the signalling system to detect the presence of the train. (*Editor's Note* - this is mitigated by manual measures which keep trains further apart and by using signalling on an unaffected section of track, where this is available. This may reduce the number of trains which can be run.) There are two stages to dealing with the residue of leaf-fall to allow normal working of trains to be maintained: first the film is removed from the rail-head by high pressure water, then a trail of Sandite (a mixture of sand and steel shot in a gel: sand to improve adhesion, steel shot to improve electrical conductivity - as sand alone is a good electrical insulator) is left on the rail. These mitigation measures are applied by special trains and it is the scheduling of these services which requires accurate forecasting of the onset of leaf-fall.

Forecasts are based on models which take into account the tree type, recent weather, and current diseases. This information is fed into the model which produces three categories of warning for each area when leaf-fall onset is predicted and provides detail about the intensity of shedding. The most severe category of warning triggers a slowing down of the treatment trains so that the jetting is more effective. Whilst these mitigation measures are expensive they have been very effective at tackling the leaf-fall problem, leading to a reduction in service disruption. Hand-in-hand with these measures Network Rail is pursuing an ongoing programme of clearing the lineside of trees and encouraging the establishment of grasses which are far better at stabilising earthworks and reducing the effects of extreme rainfall.

Looking forward, the rail industry is exploring further methods of leaf fall mitigation including the Dutch method of dealing with leaf-fall, which is to equip passenger trains with treatment apparatus, operated automatically by GPRS, to further enhance the mitigation provided by the dedicated treatment services.

Here we took our leave of terra firma and headed into the air, *Phil Goodall* of Muir-Matheson Ltd. presenting a discussion about *Automated Observations to Support Civil Airport Operations*. The shift to automation of observations in this field started in the late 1980s in the US, where the Automatic Weather Observing System (AWOS) was implemented. Experience there by the early 1990s indicated that there were problems in some circumstances with observations not fitting reality owing to the difficulty of automatically detecting some parameters in all conditions, i.e. visibility, present weather and cloud type / amount. In the UK the first system, Metcom, appeared in 1982, followed by ATIS which was rolled out through to 1991. In 1994 Muir-Matheson commenced trials of their automated system for helicopters servicing the UK off-shore oil and gas industries. The first SAMOS system became operational in the UK in 1996 at Stansted Airport. This ~20 year period sees us today with no dedicated observers at UK airports.

Phil then described the Muir-Matheson system which has been installed at UK airports to operate within Metcom and the development of their 1994 system which led to this. Going back to the beginning with the system used by the offshore helicopter industry, the aim was to produce automatic METAR reports. These were not transmitted directly to pilots but were filtered through the Aberdeen Weather Centre, who were able to delete any obviously erroneous data. The difficulties, as experienced in the US, were the visibility, present weather and cloud type / amount components of the METAR report. The ways these have been tackled were dealt with in turn.

Visibility measurement for aviation use is not the same as the normal measurement of visibility for meteorological purposes. The actual requirement is for Runway Visual Range (RVR) which gives a pilot approaching an airfield information about when the runway will be visible as he comes in to land. The measurement of RVR also contains factors related to the intensity of the runway lights and the

background luminance. In manual days this was done by counting the number of runway lights visible from the runway end and the first stage of automation was to use the transmissiometer system, but forward scatter systems are now being used at some sites.

Instrumental measurement of present weather is measured optical detectors. This component of the automated report is currently weak at times with difficulties experienced with differentiating between rain and snow, and a mix of these. Improvements to the system include an extra head on the detector and resolution through four sheets of scattering.

The cloud type & amount is established by passing the output from a ceilometer through an algorithm, which automatically generates cloud amount in METAR code. Phil showed some interesting trials with mirrored detectors which attempted to better identify cumuliform cloud types, which are particularly interesting to pilots due to turbulence, although currently this work is stalled due to funding difficulties. Civil Aviation Authority regulations have been amended to allow the METAR report to omit cloud type from overnight / early morning reports, when the airfield is closed to normal traffic.

The Metcom system was then illustrated by means of VDU shots. The Air Traffic Control staff can see the automatically generated METAR codes and these are not transmitted to pilots until they have been verified manually - this provides the aspect of quality control needed in a fallible automatic system. The ATIS system also utilises the same procedure.

