HISTORY GROUP NEWSLETTER

Royal Meteorological Society

News, views and a miscellany published by the Royal Meteorological Society's Special Interest Group for the History of Meteorology and Physical Oceanography

Issue No.3, 2013

CONTENTS

FORTHCOMING EVENTS

Meeting suggestions are greatly welcomed. What kind of meetings would you like arranged? Where would you like them to be held? Are any days of the week more convenient for you than others? Would you support two-day meetings? Can you recommend a venue that could host meetings? Please send ideas and suggestions to Malcolm Walker (contact details on page 20).

Here are dates for your diary.

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THE EARTH'S CLIMATE: PAST, PRESENT AND FUTURE

Thursday 9 January 2014
Institute of Physics, 76 Portland Place, London, W1B 1NT

This meeting has been arranged by the Retired Members Section of the London and South East Branch of the Institute of Physics.

PROGRAMME

10:30	Arrival/coffee
11:00	Welcome and notices
11:10	Chris Folland – Past climate
11:45	John Mitchell – The Intergovernmental Panel on Climate Change
12:20	Tim Palmer – Forecasting the future climate
13:00	Lunch
14:15	Ian Strangeways – Observing the climate
14:50	Simon Buckle – Policy considerations
15:25	Shanti Majithia – Developments on the National Grid
16:00	Tea and dispersal

If you wish to attend, please contact John Belling (john.a.belling.secrems@gmail.com, 07986 379935, 42 Cunningham Park, Harrow, HA1 4QJ).

Cost: £35 with a hot lunch, £10 without lunch.

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THE HISTORY OF WEATHER SHIPS

Saturday 22 March 2014, 11.00am to 5.00pm
University of Birmingham, Geography Department

This is a National Saturday Meeting of the Royal Meteorological Society organized by the History Group.

PROGRAMME

Malcolm Walker
Mid-Atlantic observatories - an idea before its time
Attempts to collect weather reports from ships that were far from land by means of the electric telegraph were made before 1870 but soon abandoned. The idea was revived in 1885 but, again, soon abandoned. The advent of wireless in the first decade of the twentieth century allowed meteorological observations to be obtained in near real time from ships on the high seas. Before 1938, though, when a French ship was stationed 800 miles west of the Azores, there were no ocean weather stations.

PLEASE TURN OVER

Brian Booth
None but the brave – the men of the British wartime weather ships
In the late summer of 1940, the Admiralty chartered two steamers to act as weather ships in the data desert of the North Atlantic. Unsuitable for North Atlantic operations, and without any means of defence, they provided weather observations for nine months until sunk by U-boats during the summer of 1941. Their crews were, without question, the bravest of the brave.

Alan Heasman
Commander Frankcom: the father of the UK Ocean Weather Ship (OWS) network from the 1940s to the 1960s.
From the immediate post World War II period, Commander Frankcom played a pivotal rôle in sourcing, equipping and staffing the original UK OWS fleet. This required great leadership and innovation at a time of national shortages. Later, he oversaw the requirement to replace the early fleet with more robust ships for this arduous task. In addition, it required international collaboration via the World Meteorological Organization, where again Commander Frankcom took a leading rôle.

Norman Lynagh
Marine Weather Observations – Fact or Fiction?"
The primary purpose of the Weather Ships was to provide surface and upper air observations. I shall discuss the difficulties involved in making accurate weather observations (surface and upper air) at sea and the need to treat the observations from Weather Ships with some caution. The relevance of this is that there is a substantial archive of observations from Weather Ships that can be used for research purposes. It is important that these are not inadvertently misused by assuming greater accuracy than actually exists. My talk will be light-hearted rather than a serious critique and I shall refer to personal experience.

David Axford
The closing years of the North Atlantic Ocean Stations Board (1982-1990) – a UK weather ship for a peppercorn £1.

ALSO

It is hoped there will be a talk about wave research from aboard an Ocean Weather Ship in the late 1940s, illustrated with film footage shot at the time.

As with most meetings of the History Group, there will be an exhibition, and it is hoped that there will be a reunion, too.

Details of this meeting and a booking form will be sent to History Group members in the New Year.

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THE METEOROLOGY OF D-DAY REVISITED

Saturday 17 May 2014, 11.00am to 5.00pm
The Halton Gallery of the RAF Museum, Hendon
A National Meeting of the Royal Meteorological Society organized by the History Group.

The meeting will not go over old ground (so to speak). Much has been published over the years about the meteorology of D-Day. Rather, the intention is that we explore knowledge that has come to light in the past two or three decades which helps clarify and correct who knew what about weather developments in June 1944 and how they knew. The meeting will consider, *inter alia*, the availability of meteorological data from Ireland, the North Atlantic and NW Europe, the reliability of J.M.Stagg's book *Forecast for Overlord*, and the forecasts for early June 1944 made by the Germans.

Confirmed speakers:

Brian Booth
Yes, a cold front has appeared from somewhere ..... ", extract from Stagg's "Forecast for Overlord".
Stagg's account of the events leading up to the D-Day forecast has long been accepted as the only definitive account of this unforgettable episode of meteorological history, but just how accurate is it? Using Stagg's own diary and letters exchanged with C K M Douglas, together with previously unseen documents in the National Archives, this presentation will explore the background to the book, and its veracity.

Anders Persson
Right for the wrong reason? A critical look at some D-day myths

Donard de Cogan
A report from Blacksod (Belmullet) was crucial in deciding which team of forecasters had the right analysis.
These words, attributed to Stagg, hide an iceberg of detail. In so far as the 'Weather War' was concerned the Irish Free State was not neutral. It provided the Allies with exclusive access to meteorological information while at the same time using censorship and other means to prevent Germany acquiring any knowledge of weather conditions in Ireland. This paper reports on the current state of knowledge on the subject.

Adrian Simmonds (ECMWF) will present a reanalysis of the D-Day weather situation made by means of modern techniques.

It is hoped there will also be a talk about information provided by secret agents in Germany and other occupied countries.

Further details of this meeting will be announced in the March 2014 issue of the newsletter.

HUBERT LAMB CENTENARY MEETING

To mark the centenary of the birth of Hubert Lamb, about 70 former colleagues and students and other friends of the great climatologist gathered at the University of East Anglia (UEA) in early September 2013 for a dinner and symposium.

At the dinner, on Friday 6 September, it was a huge pleasure and honour to have with us Moira, Hubert's widow, together with their son and two daughters, a son-in-law and a granddaughter.

After a delicious meal of smoked salmon, smoked trout and leek pâté served with a lemon and chive dressing and seasonal leaves, followed by roast rack of lamb (!) sliced over boulangère potatoes with spinach and roasted vine tomatoes, rosemary and port gravy, followed by warm chocolate fondant pudding served with chocolate sauce and vanilla ice cream, **Malcolm Walker** conveyed greetings from the Royal Meteorological Society and thanked the university for hosting the meeting. He said that he had bought a copy of Lamb's *The English Climate* back in 1964 and it was still a treasured possession. He said, too, that he was still a bit sore over an interview that same year, when he had been asked which branch of the Met Office he would like to work in and had known from the reactions of the interview board that he had said the wrong thing when replying that he'd like to work in Mr Lamb's department! He never did go on to work in the Met Office and Hubert moved on not many years later (1971) to UEA, where he founded the Climatic Research Unit (CRU) and remained until he retired in 1977. Malcolm felt sure that Hubert would be smiling down on the meeting, somewhat satisfied that studies of climate were now so very important, not just for atmospheric scientists but indeed for all humankind.

The next to speak, **Phil Jones**, CRU's current Director, provided biographical details of Hubert's life and career. Born on 22 September 1913, Hubert was the son of a professor of civil and mechanical engineering and grandson of the eminent mathematician Horace Lamb. He progressed from Oundle to Trinity College, Cambridge, where he read natural sciences and later geography; and he became a Quaker soon after graduating, perhaps influenced by the great mathematician and meteorologist Lewis Fry Richardson, whom he had known in childhood.

Hubert's career in the Meteorological Office began in September 1936, when he became a trainee Technical Officer at the old Croydon Airport, and he was subsequently posted to Montrose. On learning, in June 1939, that he had to attend a practical exercise in poison gas spraying at an RAF airfield in England, he resigned from the Met Office, not willing to become involved in something which offended him on conscientious grounds. He did not, however, leave meteorology. Instead, he was seconded to the Irish Meteorological Service, where he remained for the duration of the war. On his return to the Met Office in 1946, he was posted as a meteorological adviser on a Norwegian whaling factory ship and served aboard it on the Southern Ocean. His involvement in climatology increased greatly through the late 1940s and the 1950s, and by the early 1960s he had become an acknowledged authority on climate and climate change.[1]

On Saturday 7 September, the symposium began with another presentation by **Phil Jones**, this one entitled 'The development of Lamb Weather Types: from subjective analysis of weather charts to objective approaches using re-analysis'. Phil mentioned that Hubert's first paper on types and spells of weather during the year in the British Isles

Above: Flowers for Moira, presented by Phil Jones. Below: Moira, members of her family, and many of those who attended the symposium on Saturday.

[1] For information about the life and work of Hubert Lamb, see his autobiography, *Through all the changing scenes of life: a meteorologist's tale* (Taverner Publications, 1997, 274 pages).

had been published in the *Quarterly Journal of the Royal Meteorological Society* in 1950,[2] and his seminal work in this field had appeared in 1972, in a Met Office *Geophysical Memoir* (No.116), in which he had given details of seven main 'Lamb Weather Types' (LWTs) on each day back to 1861. Hubert continued his manual classification to February 1997, just four months before he died.

