HISTORY GROUP NEWSLETTER

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

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HISTORY IS BUNK ???

by Malcolm Walker
Chairman of the History Group

Henry Ford famously asserted that history is bunk (*New York Times*, 28 October 1921). He also said that history is myth.

I feel sure no member of the History Group would ever consider that history is nonsense, humbug or fiction, but how much of what you read in books and articles about matters historical can you believe?

Let us leave aside the deliberate rewriting or slanting of history which results from personal or corporate agendas. Regrettably, there have been occurrences of this in meteorology. Rather, I wish to focus in this article on frailty of memory and the perpetuation of errors. An extended discussion I had recently with a fellow member of the History Group moved me to write the article.

Our discussion centred on the accuracy, or even veracity, of some wartime reminiscences which had been published in the *Meteorological Magazine* in the 1980s. I think we agreed that the author had not intentionally exaggerated or intentionally made any false statements, but frailty of memory was certainly an issue, and so also, to some extent, was careless and potentially misleading phraseology.

Have you ever had a discussion or even argument with someone about when you did something or when something happened? Have you ever resolved the matter by going to a diary or some other reliable source and found that frailty of memory had affected one or maybe both of you?

Someone once said that discovering historical facts is a bit like archaeology: you need to dig. In the aforementioned extended discussion, we both dug deeper and deeper into primary sources, particularly documents deposited in the National Archives and other archives. Thus, we discovered that the reminiscences in question were basically true, but details of them left much to be desired. The dates that had been given were not always correct, for example, and some of the impressions that were given in the reminiscences were misleading.

The lesson to be learned from all this was that reminiscences are historical sources which are potentially useful but need to be treated with great caution. My fellow member of the History Group and I had both known this, of course, long before our discussion began, but the discussion served to underline the need for caution.

A problem over the reminiscences in question is that they have been used by the authors of obituaries and by other authors; and most of these authors have accepted without question what was stated in

the reminiscences. Thus, mistakes and false impressions have been repeated, which leads me on to another matter: perpetuation of errors.

A paper published in 1967 by an oceanographer, L.H.N.Cooper, stated that the overall residual speed of the surface ocean current near Land's End was 130 cm/sec. In the paper which first contained a figure for the speed of this current, published by J.N.Carruthers in 1934, the speed had been given correctly as 2.5 miles per day, but someone had subsequently quoted it as 2.5 miles per hour; and Cooper had then metricated the figure!

Some years passed before anyone queried the startlingly-large figure of 130 cm/sec. The assumption appears to have been that if someone as distinguished as Cooper had given the figure, it must be correct! Only when someone engaged brain and realised that the residual current past Land's End was surely not that strong did anyone query accepted wisdom. Deference to distinguished scientists has a lot to answer for! And far too many so-called researchers copy blindly and thereby perpetuate mistakes and misconceptions.

A paper on the climate of Lhasa (Tibet) provides another example of an error getting perpetuated. The paper, by Alfred Lu, was published in the *Quarterly Journal of the Royal Meteorological Society* in July 1939 (pp.297-302). In it, Lu stated that the amount of rain that had fallen at Lhasa in 1936 had been 5035.5 mm, with a maximum fall of 296.1 mm in 24 hours. He commented that the 1936 total had been about ten times the amounts which had fallen in each of the years 1935, 1937 or 1938, respectively 448.1, 373.5 and 533.9 mm.

In the course of preparing an article on the weather and climate of Tibet, which was published in *Weather* in July 1973 (pp.268-280), I consulted Mr H.E.Richardson, who had been Officer-in-Charge of the British Mission at Lhasa from 1936 to 1940 and 1946 to 1950. He told me that the monthly rainfall totals for the summer of 1936 were certainly not correct. On arrival in Lhasa on 24 August 1936 to take up residence there, he had found no evidence of unusually wet weather.

When researching my article for *Weather*, I found that the 1936 rainfall total had been quoted over and over again, so who was I to query it? When I examined the daily rainfall totals recorded in 1936, however, I found the cause of the problem. No zero had been placed in front of decimal points. Thus, a rainfall total of 0.1 inch had been recorded as .1 and transcribed as 1 inch (and then metricated)! Accordingly, the 1936 rainfall totals were in error by a factor of ten. The total for that year should have been about 500 mm, not 5000. That was more like it. The amount of rain that had fallen in 1936 was, in fact, comparable with what had fallen in each of the years 1935, 1937 and 1938.

So did Henry Ford have a point? Judging by many other statements he made about occurrences of the past, however, he seems to have had a very shallow understanding of history and a lack of trust in the little he did understand. He also asked if it mattered what had happened in the past? After all, he said, it had happened and could not be undone.

What do you think? Is history bunk? As regards the histories of meteorology and oceanography, how much of accepted wisdom is, in fact, myth? And why does history matter – history in general and the histories of meteorology and oceanography in particular?

MEETING REPORT: FARNBOROUGH 2012

The second of three meetings on 'The use of aircraft in meteorology' took place in the Trenchard Room of the Farnborough Air Sciences Trust (FAST) on Saturday 29 September 2012. It focused on the period from the 1930s to the late 1960s. The meeting was well attended, with a turnout of 34, including a dozen who had been part of the Meteorological Research Flight (MRF) in the 1960s, brought together again by Stan Cornford. Had all 35 who booked turned up, the room would have been even cosier than it was, for its capacity was 35!