Looking to the future Phil detailed that improvements to cloud type, amount and height analysis were needed but were currently not progressing. Freezing precipitation and thunderstorms are not resolved particularly well, although the latter is easier to do but the former is especially difficult in the UK due to its patchy nature. Future code changes by WMO to METAR reports could facilitate more automatic generation.

The meeting resumed after tea on the high seas, with *Clive Lee* of Kipp & Zonen BV presenting his talk on the *Meteorological Network at the Port of Rotterdam*. Clive explained that ports need local real time information which cannot be provided adequately by forecasts. The main parameter of interest is wind as this influences the master of a vessel on his approach to harbour in his decision whether or not to request a pilot and, indeed, whether it is safe to enter port or to wait offshore for conditions to improve. Large ships with high windage are extremely difficult to control in the confines of a harbour in high winds.

The system at Rotterdam consists of 6 masts which support high quality anemometers, resolving wind direction to 1.4 degrees of compass direction, and able to withstand the rigours of a marine environment for at least 2 years between maintenance. At the end of this period they are automatically replaced by serviced units and the old ones taken away for servicing. The data are transmitted by fibre-optic cables to a control centre where they are verified and these are used to generate reports of current wind direction and speed, the maximum and minimum speed over the preceding 5 minutes, and the 5 minute average speed. This is then transmitted to ships' bridges up to 2 hours away from the port approaches in two ways: by radio or by web-based satellite communication.

The radio system was the first to be employed and gives more limited data on a dedicated receiving unit - consisting of a compass rose of wind direction, with average port speed and extremes measured over the site, transmitted every 10 seconds. The move towards web-based communication is driven by the wish to expand the system to cover the ports of Dover, Felixtowe and the Irish Sea, the limited radio bandwidth available and the limitations of the radio receiving unit. With a web-based display more information can be given from additional sensors mounted on the masts, plus as well as the average port speed it will be possible to show the wind speed at the harbour entrance and at the intended docking berth. Presently, the temperature and humidity data gathered on the masts, plus visibility data gathered by 12 additional sub-stations, are just used within the port for safety information, for pilotage and emergency personnel but this will all be available to ships' masters with the web-system.

It was interesting to note that in this application no account had been taken of the requirements of WMO for generating data suitable for synoptic or climatological purposes. This was a specialised application and the system was specifically designed to meet the specialised requirements of port operations, which could not be satisfied by standard data.

The final presentation continued the maritime theme, with *Sarah North* of the Met Office talking on *Marine Observations - the Future of the UK Voluntary Observing Fleet*. Sarah began by giving a potted history of UK Voluntary Observing Ships (VOS), which came about as a result of Maury's and FitzRoy's efforts at the 1853 Brussels Conference. After World War II the UK fleet grew to around 500 ships and the network was facilitated by shipping practices which saw ships return frequently to UK ports, where instrument checks could be carried out. Today things are very different with a greatly diminished UK shipping fleet and many ships operated under flags of convenience with variable trading patterns. In January 2008 there were 373 ships participating in the UK observing fleet, including 65 ships recruited to the VOS Climate Project which aims to collect a higher quality data for climate research and prediction, and 28 off-shore platforms / rigs. Port Meteorological Officers inspect instrumentation and provide support and training for the observers while the ships are in UK ports, although there has been a reduction in their numbers in recent years. VOS data is used in forecasting, ocean routing, climate studies, search & rescue operations, oceanographic observations and pollution response, as well as being highly important for calibrating and validating remotely sensed satellite data.

The problems facing the future operation of the VOS fleet were discussed. There is an ongoing need to convince ship-owners to buy-in to the value of providing data and to encourage their ships' officers and masters to participate. In return they benefit from quality marine forecasts. Most VOS data is presently transmitted by a Code 41 message via Inmarsat C which ensures that the cost of the transmission is borne by the Met Office and not by the shipowner, however an increasing number of ships are now willing to send their observations by email and to absorb the costs themselves. Many of the traditional instruments supplied to reporting ships are somewhat dated and require significant logistic effort to maintain. Whilst there is a clear need to move towards increased automation this will inevitably pose new obstacles, such as the locating of sensors in positions that will ensure meaningful data of the required quality. In particular it is difficult to gain good exposures when anemometers are retro-fitted to existing ships, and difficult to run cables to sea sensors when equipping a large ocean going vessel. Shipping restrictions relating to electrical interference, safety evacuation, and fire protection must always be observed. In addition decks may need strengthening if meteorological masts are fitted. It can therefore be an extremely difficult, time consuming task to equip ships with the complex automatic weather stations (AWS) and there is a need for a simple, reliable, modular AWS system to be developed.. There is also a need to liaise more closely with shipowners with a view to ensuring that the design of new vessels takes into account the need to fit meteorological sensors in future and to ensure that the instruments they provide comply with WMO standards. Unfortunately, whilst many modern ships are already provided with high quality meteorological instrumentation for their own use, and could be meaningfully employed by the VOS network, their sensors are rarely calibrated or maintained once the ship is in service.