Phil pointed out that manual updating was expensive in terms of time. An objective (and hence easily reproducible) approach had been introduced in 1993 and updated to 2012 using extended twentieth century re-analyses from 1871. He went on to compare Lamb's original approach with the objective, highlighting differences and discussing the future of this once active but now markedly less studied area of synoptic meteorology. His conclusion was that LWTs will continue to be an important part of synoptic climatology.

The next speaker was **Dennis Wheeler** of the University of Sunderland, whose talk was on 'Hubert Lamb's 'treasure trove': ships' logbooks and climate change'. Dennis reminded the audience that Hubert had said in his book *Climate, History and the Modern World* (page 79) that ships' logbooks were "a vast treasure trove waiting to be used". However, as he put it in the abstract for his talk: Hubert "sadly did not have the opportunity to explore this uniquely rich source of information on past climates". Dennis went on to describe work that had been undertaken in this field over the past decade or more and presented results which showed how right Hubert had been in his description of the logbooks. He outlined the information available in logbooks and examined, as a case study, evidence gathered from the later years of the Little Ice Age, a period which greatly interested Hubert. He stressed that the potential of this treasure trove was still very far from exhausted.

Richard Cornes of UEA then spoke on 'Early instrumental data and North Sea storms'. To quote from the abstract for his talk:

"In *Historic Storms of the North Sea, British Isles and North West Europe*, published in 1991, Hubert Lamb – with assistance from Knud Frydendahl of the Danish Meteorological Institute – applied many of the skills developed throughout his career as a climatologist to the examination of significant historic storms. For the reconstruction of storms in the period following the invention of the barometer in the mid-seventeenth century, Lamb was able to use early measures of barometric pressure from sites across Europe to achieve synoptic reconstructions. The approach that he used for the reconstructions was directly comparable to that used in his famous catalogue of weather types for the British Isles, and the derivation of an index of storm severity was analogous to the approach he used to derive his Dust Veil Index of volcanic activity."

In his talk, Richard summarized Hubert's work on early instrumental data, with reference to the reconstructions of storm events, and he described advances that have been made in recent years concerning the recovery of ancient meteorological measurements. He placed particular emphasis on Hubert's use of early measures of barometric pressure, as well as their importance in modern-day climatology.

The first talk after the coffee break was given by **Giles Foden**, whose topic was 'D-Day weather: fact and fiction'. As a professor of creative writing (at UEA), he brought a different perspective to a meteorological meeting. With reference to his novel *Turbulence*, which focuses on the famous weather forecast for D-Day, he considered the fascinating question of weather and language, both in the dissemination of forecasts and their historical and literary recapitulation.

Giles Foden (left) with Malcolm Walker.

[2] 'Types and spells of weather around the year in the British isles: annual trends, seasonal structure of the year, singularities', *QJRMetS*, 1950, Vol.76, pp.393-438.

Aryan van Engelen of the Royal Netherlands Meteorological Institute then spoke on 'Climate of the Low Countries: past, present and future', saying by way of introduction that he had been inspired by Lamb's masterpiece *Climate Present, Past and Future* (Methuen, 1972) to devote part of his professional life with the Dutch meteorological service to the reconstruction of the climate of his country. He went on to speak about his production of the Low Countries Temperature Series, which was based on analyses of documentary sources for the period 1000 to 1900 and instrumental meteorological readings from 1700 to the present day. This had served as input for projections in the form of scenarios for the future climate of the Netherlands, with particular reference to the development of services that would enable Dutch society to adapt better to future changes in climate.

The next talk (the first after lunch), on 'Mediæval documentary data sources from England', was given by **Kathleen Pribyl** of the University of Berne, Switzerland. In this, she provided an overview of available documentary sources from mediæval times, pointing out advantages, problems and pitfalls of using them. These sources include narrative sources, such as chronicles and annals, and administrative sources, particularly manorial accounts, which refer to weather either directly or indirectly in the form of proxy data. She mentioned that Hubert Lamb had made use of information found in chronicles and annals, and she went on to discuss in some detail her own use of proxy data in the form of grain harvest dates derived from administrative sources to reconstruct late mediæval spring and early summer temperatures.

Next to speak was **Astrid Ogilvie** of the CICERO Norway Stefansson Arctic Institute, Iceland, on 'Documentary historical evidence for the climate of northern Europe in the mediæval period'.[3] In her words, "Hubert Lamb was a pioneer in the use of historical documentary data to reconstruct the climate of the past, and he had a particular interest in northern regions".[4] For inspiring and encouraging her, she had much to thank him for. Astrid's presentation focused primarily on historical information about the climates of Iceland and Greenland from the time of the settlement of these countries (*c.*871 and *c.*985, respectively) to around 1500. She introduced various types of documentary sources that contain information about weather and climate, these sources including sagas, mediæval annals and works of geographical description, and from these she showed how she had been able to produce reconstructions of the climates of Iceland and Greenland from the times of settlement to about 1600, as well as draw conclusions about sea ice variability.

The last speaker was **Chris Folland**, who spoke on 'Developments in UK and European seasonal forecasting since Hubert Lamb's time in the Met Office'. He, too, was grateful to Hubert, saying that his interest in climate variability and change owed much to his writings in the 1960s, especially his research into the variations of westerly winds in winter around the United Kingdom, nowadays largely called the North Atlantic Oscillation. Chris explained the importance of sea-surface temperatures for seasonal prediction, reviewed progress with other sources of seasonal predictability since Hubert's time in the Met Office, discussed new observing and modelling capabilities, and showed that understanding of variations in the UK winter westerlies had greatly increased in recent years. In his conclusions, Chris stated that European seasonal forecasting research had cast much light on one of Hubert's greatest interests: variations and trends in North Atlantic winter westerlies. And also, he said, Hubert might have been pleased that observations continued to play a crucial rôle in seasonal forecasting and the closely related topic of climate change, his key interest.

The meeting ended with a visit to CRU's Hubert Lamb Building, where refreshments were served and, in the CRU Library, a special exhibition of Hubert's charts and publications could be viewed. At this exhibition, it was a great delight that Moira was again able to join us.

Please turn over

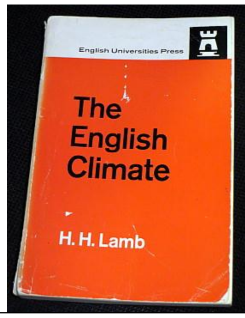
Moira Lamb with Alan Ovenden in the Library of CRU.

[3] CICERO stands for Center for International Climate and Environmental Research, Oslo.

[4] He spoke Norwegian.

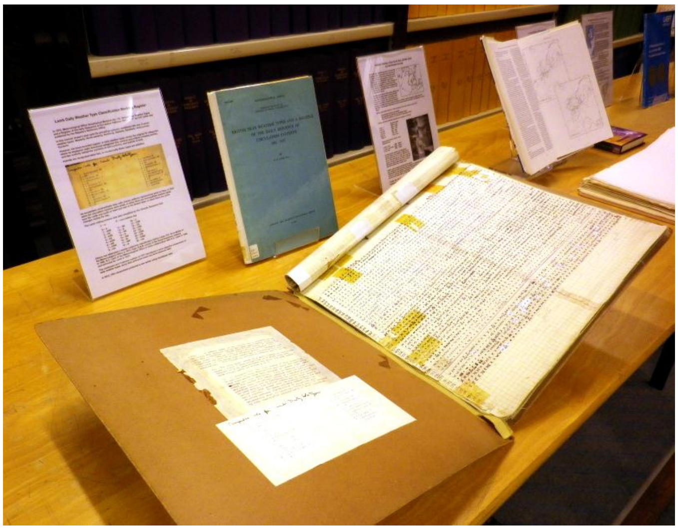
A great deal of planning went into this very successful centenary meeting, for which a number of people were thanked: especially Phil Jones, Richard Cornes, Alan Ovenden, Clare Goodess, Marcia Spencer and Malcolm Walker.

Coffee time!