The meeting opened with a brief welcome and introduction from the History Group's Chairman, Malcolm Walker, in which he thanked Joan Self and Kirsty McBeath, both of the Met Office, for bringing along archive and other display material.

The first speaker was **Brian Booth**, whose talk was entitled 'A brief history of RAF meteorological flights 1920-1959'. He told the meeting that from 1920 until 1951, RAF aeroplanes were used to make vertical ascents for meteorological purposes, firstly in the UK, but between 1943 and 1946 in all theatres in which the RAF conducted operations. However, autonomous RAF Meteorological Flights existed only between November 1924 and June 1946. At other times, ascents were made by units at selected RAF airfields. From 1920, Brian said, the aeroplanes were

all biplanes with open cockpits, until the Gladiator, with an enclosed cockpit, was introduced in 1939. Replacement by the Hurricane started late in 1944, and the Spitfire was used for high-altitude ascents at selected locations from late 1941. Instrumentation, for the biplanes and Hurricane mostly consisted of a precision aneroid and a strut psychrometer, but no reliable sensors were available for the Spitfire until a balanced bridge thermometer, developed at Boscombe Down, became operational in late 1944. In April 1951, a civilian THUM Flight[1] was formed at Hooton Park to fly once-daily ascents using Spitfires fitted with a balanced bridge psychrometer. These were replaced by Mosquitoes in 1957, but when they reached the end of their operational life in 1959 the THUM Flight was disbanded.

Met Office balanced bridge thermometer indicator Mk.2B

Next to speak was **Peter Rackliff**, whose topic was 'The weather reconnaissance operations of World War II'. In his talk, he covered the activities of the various Met Flights and Squadrons, their aircraft and crews, with the support of 25 photographs. He included a number of interesting and amusing anecdotes, plus a few technical details concerning some of the aircraft that were employed for wartime meteorological reconnaissance sorties. His presentation began with a map which showed the tracks of such sorties flown by the RAF and USAAF in the latter months of the war and continued with photographs of aircraft and their crews. He concluded with a group photograph which was taken at Farnborough in 1948 and showed personnel of the MRF. Peter himself was a Meteorological Air Observer during the war and showed a photograph of the observers' nose position in a Halifax Mk.III. He brought out very clearly the difficulties and dangers of wartime meteorological work in aircraft, as well as the excitement and adventure; and he told some amazing stories of derring-do and survival.

Third to speak was **Alan Heasman**, who kindly presented a talk written by **John Kington**, entitled 'Wekusta: Luftwaffe meteorological reconnaissance operations 1939-1945'. John was unfortunately not able to attend the meeting. Here, in his words, is the very full summary of his talk.

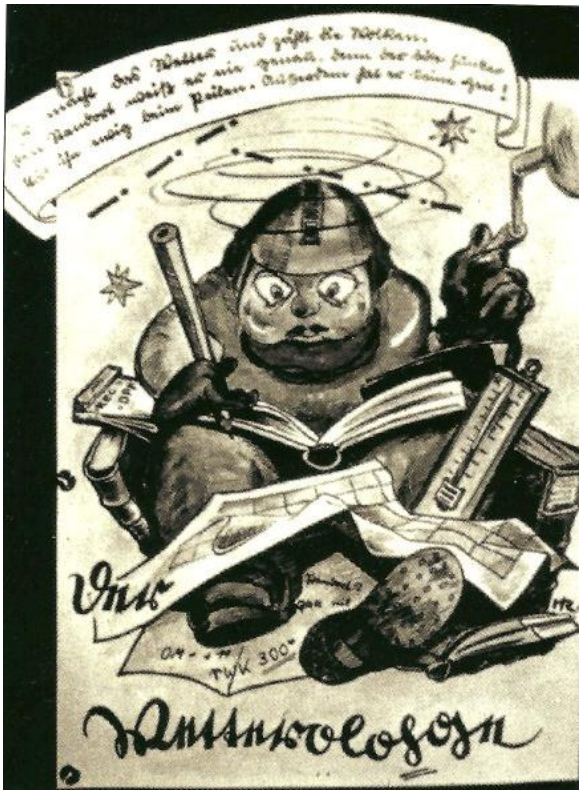
"Weather systems affecting Central Europe generally move from west to east. In the late 1930s, cutting off all weather information coming from the North Atlantic and British isles effectively shut down the weather forecasting capabilities in continental Europe. This was the situation Germany found itself in during 1939. Weather data became an important military asset and a military secret.

"The solution to this problem was the in-situ collection of most of the missing data by using suitably instrumented aircraft. This led to the creation of the wartime Luftwaffe *Wetter Erkundungs Staffeln* ('Meteorological Reconnaissance Squadrons') abbreviating to *Wekusta* or *Westa*. This was facilitated by the existence in Germany since the 1920s of the so-called *Wetter Flugstellen* ('Met Flight Stations') abbreviating to *WeFlugSt*. These were pioneering attempts by university departments and state weather services to use small aircraft for daily ascents through the lower atmosphere. These units also (neatly) circumvented the tight restrictions placed on Germany after World War I concerning military aviation. The daily ascents, often to quite high altitudes, led in 1935 to the first upper-air weather maps at 500 millibars (5500 metres or 18,000 feet) and in 1937 led to the discovery of a (yet to be named) 'jet stream' of 150 knots – although this was attributed at first to 'navigational errors'! Eight Met Flight Stations existed at the outbreak of war and they quickly became the nuclei for the Wekusta units.