Moving on to the recording of data, the move away from paper logbooks towards entering data electronically via computer terminals is almost complete, with only a handful of ships still manually recording their observations. The electronic logbooks software - known as TurboWin - is supplied to all UK and European observing ships, while other software programs are used on those of the US and Japan. The advantage of such software is that it automatically codes up data for transmission whilst also performing internal quality control checks. The real time data sent by observing ships are automatically ingested into the numerical forecast models, while the delayed mode data is added to the climate database.

The impending EU ban on mercury thermometry will also accelerate the move towards automatic sensors on ships. Met Office trials with commercially available AWS have shown that they are often poorly suited to the VOS network's needs, in that they can often be difficult and complex to fit, run and maintain in a shipboard environment. Moreover, reliability problems mean that they require significant use of technical resources. Work on new improved AWS systems is now underway and it has been shown that one such system, known as MetPod, can be typically installed in less than 2 hours and, by using new satellite transmission systems such as Iridium, the transmission costs can be greatly reduced. Data compression is also seen as a way of reducing costs.

More ships are always being encouraged to join the VOS Scheme which falls under the auspices of the Joint WMO/IOC Technical Commission for *Oceanography and Marine Meteorology* (JCOMM). Efforts to increase participation are also being made within the International Maritime Organisation, where the need for weather observations is called for by the Safety of Life at Sea Conventions (SOLAS). A topical issue that also needs to be tackled is that of ensuring data security: some ships are unwilling to transmit meteorological data because it includes ship position information which could potentially be used by pirates, or which could give rise to commercial concerns. Options for masking the data, so that the ship's identity cannot be determined by third parties, are therefore being trialled

The picture painted by Sarah was of a network which had declined in recent years and which faced major challenges to modernise for the future. But it was clear that the nadir had been passed, that there was a strong feeling internationally that VOS from all nations play a vitally important role in meeting the requirements of the World Weather Watch and the Global Observing System, and that developments in automation and communications technology indicated a bright future.

The thanks of the Group are due to Manchester MMU for hosting this most interesting meeting, Mike Bennett for organising such an interesting programme and, of course, the speakers.

Committee Meeting
held from 12.30 to 17.00 on Monday 16th March 2009
at 104 Oxford Road, Reading.

Minutes of the Meeting

Those present:

Mike Brettle, Treasurer & Acting Chairman
John Prior, Secretary
Steve Colwell, Dick Saffel, Ian Strangeways

Paul Hardaker, RMetS Chief Executive
Andrew Overton, Newsletter Editor

Item 1. Apologies

Stephen Burt, Jonathan Wright, Jonathan Shanklin, Mike Bennett

Item 2. Agreement of Agenda

The agenda was agreed. The future of MetLink, SIG / RMetS membership fees and the ISO sub-committee on observations were items to be raised under AOB.

Item 3. Minutes of last meeting

The minutes of the Committee Meeting held on 27th October 2008 were agreed as being correct.

Item 4. Items arising

The actions were considered and all had either been completed or were to be covered by later agenda items. Under the item concerning receipt of amateur observations by the Met Office, John Prior noted that more observations were also being sent by co-operating climate stations in 'real time' through a web-based data submission system called OWL (Observer's Weather Log), which is gradually replacing the month-end paper returns.

Item 5. Treasurer's Report

Mike Brettle tabled a statement of the SIG's accounts which showed the net assets to be £3913.78, some £200 lower than last October because of expenses for meetings.

Item 6. Newsletter Editor's report

Andy Overton reported that he had plenty of material for the Spring and Autumn 2009 Newsletters. However, research news was proving difficult to source and some University contact suggestions (eg Leeds, Reading, Loughborough) were made. **Action:** Paul Hardaker & committee members to forward contact details to Andy Overton.

Autumn 2009 or Spring 2010 would be a suitable time for an account of the new Met Monitoring System being installed by the Met Office. **Action:** John Prior to check network installation progress and prepare material.