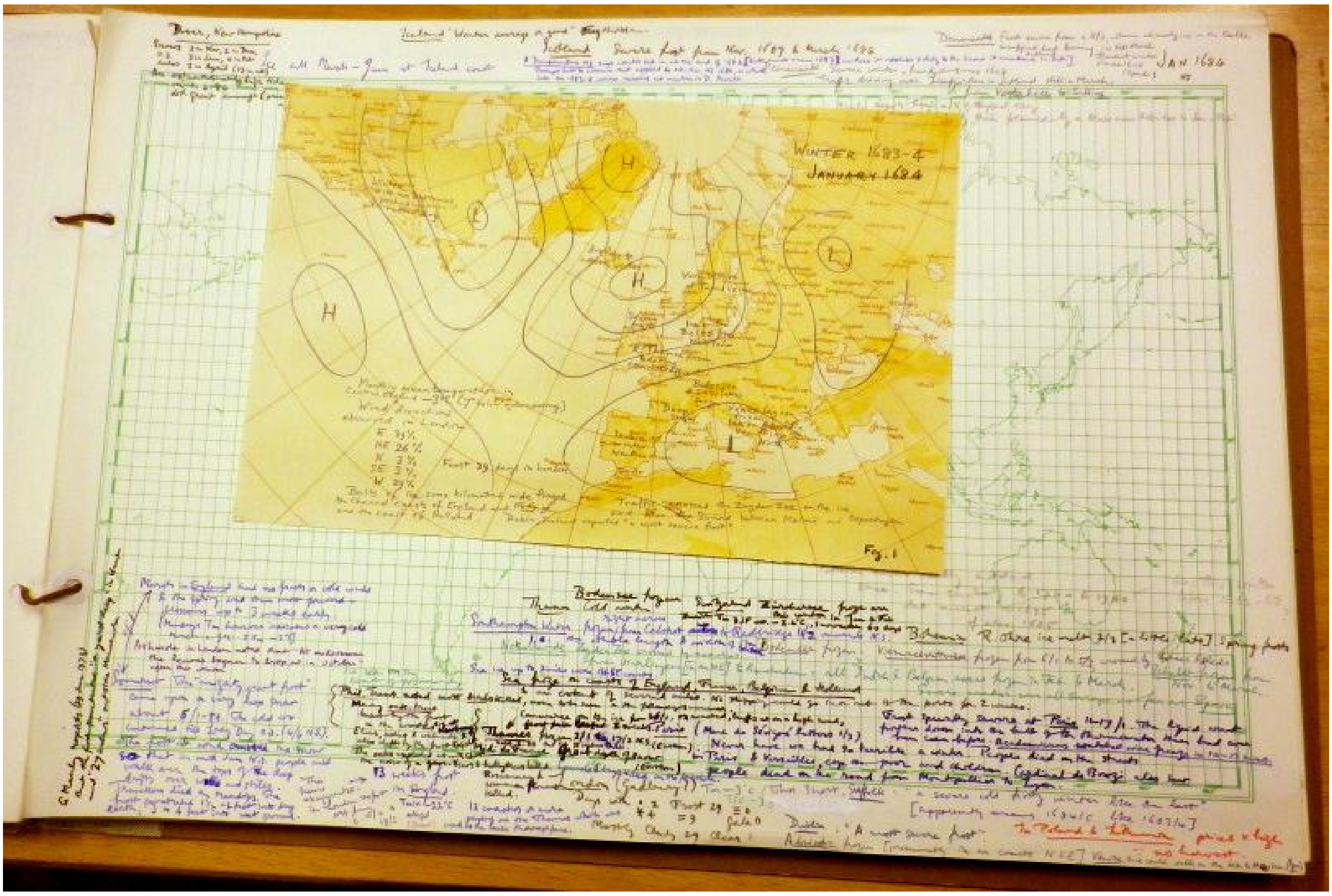


A well-thumbed classic

Speakers (left to right):
Kathleen Pribyl, Dennis Wheeler, Astrid Ogilvie, Phil Jones, Aryan van Engelen, Chris Folland, Richard Cornes, Giles Foden.



Above: Part of the exhibition in CRU's Library.
Below: Hubert Lamb's notes on conditions in January 1684.



TRAVELS IN THE AIR MODERN STYLE[5]

The third of a series of three meetings on uses of aircraft for meteorological purposes was held at the University of Reading on Saturday 19 October 2013.

In his introduction, **Malcolm Walker** mentioned that the first meeting had been held at Farnborough in September 2011. It had begun the story in 1910, when barographs had first been taken aloft to measure altitude, but this had not been strictly the first meteorological use of a meteorological instrument. That had come in 1912, when a meteorograph had been attached to an Euler monoplane and measurements of temperature and pressure made to an altitude of 1,100 metres. Cloud photography from aircraft had begun in 1915, and rain-making experiments by seeding clouds with sand, dust and dry ice had begun in the United States around 1916-17. Instruments of various sorts had been attached to aircraft in the 1920s and 1930s, and gliders had been used increasingly for meteorological research. Information about the meeting had been published in the History Group's Newsletter 3, 2011, pp.17-19.

Malcolm went on to say that the second meeting, in September 2012, had also been at Farnborough and had been written up in Newsletter 1, 2013, pp.2-9. It had covered RAF meteorological flights from the 1920s to the late 1950s, British and German meteorological reconnaissance flights during the Second World War, studies of winds over the Red Sea in the 1960s, and work carried out by the Meteorological Research Flight (MRF) in the 1940s, 1950s and early 1960s. Today, he said, the story would be taken on from the late 1960s to the present day and into the future.

By the middle of the 1960s, Malcolm continued, the aircraft of the MRF were showing their age and needed to be replaced if they were to continue supporting effectively the research programme of their parent body, the Met Office. The Hastings and Varsity were withdrawn from service in the late 1960s and the Air Staff agreed in 1968 to the Hastings being replaced by a C-130 Hercules aircraft for the exclusive use of the MRF. The Varsity had been replaced by a newer Varsity and the Canberra had remained in service. Conversion of the Hercules had taken two and a half years and the aircraft had not been delivered until late 1973. This conversion had involved the removal of the radar from the aircraft's nose and its relocation in a pod on the top of the aircraft, as well as the fitting of a nose boom seven metres long fitted with wind, turbulence and temperature probes. The case for acquiring the Hercules, nicknamed 'Snoopy' because of its long nose boom, had rested largely on an invitation for the aircraft to participate in an international geophysical experiment in the 1970s, but another factor had been that it could be redeployed in wartime as a transport plane.

During the 1960s, the MRF had explored, among other things, turbulence in cloud-free air at low levels over the Libyan Desert, cumulonimbus clouds in the Far East, sea-surface temperatures near Malta (using the Varsity's new radiation thermometer), wave clouds over the Pyrenees and, in April 1964, emissions from Surtsey, a volcanic island in Iceland (which had started to erupt on 14 November 1963 and continued to erupt until June 1967).

The MRF had also played an increasingly significant rôle in endeavours to obtain basic physical data for improving and validating models used for Numerical Weather Prediction and climate modelling; and a number of external factors had helped shape the MRF programme during the latter part of the 1960s. One of these had been the pioneering work carried out by Keith Browning and his colleagues in the Office's Research Unit based in the Royal Radar Establishment at Malvern, Worcestershire. Their work had consisted of radar-based investigations into the structures of weather systems and the physical processes occurring in the rain areas within the systems. Common areas of interest between the Malvern group and the MRF had been the dynamics of fronts and clear-air turbulence, the latter being of interest not just to aircraft designers and operators, whose concern was aircraft safety, but also to meteorologists, who had wished to understand and forecast such turbulence.

Another external factor had been the transfer of the Imperial College Department of Cloud Physics to the Met Office in October 1966. The new Cloud Physics Branch of the Office, in collaboration with the Malvern group and the MRF, had begun to move research in cloud physics away from laboratory studies towards the interaction of cloud microphysics with cloud dynamics. This had necessarily involved the use of research aircraft. One of the first tasks undertaken by the new branch had

[5] With apologies to James Glaisher for cribbing the title of his classic work on meteorological studies from balloons, *viz. Travels in the Air*, by James Glaisher, Camille Flammarion, W.de Fonvielle and Gaston Tissandier (London: Richard Bentley & Son, Second Edition, 1871).

been to develop a radiosonde which could be released from the Hastings aircraft, the intention being that the data transmitted by these so-called 'dropsondes' would be received and stored by a computer on board the aircraft.

The first major venture of the new branch, *Project Scillonia*, had been based on the Scilly Isles, where studies of the fronts of depressions approaching from the Atlantic could be carried out comparatively free of any topographic influences. Starting in 1968, measurements of approaching cloud systems had been made with a mobile Doppler radar facility installed on the Scilly Isles, and dropsondes had been released from the Varsity aircraft from a height of 5 km to obtain data about temperature, humidity and winds within the cloud systems. A major finding of the project had been that organized bands of ascent and descent and associated bands of precipitation existed in the cloud systems of depressions. This had been a discovery of great value to operational weather forecasters and provided an observational framework for the development and testing of numerical models of fronts.[6]

Malcolm then mentioned the Royal Society Joint Air-Sea Interaction Project (JASIN), an intensive study of the atmospheric boundary layer and upper ocean in an area of the North Atlantic 450 km west of the Outer Hebrides. Field trials to develop and test necessary instrumentation had taken place in June 1970 and September 1972 near 52°N 20°W, and the project itself had taken place farther north from July to September 1978, near Rockall. The MRF's Hercules had taken part, along with aircraft provided by the USA and West Germany. These three flying laboratories had used sophisticated instrumentation to measure air motions, humidity, air temperature and sea-surface temperature.

Malcolm also mentioned an environmental concern which had come to the fore in the 1970s, that commonly called 'acid rain', i.e. acid deposition by all forms of precipitation and by clouds, fog and dew. In its broadest sense, however, the acidification problem had included, too, dry deposition of gases and small particles. The consequences had taken the form of damage to trees and other vegetation, soils, buildings, fisheries, and so on. Public concern had grown as the media reported serious tree damage in Germany and Scandinavia, as well as ecological damage in rivers and lakes in Scandinavia and Scotland.

Prevailing winds over the British Isles blow from a westerly point. Accordingly, the finger of blame for the acid rain problem in Scandinavia had been pointed at the UK, as a result of which studies had been carried out by the Met Office and the Central Electricity Research Laboratories. The methods employed to investigate the transport and dispersion of pollutants had included the use of aircraft.[7] It had been found that the UK was not the only significant source. Most of the pollution that had been deposited in Scandinavia when rain had fallen from warm and occluded fronts had originated in the industrial areas of the German Democratic Republic. Trajectories of air in these fronts are broadly from the south or south-east, not the west. However, much of the pollution that had been deposited in Scandinavia in dry form and in showery precipitation had originated in the British Isles, carried across the North Sea by westerly winds.