"The Wekusta units expanded steadily in response to Germany's weather requirements on so many different military fronts from the Arctic through the Atlantic to the Mediterranean and east towards Russia. At the height of the war, there were about twelve Wekusta 'squadrons' totalling several

[1] THUM = **T**emperature and **Hum**idity monitoring.

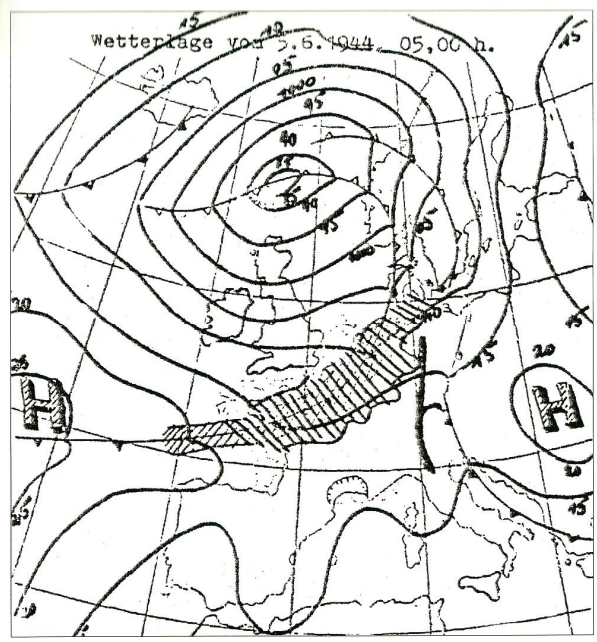
hundred aircraft and over 1000 flight crew! This far exceeded the similar meteorological reconnaissance (met recce) resources of the British and Allied forces. In common with the Allied met recce flights, the Wekusta suffered from the hazards of making long-duration flights (up to 18 hours) often over exposed maritime routes. Over 50% of Wekusta aircraft and crews were lost. Many of the losses were attributed to mechanical failures, fuel shortages, navigation errors and, of course, bad weather. Some losses may have been due to encounters with Allied aircraft. However, after the Allies gained access to the secret *Zenit* weather codes used by the Wekusta, the RAF were more likely to let the German met recce flights pass unhindered because the Allies could later gain access to these Wekusta reports to enhance their own Allied observations and analyses.



A Wekusta cartoon depicting a meteorological observer in a spin with his instruments, notebook and charts!

"The Wekusta also assisted in the deployment of pioneering Automatic Weather Stations (AWSs) for use on land and meteorological buoys at sea. The one-ton AWS units, using long-range radio transmissions, were installed in several Arctic locations by daring Wekusta flights which also assisted in setting up a few manned weather stations, also in the Arctic. German submarines also deployed AWS units in Labrador and Greenland.

"Thus, Germany benefitted from a substantial and quite sophisticated source of meteorological information for much of the early part of the war, and in turn this could be utilized in professional researches."



German Meteorological Service synoptic weather chart, 05:00h, 5 June 1944, the day before D-Day.

The next speaker was **Malcolm Walker**, who called his talk 'Continuity: a summary of things we didn't have time to talk about in detail today!'. In this, he spoke about uses of aircraft by the Met Office in the late 1940s and early 1950s and also about the work of Herbert Riehl in shedding light on the global importance of the Intertropical Convergence Zone (ITCZ). He listed investigations carried out by the Met Office during the period in question (fog prediction, the dynamics and physical structure of depressions, ice accretion on aircraft, clear-air turbulence at heights above about 6km, the temperature and humidity structure of the upper troposphere and lower stratosphere, and the internal structure of towering cumulonimbus clouds, with particular reference to lightning, strong upcurrents, hail, and severe turbulence). He also showed a photograph which had appeared in the issue of *Flight* published on 29 June 1950, showing postcards by the hundred being scattered over London from an MRF Halifax flying at 15,000 feet. As it was put in the picture's caption: "The Meteorological Office hopes to compile information on turbulence in the upper atmosphere from the fall of the cards, on which members of the public are asked to write certain details before returning them". When focusing upon the work of Riehl,

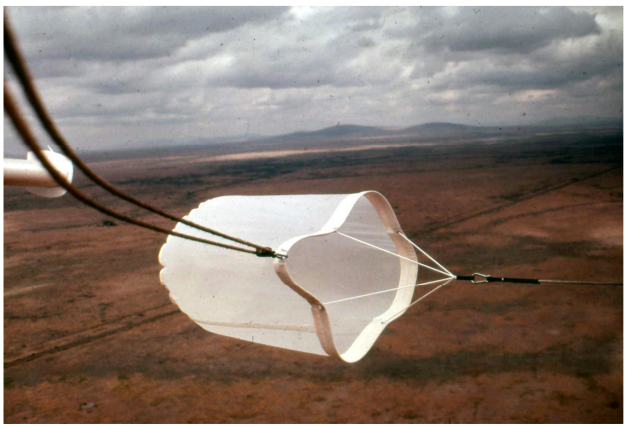
Malcolm talked about flights by Riehl and others into Atlantic hurricanes and Pacific typhoons from 1944 onwards and about Riehl's pioneering studies of the ITCZ and trade-wind zones, which shed much light on the maintenance of the general circulation of the atmosphere.