Item 7. Report of Meetings

- *Observations for Transport Applications* – Manchester, 20th November 2008

This meeting was organised by Mike Bennett and considered very successful in all respects - the venue, presentations and attendance (about 30, with some new contacts).

Item 8. Future Meetings

- *Joint meeting Data Assimilation Group* - ECMWF, 5th May 2009. This is being organised jointly with the Data Assimilation SIG and the programme is about to be finalised. This will be available for the Spring Newsletter and the RMetS web site will be updated. (**Action:** John Prior)
- *AGM & Summer Visit* – Reading, 1st July 2009. This will take place during the national conference at Reading, allowing access to the exhibition and posters. The format will be AGM, pub lunch then tour of the exhibition. Room and tea/coffee costs will be met by sponsoring manufacturers, enabling the AGM to be free to members. Registration will be required to enable Conference passes to be provided. (**Actions:** John Prior to update the RMetS web site with registration form etc, pass details to Andy Overton for the Spring Newsletter, continue to liaise with Conference committee and identify a suitable pub for lunch!)
- *Data transmission and presentation* – BAS, probably autumn 09. A format had been proposed of speakers on transmission and demonstrations of presentation with a 'hands on' opportunity. (**Action:** Steve Colwell to consult Jonathan Shanklin over possible dates / programme so that a preliminary announcement can be put in the Spring Newsletter).
- *Joint meeting with WCSIM* – WCSIM still interested in collaboration with the RMetS and have made 2 suggestions for collaborative events – (i) setting up an AWS in the City of London as a Saturday event in summer 2009 and (ii) a 1-day conference "Climate Change or Instrument Change?" in Spring 2010 at Gresham College. It was felt that the AWS event was a good opportunity for promoting the observing guidance, and possibly for a manufacturer to provide equipment and advice. The 2010 conference should offer opportunities for wider SIG and RMetS participation eg through presentations at an 'expert' level. (**Action :** John Prior to express the strong support of the SIG and RMetS to Robert Seaman, the WCSIM contact, explore collaboration possibilities for both events and circulate outcome to committee).
- *AGM & Summer visit, 2010 to Chiltern Observatory at Dunstable.* Before confirming, we need to ensure that the developments there (e.g. instrumentation trials and calibration) proceed as planned. (**Action:** Andy Overton to re-establish contact with Philip Eden before autumn 2009 committee meeting)
- *Joint meeting History Group* –the History Group are planning a meeting at Exeter University on 'observatories and observing' in summer 2010. This will not be a joint meeting with our SIG, but we will consider providing any support they require.
- *Saturday meeting on instruments/calibration, late 2010* This is to mark the 40th anniversary of COL. It is intended to appeal to amateur observers and include experiences with using instrumentation. Another opportunity to promote the observing guide, and possibly to have the 'Back to basics' Weather articles re-printed. However, there were doubts that enough speakers willing to describe their experiences could be identified. We need to know if COL is expecting us to arrange a meeting or if we are being asked to supplement a list of speakers sourced by COL. A possible way to improve the 'knowledge base' would be for RMetS to sponsor a Which? type trial of instrumentation

suitable for amateur use at a range of sites and lasting at least 1 year. Use of Met Office sites such as Camborne or NCAS sites might be feasible. (**Actions:** Paul Hardaker to contact Roger Brugge, COL over what the COL expectations are, eg how many speakers they expect to find, and to contact Which? Magazine over possible involvement with trials)

Item 9. 2009 RMetS National Conference

This will be at Reading University, June 29th – July 2nd with the manufacturer's exhibition from Tuesday June 30th to the morning of Thursday July 2nd.

Item 10. Selection of new chairman

Jonathan Shanklin has announced his wish to step down as committee Chairman with immediate effect. Steve Colwell (BAS) is willing to replace Jonathan and this offer has the full support of the current committee. However, the procedure is that other nominations need to be sought and voted on at the 2009 AGM. (**Action:** Andy Overton to include in Spring Newsletter an invitation for nominations, with seconder and a brief CV. These to be sent to John Prior by June 15th). The incoming Chairman needs to become familiar with the committee's responsibilities so an SIG rule will be proposed that 'any new Chairman should have served as a Committee member for at least the previous 12 months' and this will also be tabled at the AGM. To assist during this transition period, Mike Brettle has kindly agreed to be Acting Chairman of the SIG until the 2010 AGM.