The introduction was then concluded by **Stan Cornford**, who spoke briefly about investigations in the late 1960s of the monster cumulonimbus systems which form in Nor'wester storms over North East India in the pre-monsoon season. These investigations had become necessary because of possible Concorde flights over the area. The aircraft was to operate at heights of 55,000-65,000 feet, and knowledge of clear-air turbulence, clouds, precipitation and horizontal gradients of wind and temperature at such altitudes was required. It had been found that the cumulonimbus systems over North East India certainly posed a hazard to Concorde. Their tops could reach 70,000 feet.

After the introductions by Malcolm and Stan, there followed a talk by **Mike Nicholls**, entitled 'An era of multinational collaboration'. In this, he reiterated what Stan had said, that the 1960s and 1970s were an exciting time in respect of uses of aircraft for meteorological purposes. It was not just that there were big gaps in knowledge to be plugged, which

[6] For information about the work of the MRF in the second half of the 1960s and early part of the 1970s, see 'The current work of the Meteorological Research Flight', by D.G.James and J.M.Nicholls, published in 1976 in the *Meteorological Magazine* (Vol.105, pp.86-99).

[7] For information about studies of acid rain in the mid to late 1970s, see 'Acid rain and the long-range transport of air pollutants', by B.E.A.Fisher, published in *Weather* in 1981 (Vol.36, pp.367-369). See also 'Acid rain – cause and consequence', by B J Mason, published in *Weather* in 1990 (Vol.45, pp.70-79).

was in itself scientifically exciting, but also that the flights of research aircraft could approach health and safety limits, which called for the most expert of flying skills on the parts of pilots!

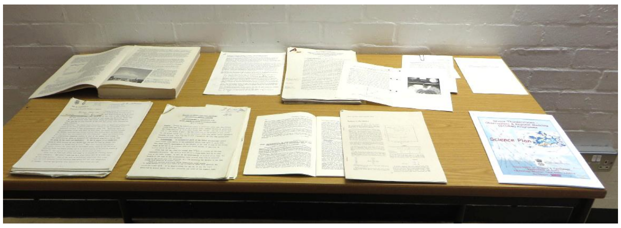
Mike's work in the late 1960s was also, like Stan's, concerned to some extent with the operational requirements of Concorde at high altitude, but, in his case, in North America, where the U2 aircraft and a modified (RB57F) Canberra were used to shed light on atmospheric conditions at Concorde cruising altitudes. Mike also studied atmospheric motions over and downwind of California's Sierra Nevada mountain range in the early 1970s, flying at times in the most dangerous conditions possible, sometimes with violent changes of aircraft speed associated with 'hydraulic jumps'.[8] Conditions in this region are sometimes so violent and unpredictable that glider pilots have been taken by surprise and their aircraft broken up.

Finally in his talk, Mike spoke about his trip to Africa to study weather systems and sub-systems of the Intertropical Convergence Zone in one of the experiments of the Global Atmospheric Research Programme (GARP). This was the GARP Atlantic Tropical Experiment (GATE), which took place from June to September 1974, based in Dakar. In the experiment, the UK's Hercules and twelve other aircraft had been used, as well as 39 ships, a geostationary satellite and fourteen radio/ rawinsonde stations.

The period covered by Mike was indeed an era of multinational cooperation.

The next speaker, **James Milford**, called his talk 'Life in the slow lane'. In the words of his abstract: "A powered glider was a cheap and cheerful way of looking at structures in the atmospheric boundary layer, using a portable data logger developed in the University of Reading to measure temperature, humidity, pressure and vertical velocity every 50 metres or so along the flight path". The work was carried out during the period 1968 to 1975 and showed just how much could be achieved with resourcefulness, imagination and limited instrumentation. To quote the abstract further: "With a single, slow aircraft, rapidly developing structures could not be investigated properly, but we completed useful investigations of sea breeze fronts over southern England, and of the boundary-layer development during the day in anticyclonic conditions". As James and colleagues showed in papers published in the *Quarterly Journal of the Royal Meteorological Society* in 1977 and 1979, their work yielded considerable advances in understanding of sea-breeze fronts and eddy fluxes in the boundary layer.[9] A remarkable finding was that inland penetration of sea breezes over southern England could sometimes be as much as 100 kilometres.

Life in the slow lane? James said that the speed of his glider over the M3 was generally such that traffic below overtook him!



Above: Exhibits brought by Stan Cornford.
Below: Exhibits brought by James Milford.

The first speaker after lunch was **Debbie O'Sullivan**, who traced the history of the MRF from its inception as the High Altitude Flight at Boscombe Down in the early 1940s through to its transformation into FAAM, the Facility for Airborne Atmospheric Measurements, ten years ago.

In so doing, she reviewed the MRF's involvement in many research projects over the years and showed photographs of aircraft that had been used. An early concern of research flights in the Second World War had been contrail formation; and aircraft used in the wartime years were Spitfires, a Boston, a Hudson

[8] See 'Aircraft measurements of disturbed airflow over mountains', by J.M.Nicholls, *Weather*, 1973, Vol.28, pp.141-152.

[9] See 'Inland penetration of sea-breeze fronts', by J.E.Simpson, D.A.Mansfield and J.R.Milford, *QJRMetS*, 1977, Vol.103, pp.47-76. See also 'Eddy flux measurements using an instrumented powered glider', by J.R.Milford, S.Adbulla and D.A.Mansfield, *QJRMetS*, 1979, Vol.105, pp.673-693.

and a Flying Fortress. Mosquitoes were used from 1943 to 1955 and a Halifax from 1946 to 1952.

With the Spitfires, Flying Fortress and Mosquitoes, the atmosphere could be studied to about 35,000 feet. The Hastings which was part of the MRF fleet from 1950 to 1966 had a ceiling of a little over 26,000 feet, but the Canberra which was available from 1953 until destroyed in a crash in 1962 could reach altitudes above 45,000 feet.[10] The first of the Varsities was in MRF service from 1955 to 1970 and the second from 1970 to 1975. Simultaneous use of the Varsity and the Canberra allowed measurements to be made at low and high levels at the same time.

The replacement Canberra was in MRF service from 1964 to 1981. An inertial navigation system was installed on this aircraft which provided a stable platform for the measurement of wind from the aircraft. The long boom which was fitted to the nose of the aircraft housed wind-speed sensors that provided measurements made before the aircraft disrupted the air flow. The wind measurements allowed research into clear-air turbulence (CAT) to be carried out, an outcome of which was the discovery that breaking Kelvin-Helmholtz waves are a major cause of CAT. Wind measurements from the Canberra were also used in studies of gravity waves and mountain waves; and radiometers fitted to the Canberra provided data for studies of radiative transfer.

The arrival of 'Snoopy' in 1973 brought with it advances in technology and improved instrumentation which have yielded, *inter alia*, greater knowledge and understanding of aerosols, acid rain, frontal dynamics, radioactivity, and tropopause characteristics; and the aircraft's radiometers have been used for testing, calibrating and validating satellite instrumentation.

The next speaker was **Geoff Jenkins**, who focused on his time as Head of the MRF, 1990 to 1995, but began his talk with brief recollections of JASIN in 1978. He then provided information about the MRF C-130 Hercules XV208, which was based at the Royal Aircraft Establishment at Farnborough from 1973 to 1994 and thereafter at Boscombe Down until 2001, when it was withdrawn from MRF service. Its ceiling was 33,000 feet and its range 5,500 km at 25,000 feet. It could fly as low as 50 feet over water and 100 feet over land. It carried five aircrew and could carry up to fifteen scientists. The MRF's research areas during his time in charge were cloud physics, atmospheric radiation, satellite calibration, frontal systems, and atmospheric chemistry; and the main instrumentation of the C-130 included gust probes, weather radar, a dew-point hygrometer, radiometers, water content sensors, an in-cloud-temperature probe, a holographic camera, a holographic laser, and a forward-facing TV camera.

Geoff outlined threats to the existence of the MRF which had been countered successfully at every annual budget round; and he then returned to the science, showing images of superb quality of results acquired by a cloud probe which had sampled cloud water droplets and ice crystals from 50 to 800µm and counted them in different size ranges. He then showed results of dropsonde descents through a cold front before turning to a matter which had caused concern around the world, the fires caused by the setting alight of more than 600 Kuwaiti oil wells in February 1991. The C-130 had been dispatched to the Gulf the following month with himself and colleagues who had studied the spread and effects of the thick black smoke from the fires. The dire predictions of some – of a 'nuclear winter', for example, and other serious threats to human health – were shown to be fallacious or greatly exaggerated. There were certainly unpleasant downwind consequences within a few hundred kilometres of the source, but the global effects of the oil fires proved to be negligible.

To conclude his talk, Geoff turned first to work on aerosols in respect of cloud droplet concentration and then to the European Tracer Experiment (ETEX) of 1994, in which the C-130 had been used to identify the positions of a tracer in real time over the south of England and north-eastern France, thereby helping validate the Met Office's NAME dispersion model. The tracer, perfluoromethylcyclohexane, had been released near Rennes, in the north-west of France.

The next speaker, **Guy Gratton**, presented a talk entitled 'Atmospheric Research Flying – the latest chapter: FAAM'. He explained that Snoopy had by 2001 become expensive and unreliable and something of a financial burden on the Met Office. The outcome had been a collaboration with the Natural Environment Research Council (NERC) to form FAAM, the Facility for Airborne Atmospheric Measurements, with its own aircraft, a BAe 146-301 Atmospheric Research Aircraft, commissioned in 2001 and granted a Certificate of Airworthiness in 2004. This aircraft, based at Cranfield, is now but

[10] For an account of this crash, see History Group Newsletter 1, 2013, pp.8-9.

one of a fleet of geosciences research aircraft, the others being the NERC Airborne Research and Survey Facility's Dornier Do-228, the University of Edinburgh's Super Dimona, the British Antarctic Survey's Twin Otter Dash-7, and the Met Office's Civil Contingency Aircraft, a Cessna C-421.