The focus on the tropics and sub-tropics continued with a talk by **David Pedgley** on 'Winds, waves and manta rays', in which he described how, in February 1964, during a six-month secondment from the Met Office, he had been given the opportunity to examine the structure and behaviour of a large-scale topographic distortion of the wind field. The Red Sea, he explained, between latitudes 10 and 25 degrees, lies in a 2-3 km deep trench between the plateaux of Arabia and Ethiopia. Instead of the expected north-east trades, surface winds blow dominantly from either NNW or SSE, usually with a convergence zone between them – the Red Sea Convergence Zone. Using a light aircraft fitted with a strut psychrometer, and based on the Ethiopian plateau, the vertical structure of the wind field was measured on many days. Together with pilot balloon wind soundings from a temporary station set up within the trench, as well as synoptic data from both routine stations and a few volunteers, it was possible to monitor the day-to-day changes in position of the convergence zone and its related cloud structure. It was clear that David had an exciting time, not least when he was flying at a height of 50 feet above the sea and spotted manta rays in the water below.

Local children assist David Pedgley!

David's talk was followed by another on winds over Africa, this one by **Margaret Haggis** entitled ' Bug hunting and wind finding with a spray plane', in which she described the use of a spray aircraft fitted with insect nets and Doppler navigation equipment to search for zones of wind convergence, particularly the ITCZ. Here are the words of her talk's synopsis.

"A single engine Pilatus-Porter spray aircraft was fitted with Doppler navigation equipment to enable wind finding. Wet-bulb and dry-bulb temperatures were measured with a strut psychrometer, and a net was towed during flights to sample airborne insects. The first field trials in Kenya in May-July 1970 were conducted by Reg Rainey from the Anti-Locust Research Centre and John Findlater of the MRF. The wind finding was very successful: John identified the low-level East Africa Jet, and on two occasions Reg found the African Rift Convergence Zone. Together they measured the anabatic flow around the isolated massifs of Kilimanjaro and Mount Kenya, with ground observations at the same height on Mount Kenya. The insect nets were unsatisfactory, but did show a larger catch when flown through an area where there was a reversal in wind directions than in uniform winds, on the same sortie.



Margaret Haggis's insect net in Kenya

"These successes led to Reg, with assistance from me of the Anti-Locust Research Centre, doing further work with the same aircraft in September-November 1970 in Sudan. Here the target was the ITCZ, which we traversed on many occasions during its seasonal southward shuffle over the area of the Gezira Irrigation Scheme, where Vernon Joyce, Director of Ciba-Geigy's Agricultural Aviation Research Unit, was engaged in spray trials against cotton pests. With manual recording in the cockpit and an observer/net operator in the back, we developed a system for in-flight wind computation so that, once we had identified the main discontinuity (ITD) between the dry trade wind and the very humid monsoon, we could change course to make multiple crossings of it. Thus we could estimate its orientation and the rate of

convergence within the area of our closed pattern. On a very brief visit to Tokar and Port Sudan we also traversed the Red Sea Convergence Zone.

"Vernon invited us to do similar work in subsequent years, again in the Sudan Gezira. In 1971, many of the research flights were after sunset to coincide with the period of maximum insect activity. With a much improved insect net, we caught increased numbers of insects in the immediate area of the ITD and grasshoppers up to 3000 feet above ground after dark, guided into the layer by radar."

The next speaker was **Stan Cornford**, whose talk was called 'A versatile 1960s trio: MRF's Canberra, Hastings and Varsity'. He explained that, from the Arctic and Iceland to Malaysia and the South China Sea, aircraft of the MRF made observations to support research which could be made only through the use of aircraft. Despite many complications, he said, the skills, dedication and perseverance of RAF aircrew, Met Office scientists and RAE engineers enabled the MRF to gather cloud-physics, cloud-structure, chemical-composition and turbulence data from Iceland and northern Norway to Singapore, sometimes on behalf of colleagues in the Royal Aircraft Establishment, the Rothamsted Experimental Station, and the UK Atomic Energy Authority (Harwell). Since the MRF had too few scientists to use many of its data, this laid the trail for today's Facility for Airborne Atmospheric Measurements. Chance rescue of TSR2's inertial navigation system made better measurements of turbulence possible. As regards the complications, Stan explained that aircraft pitched, rolled and yawed as they moved through the air. Accordingly, even finding somewhere on a plane where the air pressure was about that of the ambient air was an art. This, the ambient air temperature and the pressure of the air compacted at the pitot head were needed to deduce, accurately, the aircraft's speed through the air. But the thermometer, too, measured the temperature of air compacted by the aircraft's motion. Solutions for these problems, and equipment for measuring other quantities, had been evolved earlier. Accurate measurements of temperature in cloud became possible only in the mid-1960s, using a radiation thermometer.