It was noted that the committee would benefit from the addition of reps from university research and the smaller manufacturers. (**Actions:** Mike Brettle to approach Reading then Leeds Universities; Andy Overton to insert an invitation to join the committee in the Spring Newsletter)

Item 11. Guidance on making observations

Andy Overton had circulated an updated version which was approved. (**Action:** Andy Overton to send to RMetS for placing on the web site).

Item 12. Award for services to observations

The committee was pleased to note that the "Vaisala award for weather observing and instrumentation" would be made every 2 years at the RMetS national conference. A call for nominations (amateur and professional) will be made during the preceding year (i.e. 2010 for 2011 award) and these will be considered by the awards committee, with SIG involvement.

Item 13. Upper-air observations article for Weather

A request for an article had been made by the Weather editor, but there was uncertainty about the scope. It was felt that ground-based upper-air, aircraft and r/s observations all deserved to be included, with the emphasis on developments in the last 5-10 years and those expected. Marine observations and EUCOS should also be considered. (**Action:** Mike Brettle to contact Weather Editor to explore requirements)

Item 14 Any other business

- **MetLink** - Paul Hardaker explained that the interest from schools has declined (< 20 participate now) but it may appeal to amateur observers who want to share their observations. However, doubts were expressed about most observers having sufficient time to input data manually on a daily basis and it was suggested that most AWS software is capable of creating a webpage and updating it with current data automatically. Many observers are already posting their data automatically on the web in this way. It was felt that the initiative would be more successful if a way were found to provide links to these sites rather than hosting the data itself. In the light of this, Andy Overton suggested that a solution could be for RMetS to host a map of climate station sites that leads to both metadata information (eg using the COL A/B/C grading) and gives links for accessing the AWS data. This idea was welcomed. (**Action:** Andy Overton to contact Stephen Burt for COL input and send Paul Hardaker examples of web points of contact. **Action:** All to

exchange proposals for what site metadata should be available, so that a metadata form can be designed and submitted to Paul Hardaker)

- Membership fees – Paul Hardaker noted concerns about the membership arrangements for RMetS and SIGs (and Local Centres), in that it is possible to join an SIG/LC for a relatively low annual membership fee without being a member of the RMetS. This seems unfair on RMetS members and inconsistent with other scientific societies. Alternatives include allowing free SIG membership/ meeting attendance for RMetS members, and increasing the membership/ meeting fees for non-members accordingly. A proposal will come, possibly in time to be discussed at our 2009 AGM.
- ISO sub-committee on observations – Paul Fransioli (ISO sub-committee chairman) had joined the SIG. It was thought that a UK representative might be needed. (**Action:** Mike Brettle to contact Paul Fransioli to explore any SIG role).

Item 15. Date of Next Meeting

Monday November 2nd was suggested and it has been confirmed that the RMetS HQ meeting room is available then.

The meeting closed at 1705

John Prior, Secretary
27 March 2009

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Mr. Stephen Burt (FRMetS)
Mr. Steve Colwell (British Antarctic Survey)
Mr. Dick Saffell (Campbell Scientific Ltd.)
Dr. Ian Strangeways (Terradata Ltd.)

AGM and Manufacturer's Exhibition

1000 to 1630 on 1st July 2009 at the University of Reading,
during the 2009 RMetS National Conference

REGISTRATION FORM

Registration is required in order to be issued with a Conference badge for this meeting. Conference delegates and exhibitors will already have badges but it will still be helpful to know who is expected to attend the AGM.

NAME	
ORGANISATION	
TEL NO.	
Email	
CAR PARKING REQUIRED? #	<i>If required, please provide details of vehicle make and registration</i>
SPECIAL REQUIREMENTS e.g. disabled parking	

Please note that car parking is limited at the University, with no guarantee of a space

Day visitor badges will be required and should be collected from 0900 from the Palmer Building. Tea/ coffee will be available in the Students Union from 1000 to 1030. The AGM will be held in room G1.11, Palmer Building from 1100 to 1230, followed by Lunch in a nearby pub from 1230 to 1400. The visit to the Manufacturer's Exhibition (Students Union) will be from 1400 to 1600 followed by Tea / coffee from 1600 to 1630.

There is no charge for this meeting as costs are being met by sponsorship by Vaisala Oyj and Campbell Scientific Ltd.

If you wish to attend please send this form to:

John Prior, Met Office, FitzRoy Road, Exeter, EX1 3PB or email john.prior@metoffice.gov.uk to arrive no later than **13th May**.