Guy went on to outline recent science programmes which have involved the FAAM aircraft, including:
● in March and April 2012, a study of pollution dispersal from the North Sea Elgin Platform;
● in 2013, ACCACIA, the 'Aerosol-Cloud Coupling and Climate Interactions in the Arctic' Project;
● in May 2013, SALSTICE, the 'Semi-Arid Land Surface Temperature IASI Cal/val Experiment' in the south-west of the USA;
● in July 2013, COPE, the 'Convective Precipitation Experiment', a study of developing showers, mainly over Devon and Cornwall.

Then followed a talk by **Kirsty McBeath** entitled 'The response of the FAAM research aircraft to the 2010 Eyjafjallajökull volcanic eruption'. In this, she ran through the timeline of events which surrounded the volcano's eruption and showed how the FAAM research aircraft had supported the Met Office in its rôle as a Volcanic Ash Advisory Centre. She also spoke about the Met Office Civil Contingency Aircraft (MOCCA), which is a dedicated airborne platform that was commissioned in 2012 after the Eyjafjallajökull eruption and is capable of responding to a wide range of civil contingency events in UK airspace.

In her talk, Kirsty highlighted the challenges of measuring volcanic ash, pointing out that ash particles are comparatively large. As decelerating such particles and taking them through a sample pipe into the aircraft is very inefficient for particles more than three microns in diameter, it was necessary to use optical scattering instruments to measure sizes. Lidars, she said, could measure scattering but were not capable of measuring mass concentration directly. She presented results of ash measurement and showed a photograph of a Cloud, Aerosol and Precipitation Spectrometer (CAPS) by means of which in situ measurements of particle sizes can be obtained.

The MOCCA has a range of sensors, including an Aircraft-Integrated Meteorological Measurement System (AIMMS) air data probe (a wing-tip-mounted probe that provides measurement of temperature, humidity and pressure), an aerosol lidar (a UV aerosol backscatter lidar that provides information on distribution of aerosols / clouds above and below the aircraft), a sulphur dioxide analyser, CAPS, and an integrating nephelometer (an apparatus used to measure the size and concentration of particles in a liquid by analysis of light scattered by the liquid).

After tea, the first speaker was **Steve Stringer**, who spoke on 'Operational observing by commercial aircraft'. He began with a brief history of aircraft-based observing, noting that the first system had been developed by the Australian Bureau of Meteorology in the 1980s and soon used by Ansett and Qantas. After that, other airlines and national meteorological services had quickly followed, with Air New Zealand and a number of US airlines in 1992, KLM in 1993, Air France in 1995, British Airways and SAS in 1998, Lufthansa in 1999, and others since then. About forty airlines around the world now supplied data.

Steve went on to talk about AMDAR (Aircraft Meteorological Data Relay), which is used to collect meteorological data worldwide by means of commercial aircraft. Data are collected by aircraft navigation systems and standard on-board temperature and static pressure probes and are then pre-processed before being transmitted automatically to the ground by either the VHF Aircraft Communications Addressing and Reporting System (ACARS) or satellite link (ASDAR). Existing aircraft sensors are used to obtain measurements of pressure, temperature, wind speed and wind direction, and additional parameters which can be made available are turbulence, icing and humidity.

AMDAR data can be reported in all phases of flight to provide a series of observations at different heights, latitudes and longitudes. Disadvantages are, however, that meteorologists have no control over where aircraft fly, what sensors are fitted or how sensors are calibrated. Moreover, data flow can be interrupted by industrial action, financial restrictions of airlines, airport closures, disruptions to flights by weather, and changes in flight schedules. Nevertheless, it is usual now for more than 390,000 observations to be received each day, with the largest concentrations over North America, the North Atlantic and Europe and relative sparseness over southern oceans. The data are invaluable for weather forecasting purposes; and for airlines the benefits of using AMDAR data come in the form of pre-departure fuel planning, pre-departure flight planning, optimized descent profiles, and in-flight adjustments. Case studies have shown that fuel savings (and therefore reduced carbon dioxide emissions) are considerable.

It is very desirable, Steve pointed out, that greater information about thunderstorms, wind and wind shear, turbulence, humidity, low cloud, fog, icing and snow could be incorporated in AMDAR. There are options, he said, but they all involve cost. However, research and development and testing of prototypes are being carried out. The future looks promising.

The final speaker was **Jeremy Price**, who provided a glimpse of the future through his talk on 'The use of airborne autonomous systems for meteorological research'. He began by defining UAVs and UASs (unmanned aerial vehicles and unmanned aerial systems) and went on to say that these are aircraft which can take off and perform a pre-determined flight autonomously. Some UAVs that are used for meteorological purposes are actually ex-military aircraft. Today, as a result of trickle down of technology, UAVs have been put within reach of small research groups, but they are still costly to operate.

Jeremy then touched upon legal aspects of UAV/UAS flights and proceeded to describe various types of UAV/UAS, starting with NASA's Global Hawk Northrop Grummen RQ-4, two of which have been used to study hurricanes over the North Atlantic. They are impressive aircraft 30 to 40 feet long, with a ceiling of about 60,000 feet, a range of about 9,000 miles, a duration of 28 to 30 hours and a payload capability of 680 kg; and they are able to carry a cloud physics lidar, a microwave temperature profiler, a differential absorption spectrometer, an air sampler, a diode laser, a hygrometer, an ice crystal imager, radiometers, and sensors for measuring temperature, pressure and humidity. Impressive indeed!

More modest but still impressive was the next aircraft described by Jeremy, The Cruiser, which has a wing span of 3.8 metres and is powered by a 50 cc two-stroke engine. He then showed pictures of a number of smaller UAVs/UASs before focusing on the Met Office Light Unmanned Aerial System (LUAS), which weighs under 3 kg, can carry a payload of 500 g, has an operating duration of about 30 minutes and can reach an altitude of more than 5,000 feet. It is relatively inexpensive (costing from £1,000 to £3,000), is transportable by car and can be operated by a team of only two people. Its disadvantages are that its payload is small (typically no more than 2 kg), and its range and duration are limited (respectively, a few kilometres and no more than about an hour). Many small, light sensors are available today, but, as Jeremy said, are not all designed for meteorological use. A capacitative sensor for measuring relative humidity can be purchased for about £12 and a glass bead thermistor with a response rate of 0.1 second in still air for £120. The LUAS is especially suitable for mesoscale and boundary-layer studies and for investigations of fog and low cloud. UAVs look set to become an important meteorological tool.

The 48 people who attended this meeting had a very good day. The talks were excellent, well presented, packed with information and fully illustrated; and the day was a social success, too, with a reunion of about fifteen former members of the MRF. What would those magnificent men in their flying machines of a century ago have made of it all? A century of progress indeed!

Above: Most of those who attended the meeting, with Marcia Spencer from the Royal Meteorological Society's headquarters holding a model of 'Snoopy'. Below: MRF/FAAM reunion photo.
Photographs by Richard Griffith.

MY EARLY DAYS IN THE MET OFFICE
The first few years at Shoeburyness
by Mick Wood (Met Office 1954-1998)

After nearly 60 years and the probability that most of my early bosses are not going to give me an "adverse report", it may be safe to recount my early days as a Scientific Assistant (SA).

I started on the 20 October 1954 at RAF North Weald as probably the youngest SA in the Office being just 16 years and 8 months and the minimum entry age was sixteen and a half. I was lucky in that this station was fairly near to my home at Southend. I started on a Wednesday as I was advised that as the station was an RAF (VR) station they were open at weekends and stood down Monday and Tuesdays. I was put in a large transit billet on my own and ate in the Airmen's Mess. This was quite a change as the only time I had been away from home was camping with the Scouts. Fortunately, the CO's driver, a National Serviceman, was a Rover Scout from my Group, who took me under his wing so to speak in the CO's Standard car The one name I do remember from North Weald was a forecaster Mr Crispin. All forecasters were 'Mr'.

After that week I was posted to the Met Office Training School at Stanmore. I stayed with friends in Watford and because of bus delays was always late in the morning. I remember the restaurant at Stanmore had a stylised mural of Southend and the pier on one wall. A lady used to come round with a tea trolley for drinks and biscuits. The new 'Washington Code' was due for implementation in 1955 and the lecturers were constantly contacting Dunstable for advice on the new codes to come into effect on 1 January 1955. I was also introduced to the two nibs plotting pen, or, to be precise, two pens tied together with elastic bands and sticky tape.

After our first weekend at home, the admin SSA (Harry Pletts) asked us who had been home that weekend. Those who answered "yes" were then assured that they could only claim for the travel costs and not the more lucrative subsistence allowance. My first introduction to 'how to complete a claims form'.

I am ashamed to write that our course did not do too well in the end of course exams. 35% was the highest score! I still have the notebooks from the course and these were copied by Jane Insley as being of 'historical interest' at the Science Museum.

After Stanmore, I returned to Shoeburyness in 1955, which allowed me to stay at home. As I had requested this posting I was not allowed a Transfer Grant.

The Proof and Experimental Establishment (P&EE) was a vast artillery proving ground/range covering much of Shoeburyness and Foulness Island. The range staffs were mainly Royal Artillery with some RN and RAF officers. Old aircraft frames were sometimes used as targets. The Principal Met Officer was Dr Knighting, but he had an office in the HQ buildings and we minions did not see much of him. He gave a lecture once a month to the staff. We used to work on Saturdays in those days, and as I was under eighteen I got an increased leave allowance. Staff 'dressed down' on Saturdays and wore a blazer and tie instead of uniform or suit.