In the course of his talk, Stan mentioned the loss of the MRF Canberra WS582 in St Andrew's Bay off Leuchars in February 1962 and suggested that Allen Lock be invited to give the meeting his personal experiences of being a member of the crew of that aircraft before, during and after the crash. Allen duly

*Allen Lock in MRF Hastings **TG618***
with millisecond timer on left

obliged and has written up his experiences for this newsletter (see pages 8 and 9). Stan also suggested that David Axford be invited to talk briefly about the inertial navigation system and Canberra WE173, the aircraft that replaced WS582. David also obliged.

MRF Canberra WE173

Before Allen and David stepped forward, however, there was another presentation by **Brian Booth**, this one a short talk about a serendipitously-discovered paper written by the UK's finest ever synoptic weather forecaster, C.K.M.Douglas. Brian's talk was not about forecasting, though. It was about the first confirmed instance of temperature measurements being made aloft from a British aeroplane – made by Douglas on 28 November 1915. See Brian's article in this newsletter (pages 15-17).

A most enjoyable day ended all too soon. We now look forward to the third and final meeting on the use of aircraft in meteorology, to be held at the University of Reading on Saturday 19 October 2013 (see page 31 of this newsletter).

FARNBOROUGH, 29 SEPTEMBER 2012

***Left**: The main speakers.*
From left to right: David Pedgley, Brian Booth, Stan Cornford, Margaret Haggis, Alan Heasman, Peter Rackliff, Malcolm Walker.

***Below left:** The MRF reunion.*
From left to right: Peter Cockrell, Brian Butler, Mike Philips, Mike Jackson, Stan Cornford, Kirsty McBeath, Allen Lock, Geoff Day, Gordon Bridge, Gordon Durbin, David Axford, Geoff Jenkins, Gordon White.

***Left**: The MRF reunion toast*

***Left**: Some of the photographs on display.*
***Above:** Gordon Durbin with two photographs of great personal interest.*

THE CRASH OF METEOROLOGICAL RESEARCH FLIGHT CANBERRA WJ582: A PERSONAL EXPERIENCE
by Allen Lock

When I joined the Meteorological Research Flight (MRF) in March 1959, I was assistant to the late Bill Roach, and most of my flying with the MRF was in the Canberra. Up to the time of the crash, I had flown 190 times in WJ582, both in the UK and on overseas deployments. As a matter of interest, Canberra WJ582 was one of a hundred B2 Canberras built by Handley Page at Radlett under contract to English Electric.

We had been deployed to RAF Leuchars to give a greater range to fly as far north as possible for sampling purposes. The project was, if I can remember after all these years, 'Stratospheric Warming'. From my Flying Log Book, the first deployment took place on 10 January 1962, and we had already completed numerous flights. Brian Butler was the other Met Observer on the project and we took it in turns to fly up to RAF Leuchars on a weekly basis.

On 21 February 1962, with myself, Flying Officer Herbie Marshall as the Pilot and Flight Lieutenant Don Gannon DFC AFC as the Navigator, and with a Call Sign of Nugget 72, we took off from RAF Leuchars at 10:15 hours and headed north. Our turning point was to be at least 70°N if conditions allowed, and we climbed to our operating altitude of 48,000 feet. I commenced taking the usual readings of temperature and frost point, wind, and ozone, as well as ensuring the various cameras and samplers were working correctly. The readings were taken every five minutes, so it was quite intense work since the complete set of readings took over three minutes to complete. I think all the ex Canberra Observers will remember just how cold it got in the cockpit, with a lot of the heating going into the bomb bay to keep the scientific equipment frost free. The crew just had to wrap up!

The outward flight went well and, after starting to let down to land at RAF Leuchars on our return, we were told that the weather was closing in. Herbie Marshall requested a GCA (ground-controlled approach). Now the approach to RAF Leuchars is over the sea and, for some unknown reason, was always a long downwind leg; we used to turn at Bell Rock Lighthouse. I had been flying with both Don and Herbie for several years and the usual practice for us was, if we needed help on landing, for me to

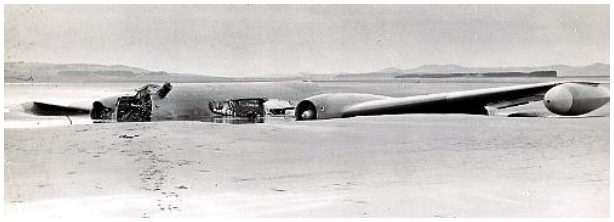
A Canberra

climb out of my ejection seat and sit beside the pilot on the rumble seat looking for the runway, leaving Herbie to concentrate on the flying side.

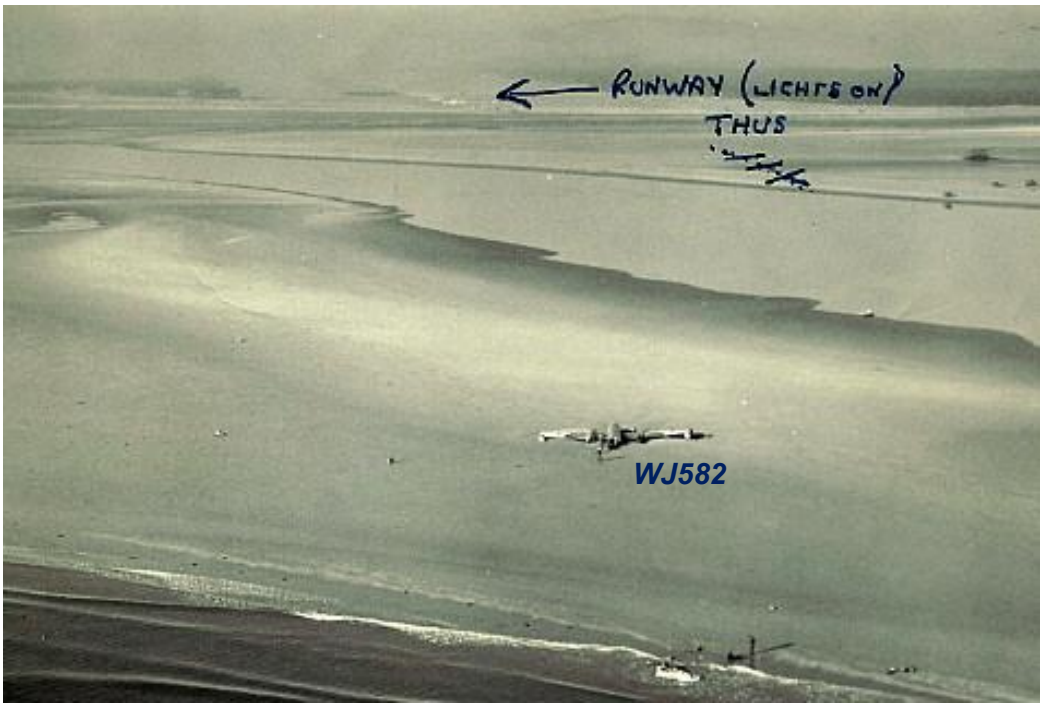
Over the intercom came the usual words on the glide path and on the centre line. Our first attempt was unsuccessful, since we broke cloud at 200 feet and way past the runway intersection. So, we climbed out again to start our second attempt. Don Gannon, our Navigator, was busy working out if we had enough fuel to fly to another airfield, because, by this time, we had been flying for nearly four hours and were very near our limit of endurance. Our actual flight time to point of impact was four hours and ten minutes.

Again over the intercom came words on the glide path and the centre line, and we continued heading into RAF Leuchars. Suddenly, we broke cloud over the sea, with no sign of the airfield in sight. Realising we were heading straight for the sea, I yelled to Herbie to pull up. Although we were doing 200 knots plus we could not climb fast enough. Herbie did manage to level out but the tail hit the water and broke off. The next thing I knew was that we were heading straight for the sea again. We hit the sea and at this point tried to turn the Canrberra into a submarine – it did not work. We hit the bottom; I was told later that the depth was about 40 feet.

At this stage, Herbie's ejection seat went off, whether by impact or blindly being pulled I don't know. Anyway, being so close to Herbie , only inches away in fact, I went out with him. I either got caught in his seat or sucked out. I don't know. It all happened so fast. I did manage to activate my Maewest with difficulty, since as well as damaging my leg and neck I also broke my right arm, which I needed to pull the toggle with. So all those wet



WJ582 after the crash



Aerial view, showing the crashed aircraft and, in the distance, the runway of RAF Leuchars.

dinghy training exercises carried out in the Command Baths in Aldershot and in the sea off Newhaven paid off and I somehow pulled the toggle.

Don the Navigator was found clinging to the wreckage, and Herbie, who by this time had inflated his dinghy, had managed to get close to myself and Don. Although we had survival suits on, mine was torn, but it did give us some protection. It was February, remember, and the sea temperature was quite low.

Two helicopters from 228 Squadron at Leuchars were scrambled and came to our rescue, plus the lifeboat from Broughty Ferry, which was launched but not needed. How long we were in the water I can't remember, but it must have been about thirty minutes before we were being winched up and flown to Bridge of Earn Hospital near Perth.

Luckily for me, I was the first to be rescued, being the most seriously injured. Don had broken feet when wreckage hit him as the cockpit broke up. Herbie was found to be half an inch shorter for a while due to compression from the seat going off and the weight of water above him, which was not surprising because you go out at about 88 feet a second. Our point of impact was about a mile from the runway touchdown point.

I spent the next six months in bed in Bridge of Earn Hospital before being transferred to RAF Headley Court in the August and stayed there as a patient until June 1963 for further treatment and rehabilitation before returning to the MRF at Farnborough. But there was to be no more flying for me, much to my regret.

Having started observing weather from the air in Sunderland flying boats as a Met Observer whilst serving in the RAF at RAF Calshot in 1951, I suppose you could say I started at sea and finished at sea!

The wrecked Canberra

NETWORKING, MEDICI SYLE
by Anita McConnell

Founding the network

The first network of meteorological observations, organized on what we would now consider scientific lines, was established in 1654 by two former pupils of Galileo, the Grand Duke Ferdinand II de' Medici and his brother Prince Leopold. Ferdinand founded the Accademia del cimento (Cimento Academy), active between 1657 and 1667 to study the new science based on direct observations. The brothers' belief, that Nature could be known by direct instrumental observations, was directly in opposition to the Church, which claimed that Nature had been written by God in numbers and mathematical terms, and that everything could be read in the Bible. The network was created to discover the main climatic features of certain localities and, rather optimistically, to find how the temperature differed in various countries, on the plains and the mountains, in middle and higher latitudes, and to answer such questions as whether ice always melted at the same temperature, disregarding geographical or height differences, how the density of liquids changed with temperature, and how air temperature differed between sunshine and shade.