The work was very interesting and varied. Observations were made 06:00-21:00 GMT seven days a week. A part of the 'Morning' observing duty was to climb up and change the charts for the Dines anemometer at the top of the 100 ft. conning tower. At the top was a wonderful view of the Thames Estuary, but it was not much fun on a cold wet windy day.

Also pilot balloon ascents, radiosonde and radar wind ascents were made. These were for the Ranges and AWRE (Atomic Weapons Research Establishment) at Foulness Island. Two flights a day were made to 10,000 feet for local use and then continued as a TEMP. It was beating and slide rule calculations in those days. Staff levels were quite high and at the radiosonde office at Landwick there was nearly always enough for a bridge four. Many blackberries and mushrooms were picked in season, and cricket was played against the balloon shed wall. My course at Hemsby ensured that I learnt to play bridge. Bill Preston was my instructor and he must have taught me well, as I came top of the class.

We were also required to do field work for the Royal Artillery for 'R/A' (Range and Accuracy) trials of guns and shells. A whirling psychrometer was used for the temperatures, much to the amusement of the 'squaddies', who wondered which football team I supported, which by the way was Charlton Athletic at the time, which is not a million miles away from the home of the Royal Artillery at Woolwich. Wind speed and direction were also recorded, so the speed of sound and thus the elasticity of the air could be computed. This is essential for deciding where artillery shells go, and then producing Range Tables for future general use. Sometimes the recordings were made halfway down the range between the gun and the target, sheltered in an armoured shell-proof sentry box. On one occasion, after spending all day alone in this box, I found out later that they were testing armour-piercing shells!

The weather on Foulness in winter is very cold and bitter. The north wind over the Essex coast is a lazy wind. It is too lazy to go round you; it goes through you! When on one particularly cold day all the service personnel were given rum to keep out the cold, we met men were not included.

After nearly two years at Shoeburyness, the Queen sent me a postal order for one shilling and a request to attend RAF Cardington for my National Service.

BICENTENARY OF THE 'YEAR WITHOUT A SUMMER', 1816

A two-day meeting (Friday to Sunday) in May 2016 is being planned to mark the bicentenary of the so-called 'Year without a Summer'. The venue for this meeting will be Whitby, and it is intended that the meeting will include both talks and visits.

In 1816, summer climate abnormalities caused average global temperatures to decrease by 0.4-0.7°C, resulting in major food shortages across the northern hemisphere. It is believed that the anomaly was caused by a combination of an historic low in solar activity coupled with a succession of major volcanic eruptions capped in April 1815 by the eruption of Mount Tambora, in the Dutch East Indies (Indonesia), the largest known eruption in over 1,300 years and possibly 10,000 years.

Details of the Whitby meeting will be announced in due course. Meanwhile, we are delighted to say that several speakers have already promised to give talks, not only on the infamous summer of 1816 but also on:

- the seafarer, explorer and scientist Luke Fox, who in the 17th Century tried to find a way through the North West Passage;
- the explorer and scientist William Scoresby Junior, whose papers, log books, instruments and botanical specimens were left to the Whitby museum;
- whaling logbooks and climate research;
- a distinguished Whitby photographer of the late 19th Century and early 20th.

RECENT PUBLICATIONS

This list of books and articles concerned with the history of meteorology and physical oceanography has been compiled by Malcolm Walker and Anita McConnell.

BURNETTE, D.J. and STAHLE, D.W., 2013. 'Historical perspective on the dust bowl in the central United States'. *Climatic Change*, **116**, 479-494.

CAMUFFO, D. and BERTOLIN, C., 2013. 'The world's earliest instrumental temperature records, from 1632 to 1648, claimed by G.Libri, are reality or myth?'. *Climatic Change*, **119**, 647-657.

DE KRAKER, A.M.J. and FERNANDES, R., 2013. 'Investigating the correlation between monthly average temperatures and tithe proxy data from the Low Countries'. *Climatic Change*, **119**, 291-306.

DIAZ, H.F. and SWETNAM, T.W., 2013. 'The wildfires of 1910: climatology of an extreme early twentieth-century event and comparison with more recent extremes'. *Bulletin of the American Meteorological Society*, **94**, 1361-1369.

DOMINGUEZ-CASTRO, F., TRIGO, R.M. and VAQUERO, J.M., 2013. 'The first meteorological measurements in the Iberian Peninsula: evaluating the storm of November 1724'. *Climatic Change*, **118**, 443-455.

KEANE, T., 2012. *Establishment of the Meteorological Service in Ireland: the Foynes years, 1936-1945*. Ireland: Varsity Press. Pp.xii+170+16 pls. ISBN 9781908417183.

LOCKETT, J., 2012. *The discovery of weather: Stephen Saxby, the tumultuous birth of weather forecasting, and Saxby's Gale of 1869*. Halifax: Fornac Publishing Company, pp.272.
ISBN 9781459500808.

MIMS, F.M., 2012. *Hawaii's Mauna Loa Observatory: fifty years of monitoring the atmosphere.* Honolulu: University of Hawaii Press, pp.xiv+463+pls.
ISBN 9780824834319.

POTTER, S., 2013. 'A long legacy: weather observations in Central Park'. *Weatherwise*, **66**, 37-41.

ROCHAS, M.J., 2013. 'The invention of the stratosphere', *La Météorologie*, **8**, No.82, 24-30.

SANDLIN, L., 2013. *Storm kings: the untold history of America's first tornado chasers*. New York: Pantheon Books, pp.xxv+266; 25cm. ISBN 9780307378521.

"WEATHER STILL REMAINS *BOISTEROUS*"[11]

Historic weather data in diaries and logbooks 1901–1904

by Dr Ursula Rack

Polar Historian and Adjunct Fellow of Gateway Antarctica, University of Canterbury, Christchurch, New Zealand

This article is an excerpt from a talk given at the joint *SCAR History Expert Group and the SCAR Social Sciences Action Group workshop in* Cambridge from 1-5 July 2013. The research is still under way and a full report will be published in the *Polar Record* after the conclusion of the project.

Polar history is mostly written by scientists or biographers with the result that often social aspects are not thoroughly considered and presented. There is limited research, for example, showing how weather phenomena affected the outcome of expeditions, as on Robert F. Scott's last expedition.[12] My research is focused on weather phenomena and how these influenced expedition members in general. Personal diaries and journals of the era have frequent comments on weather conditions and these are a rich source of data for the central work of this research: research that has wider implications. Historical data can also be compared with current data allowing climate scientists to test, analyse and quantify historic changes in Antarctica. This comparison is being carried out in cooperation with scientists from the Physics Department at the University of Canterbury. A COMNAP (Council of Managers of National Antarctic Projects) fellowship that started in August 2013 and ends in October 2013 supported this project.

The focus of this work is to investigate the relationship between ambient weather conditions and elements of the social climate such as interactions between members, physical and mental wellbeing, and variations of group dynamics caused by weather during pioneer Antarctic expeditions. This work explores the social dimensions of early expedition life from two Antarctic expeditions between 1901 and 1904: the British National Antarctic Expedition (*Discovery*), led by Robert F. Scott, and the German Antarctic Expedition, led by Erich von Drygalski (*Gauss*). Both expeditions were part of an international program modelled on the first International Polar Year in 1882 – 1883[13]. The *Gauss* expedition operated at 66°2'S, 89°38'E and the *Discovery* expedition was located at 77°38'S, 166°25'E. The scientists on the German expedition were not naval personnel although the officers and crew assisted in collecting data, and the expedition leader was a geographer. This expedition was mainly funded by the German government. The government also supported publishing the scientific reports, which were produced by the scientists itself, and in cooperation with fellow scientists. On the British expedition, only a small number of scientists were not part of the navy, but naval officers executed the scientific work as well, and the expedition leader was a navy officer. This expedition was funded partly by the British government and from both the Royal Geographical Society and the Royal Society. The Royal Society and the British Museum published the reports of the scientific work. The different combination of scientists and naval officers on both expeditions had an influence on the style and content of the diaries.

The personal accounts, diaries and letters of expedition members often included comments on weather conditions. These have been compared with the recorded temperature, and pressure measurements published in the official reports. Preliminary analysis shows a distinct correlation between the perception of temperature, wind at the diary entries, and the actual weather phenomena. Published and unpublished diaries are now being examined to get a more representative account on data to reveal the impact of weather on the expedition members and even on the course of the expedition itself.