The great value of this network and its reliable observations, recorded on documents which have recently been recovered from archives damaged in the Florence floods and elsewhere, coincide with the Little Maunder Minimum (1645-1715), in the middle of the Little Ice Age. For this reason, the readings have been subjected to intensive correction and correlation and have proved of considerable interest to historians of past climate.

Instruments at the time

The Medici network observations were made some years after the early development of the air thermometer, or thermoscope, in 1612 and constitute the earliest set of instrumental readings in the world. The so-called Little Florentine Thermometer was invented in 1641 or earlier. This was a spirit-in-glass thermometer with a sealed tube, the first instrument able to supply precise quantitative temperature readings after the invention of the thermoscope. The scale was made visible with tiny black, and larger white glass beads directly welded on the glass tube and was available with 50, 80 and 100 graduations. (Figure 1.) In practice, the instrument was very resistant outdoors, no matter the weather, being unaffected by dampness, rain, sunshine or frost. The instruments available to the Medici network were made with 50 graduations in the tube. They were manufactured by Giuseppe Mariani, the Duke's highly skilled glass-blower, and shown to be truly comparable. In subsequent centuries investigations were made to relate the graduations to Réamur, and latterly Celsius scales.

Figure 1: Little Florentine thermometers, with 50 graduations. Displayed at the Museo Galileo, Florence.

The barometer used by Viviani and Borelli in 1657–1658 was very simple and consisted of a glass tube, hermetically sealed at the top, filled with mercury and immersed into a vase with mercury. The scale had arbitrary units (AU), attached to an arbitrary level. Readings ranged from 6 to 29 AU, and the average level was 19.42 AU. (Figure 2)

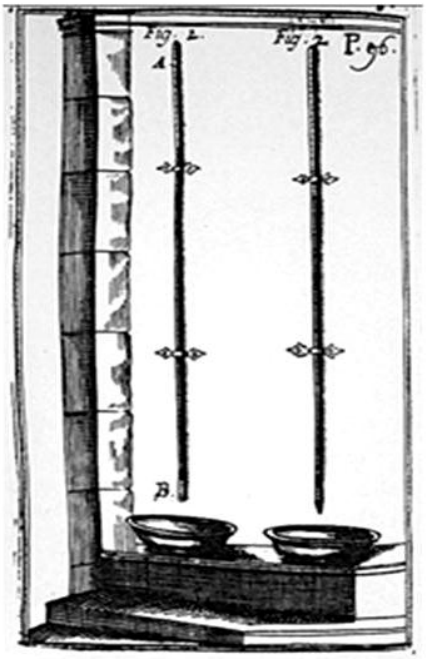


Figure 2: Medici barometers with graduated scale.

Early barometers were affected by three key problems: the zero level indicated by the scale often differed from the zero level in the cistern; the section of the tube was large in comparison with that of the cistern; and capillarity affected readings, especially in thin tubes. The errors were quite large, making the intercomparison of data and assessments of the required corrections difficult. Barometers with a thin tube had a lower error, but the thinner the tube, the greater the capillarity forces which cause an underestimate of the reading.

Several kinds of barometers were then invented, each one with known or unknown problems concerning the scale, the floating zero level, the friction between mercury and glass, the readability of the meniscus and many others. However, the instrument was not the only problem: observers had a number of variables to face, including room temperature, height above mean sea level and gravity. The observers were unable to make the necessary corrections in the early period. Fortunately, these corrections can be done today (provided enough ancillary information was recorded or we can make some assumptions), which improve the quality of the observations.

In 1639 the hydraulic engineer Benedetto Castelli invented a rain-gauge and wrote to Galileo about it, but it is not known if news of this apparatus reached the Accademia. They did however know of the condensation hygrometer devised by Duke Ferdinando in 1655. Hygrometer, and of the twisted gut and oat-beard hygrometers, which were already being described in the literature.

Observing stations

The 'Rete Medici' was based on eleven stations. Florence was the main station, under the strict control of the Grand Duke. Observations were taken at the Pitti Palace, the Boboli Gardens and in the Convent of St. Mary of Angels in the city centre. The second main station, also very accurate, was located in the Benedictine Convent of Vallombrosa, 1000 metres above sea level in the hills above Florence. These stations exposed thermometers to north and south. Up to eight readings a day were taken. The network was organized and led by the Jesuit Luigi Antinori and the observers at Florence and Vallombrosa were Camaldolense Benedictines. The other stations, operated by Jesuits, were Pisa, Cutigliano (50 km northwest of Florence), Bologna, Parma, Milan, Innsbruck, Osnabruck (in Lower Saxony), Warsaw and Paris. These stations were short-lived at the time and mostly concerned with recording seasonal extremes and thus to know the basic temperature, or as we might say – climate – of the region. Ideally, from five to eight readings were taken each day, at Italian canonical hours which started at twilight, and thus varied throughout the year. It is possible that we have only a portion of their records.