From the German expedition three diaries are examined: those of Erich von Drygalski (expedition leader, geographer), Hans Gazert (physician, bacteriological studies and meteorological observations), and Paul Bjørvig (ice pilot). All three diaries are unpublished. Published diaries have been examined for the British expedition from William Lashly (stoker), Edward Wilson (surgeon, zoologist, meteorological observations, artist), and Reginald Skelton (chief engineer and official photographer),

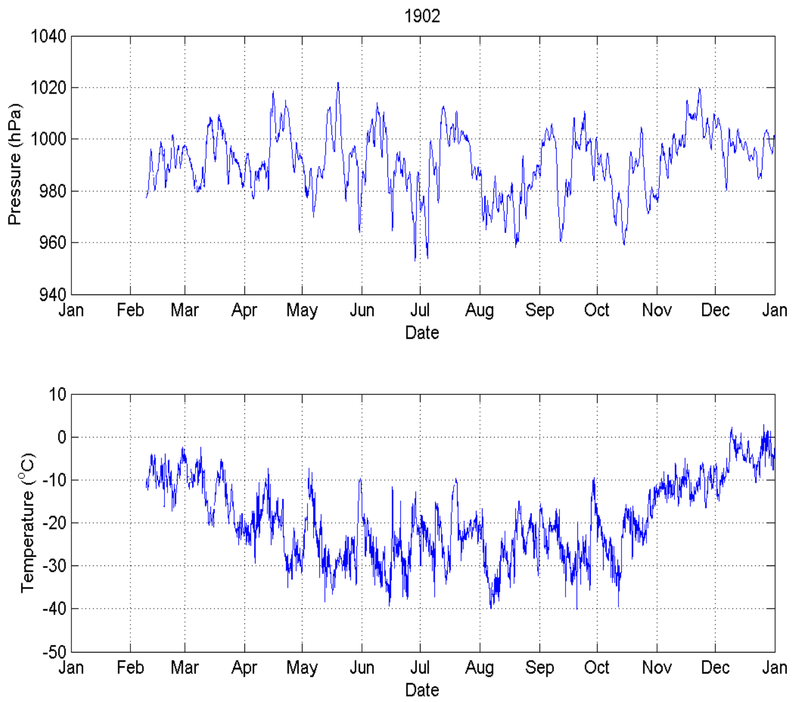
[11] Skelton, Judy: *The Antarctic Journals of Reginald Skelton "Another little job for the Tinker"*, Cheltenham, 2004, pp.102, (4 August 1902).

[12] Solomon, Susan: The coldest march. Scott's fatal Antarctic expedition. New York, London, 2001

[13] See also: Lüdecke, Cornelia; 'International Magnetic and Meteorological Cooperation in Antarctica (1901 – 1904)', in: *Antarctic Challenges*, Göteborg 2004, 247 – 261

as well as one unpublished diary from Hartley Ferrar (geologist and ice observations).

In this project analysis began with the biographical background of the diarists. This is important in order to put text analyses into the best possible context. The style of writing, the educational background, the individual's character, and the position within the hierarchical system of the expedition are examined to see how the diarists reacted to the weather phenomena. For example, Hartley Ferrar's diaries show that he felt mainly isolated and misunderstood. He was the youngest scientist on board and his laboratory was often used as a storage room, meaning that he had to clear it before he could start his work. He also seems to have been affected by the weather. Strong winds caused him to record "Had headache as usual."[14]



With courtesy: Adrian McDonald

Graphic 1: Temperature and pressure measurements of the year 1902.

The project has several aspects particular to it. First, to be able to compare German and British diarists I have had to make the German expressions comparable with the English terms. In some diaries a reader would not recognise any changes in weather or day by day routine. Other diaries have detailed descriptions of headaches correlating to certain wind speeds or changes in the style of writing, depending on the weather. Second, after reading several diaries I devised a method for categorising subjective wind descriptions (1 for calm until 14 for blizzard) that differs from the official Beaufort Scale. The outcome of this analysis is graphics, which visualise how differently each individual member described wind, for example. Personal reactions were very different.

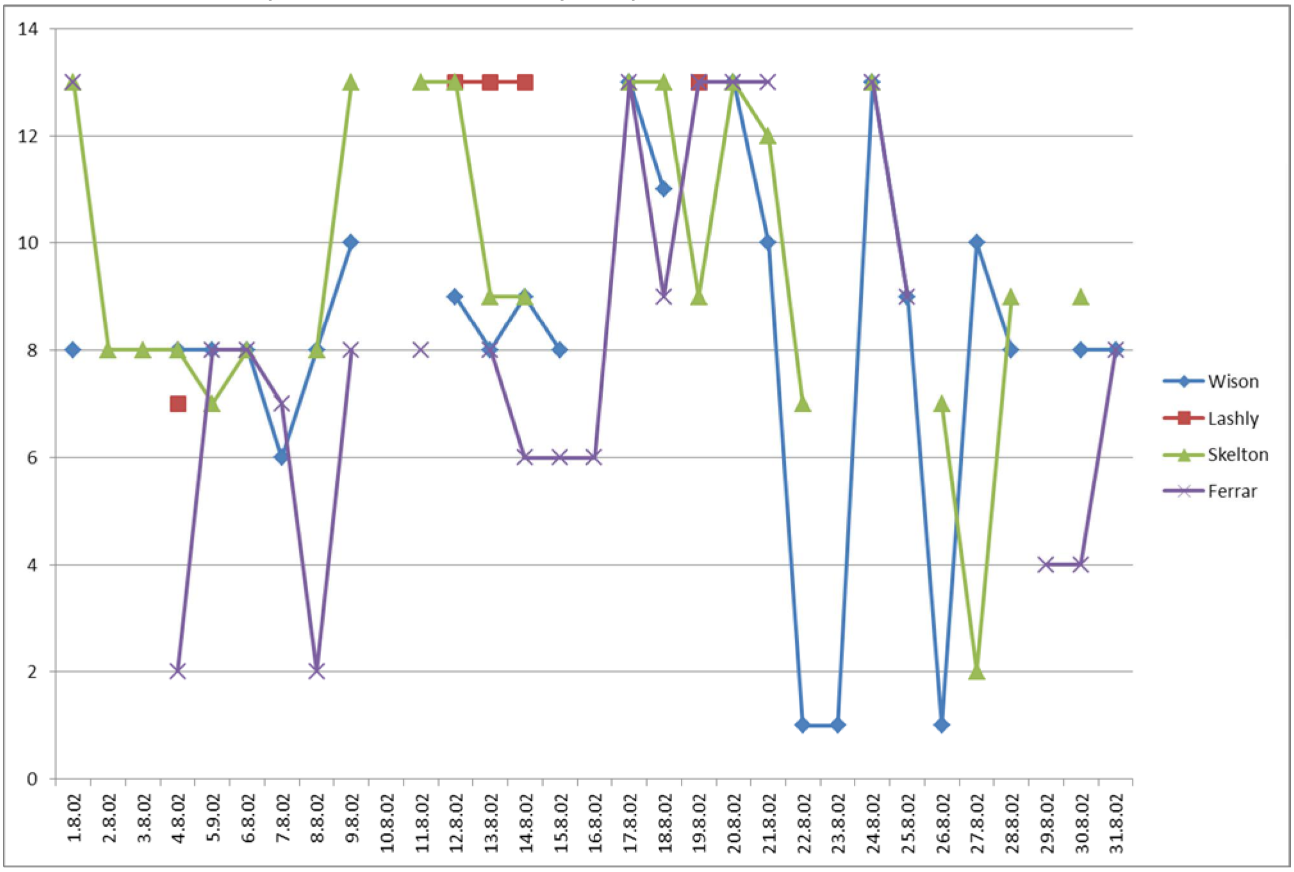
Graphic 1 shows the temperature and pressure for the year 1902 on the *Discovery* Expedition, taken from the logbook. Sometimes there is a gap in the data which may be filled with the information of the diary entries. Often the instruments were not working properly under the harsh conditions and this is often mentioned in the diaries. August is an interesting month to examine. It was the last month of darkness and expedition members had already spent a lot of time in the extreme conditions. In the official reports for the German expedition, August 1902 is the only month with comparison comments on the weather surveys.

Graphics 2 and 3 demonstrate the different wind observations from the two expeditions. The British diarists had not always as detailed comments on the wind observations as their German counterparts. Lashley made few comments on the wind while Skelton and Ferrar's entries did not always mention the wind. Wilson had the most detailed comments on the weather conditions. In the German expedition, however, variations in reactions to wind conditions are obvious, the weather having a very different impact on the diarists. Drygalski often used the official Beaufort scale to describe the wind and Gazert, who was responsible for meteorological monitoring, had observed data at hand. Bjørvig's comments though were only short and not very specific.

Article concluded on page 18

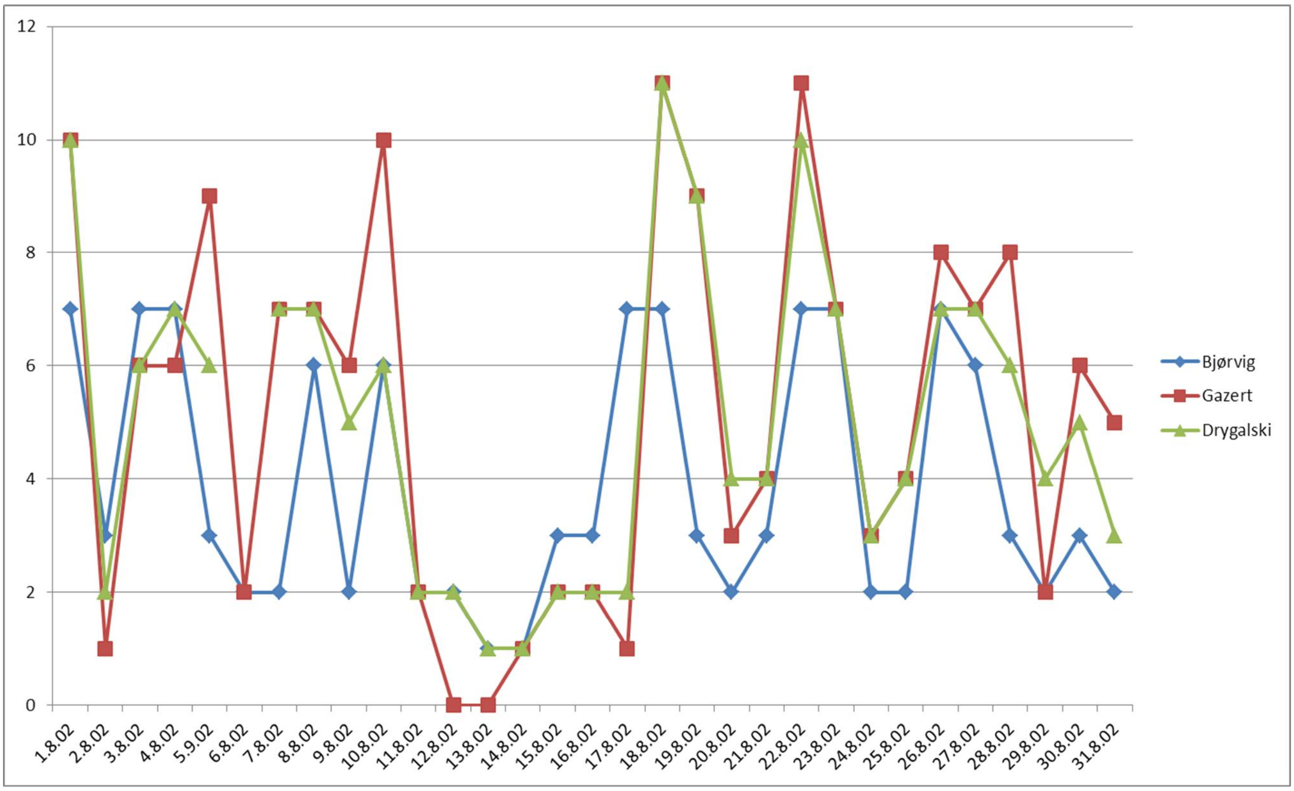
[14] Unpublished diary of Hartley Ferrar, 1 August 1902, SPRI MS 1153/1 BJ&MJ

Wind descriptions – *Discovery* Expedition



Graphic 2: Diary entries from the Discovery Expedition on wind observations from 1 – 31 August 1902.

Wind descriptions – *Gauss* Expedition



Graphic 3: Diary entries from the Gauss Expedition on wind observations from 1 – 31 August 1902.

From my studies, a behavioural pattern emerges showing that the weather phenomena are not solely responsible for interactions between expedition members. There is a wide range of components, which must be taken into consideration even though some members were very sensitive describing certain weather conditions. Although it is not possible to recreate accurate weather patterns from diary entries alone, however, they provide valuable additional information when official record keeping has gaps because of failure of instruments in harsh weather conditions. Further research is intended to examine more diaries to create a sort of 'diary-data-base' (documentary database) and examine temperature, seasons and differing expedition activities, such as sledging.

HISTORY OF THE GREENHOUSE EFFECT

Wednesday October 2014, 2.00 to 5.30pm
Imperial College, South Kensington, London

This will be a National Wednesday Meeting of the Royal Meteorological Society, a 'Classic Papers' Meeting, organized by the History Group.

October 2014 has been chosen because it coincides with the 50th anniversary of the death of Guy Stewart Callendar, who in 1938 revived the 19th century carbon dioxide theory of climate change with the publication of his paper 'The Artificial Production of Carbon Dioxide and its Influence on Temperature' (*Quarterly Journal of the Royal Meteorological Society*, Vol.64, pp.223-240). Details of this meeting will be announced in due course.

THE ROYAL METEOROLOGICAL SOCIETY'S 75TH ANNIVERSARY DINNER

The dinner was held at
The Hotel Rembrandt
London
on 22 April 1925

MENU

Delicatesse International

Petite Marmite

Saumon poché
Sauce Cardinal

Vol au Vent aux
Ris de Veau Toulousaine

Poussin en Cocotte
Petits Pois Nouveau
à la Menthe
Pommes Parisienne

Parfait Glacé Excelsior
Four Sec

Café

TOASTS.

HIS MAJESTY THE KING.
(PATRON)

THE SERVICES.

Proposed by MR. H. MELLISH. C.B., D.L.
Response by CAPTAIN H. P. DOUGLAS, C.M.G., R.N.
Hydrographer of the Navy.

THE ROYAL METEOROLOGICAL SOCIETY.

Proposed by SIR PHILIP SASSOON, BART., G.B.E., C.M.G., M.P.
Under Secretary of State for Air.
Response by THE PRESIDENT.

INTERNATIONAL METEOROLOGY.

Proposed by SIR NAPIER SHAW, Sc.D., LL.D., F.R.S.
Response by PROF. E. VAN EVERDINGEN,
President of the International Meteorological Committee,
Director of the Royal Netherlands Meteorological Institute.

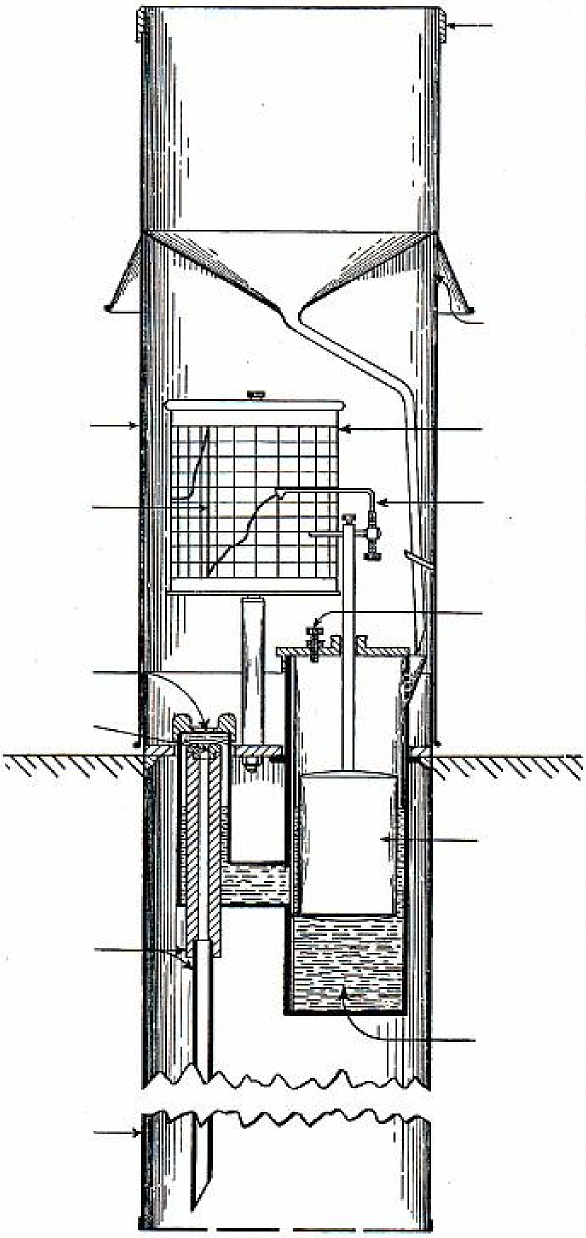
THE VISITORS.

Proposed by DR. G. C. SIMPSON, C.B.E., F.R.S.
Director, Meteorological Office, Air Ministry.
Response by SIR THOMAS MIDDLETON, K.B.E., C.B.

What did a recording rain gauge cost in 1925?

Here is page 20 of Negretti & Zambra's catalogue for that year.

RECORDING RAIN GAUGES



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NATURAL SIPHONING Recording Rain Gauge. The obvious method of a natural siphon action has not up to now met with encouragement from Meteorological Authorities as the action is unreliable and may result in water trickling over the bend without starting the siphon—a most serious fault in a Recording Rain Gauge because the record is entirely lost: the pen remains stationary on the chart without any record being made, and this may continue indefinitely until something is done to make the siphon active again.

If a design can be found which will include (*a*) **Reliability,** and (*b*) **Rapidity of Action,** it is obvious that a natural siphon will mean simplicity of design, reduced cost of production, and ease of use. The design of the siphon action forming the subject of this patent gives these two desiderata and the tests of the gauge under actual conditions leave nothing to be desired. The siphon is arranged concentrically and the secret of the positive action of discharge lies in the shape, design, and manufacture of the junction between the inner (discharge) pipe and outer (stand) pipe forming the "bend" of the siphon. As this is visible through a glass cover, it will be seen in actual operation how the water "heaps up" round the steel joint and, at its maximum tension, breaks over in a mass or flood enabling a large bore siphon to be started instantly full bore and to perform the full action of siphoning away half an inch of accumulated rain in **6 seconds.**

The lower part of galvanized iron can be let into the ground or attached to a post; the cover is of galvanized iron surmounted by an accurately turned brass rim 6 inches in diameter. The clockwork drum makes one revolution in 24 hours, giving a scale of ·45 inches per hour, and the chart is ruled to :—

$\frac{1}{2}$ inch of rain = 3 inches; } or a magnification
10 mm. of rain = 6 cm. } of 6 to 1.

	£	s.	d.
166.—**Patent N.S.** (Natural Siphon) **Recording Rain Gauge,** complete with 100 Charts, Pen, Ink, etc.	20	0	0
Extra Charts, per 100	0	11	0

ESTABLISHED 1850

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As we were going to press, the sad news reached us that History Group member John Norris had passed away.

THIS IS YOUR NEWSLETTER

Please send comments and contributions to:
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The next newsletter will be published in March 2014. Please send items for publication to Malcolm Walker by 15 February 2014.

Malcolm would particularly welcome reminiscences of life in the Met Office (at home or abroad) in the 1950s, 1960s and 1970s, also recollections of meteorological activities in universities, research institutes or the services (at home or abroad) in those decades. He would also welcome comments and letters for publication.