Pisa was the only station that measured atmospheric pressure, observed by Viviani and Borelli for the period November 1657 – May 1658. These were the very first regular pressure readings in Europe. Readings were generally taken three to four times a day and have been used to recognize the feature of the 1657/58 winter.

Paris needs a further comment. The Polish queen Marie Louise Gonzaga de Nevers was in touch with Duke Ferdinando and joined the network with the station in Warsaw that had been operative since 1655. In 1657, she sent the physicist Tito Livio Burattini to Duke Ferdinando, and he returned with a little Florentine thermometer as a gift. One of these thermometers was given to the astronomer Ismaël Boulliau to use in Paris. Although a latecomer, Paris was formally part of the network and Boulliau made observations from 25 May 1658 to 19 September 1660 in rue des Poitevins at the hôtel de Thou, which later became the headquarters of the Sociétés Savantes. These observations were reported in some tables with the comment: "readings made in Paris, year 1658, with a Florentine Thermometer", while readings made with a mercury thermometer having the same shape and dimension as the Florentine thermometer can be found in another column of the logs. Readings in all stations were daily collected in a form with all the weather and sky observations of the same day, and sent daily, or weekly, depending on the distance, to the Grand Duke. A copy of the readings was kept at the stations. This practice of sending a duplicate saved several of the readings that reached us. All the stations used two Florentines sent by Antinori on behalf of the Grand Duke, as we know from the correspondence between the observer Antonio Terillo and Antinori.

The Medici Network was officially closed in 1667 for political reasons, being considered too close to Galileo's dangerous ideas that preferred instrumental observations to the Bible when interpreting Nature. Only the Convent of Angels, particularly close to the Grand Duke, and Vallombrosa continued to operate after the official closure of the Network. Regular observations were

made there till 1670, when the Grand Duke died. Although philosophers continued their interest in the physical conditions of the atmosphere, fifty years elapsed before the next serious observations in Tuscany.

Restoring the observations

Although readings for later years were known, data for the earliest period, 1654–1670 was dispersed or lost. The catastrophic flood of the Arno River that invaded Florence on 3rd-4th November 1966 affected libraries and archives where original logs and related documents were known to be preserved. It took many years to restore the documents and organize public access to them. Subsequently exhaustive searches have been made for the original data and metadata, in public and private archives, libraries, research institutions and museums of science potentially interested in preserving documents concerning Galileo and the scientific activity in Tuscany in the sixteenth and seventeenth centuries. In the remote possibility that the documents were improperly catalogued and not easily identifiable, original logs were also sought in the archives and headquarters of religious orders that had been in charge of observations. In this way, investigators have gained access to most originals either on paper or as digital reproduction. With many original readings recovered, work is under way to transform these earliest temperature observations into modern units of date, time and temperature in °C.

Sources

The author has drawn on the following sources and acknowledges her debt to the authors of those mentioned. Full texts are available on line, except for *Meteorologica pratica*, which is held at the National Library of Scotland.

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TABLE 1 STATIONS ACTIVE IN THE MEDICI NETWORK

LOCATION	LAT (E)	LONG (N)	ALTITUDE (m)	PERIOD	OBSERVER
Florence	43°47'	11°15'	50	15-12-1654 31-03-1670	Unknown
Vallombrosa	43°44'	11°34'	980	01-01-1656 31-05-1670	P. Paceschi F. Casini N. Signorini
Pisa	43°43'	10°24'	4	26-11-1657 08-05-1658	A. Borelli V. Viviani
Cutigliano	44°06'	10°45'	678	06-03-1658 31-03-1659	Unknown
Bologna	44°29'	11°20'	54	01-12-1654 31-03-1656	G.B. Riccioli
Parma	44°48'	10°20'	57	23-12-1654 31-12-1660	A. Terillo
Milan	45°27'	9°11'	137	17-02-1655 30-04-1656	G. del Re
Innsbruck	47°16'	11°23'	574	06-03-1655 30-04-1655	Unknown
Warsaw	52°13'	21°00'	97	10-05-1655 16-05-1655	Unknown
Osnabruck	52°17'	8°03'	63	Readings lost	Unknown
Paris	48°51'	2°20'	33	05-1658 09-1660	I. Bouillau

ATMOSPHERES
Investigating the weather from Aristotle to ozone

This is the title of an exhibition in the **Museum of the History of Science in Oxford**. The exhibition has been mounted in collaboration with the University of Oxford's Department of Atmospheric, Oceanic and Planetary Physics and the University's School of Geography and the Environment.
It will run until 7 April 2013.

In the words of the Museum's website:

This exhibition focuses not on weather events themselves – the sunshine, wind, clouds and rain of daily experience – but on how these events have been investigated. Meteorology's long history has resulted in a huge range of devices for measurement and prediction. These instruments and observations provided the historical foundation for the intense current concern with global climate.

'Atmospheres' draws on the Museum's collection, featuring many objects never previously displayed. It also includes material preserved in the University's science departments, providing Oxford examples of the broader development of meteorology from ancient origins to modern space science.

History Group member Alan Hughes has visited the exhibition. Here is his report.

I recommend a visit to this exhibition in the Museum of the History of Science in central Oxford (details below). Located in the Old Ashmolean, built in 1683, the museum is the world's oldest surviving purpose-built museum. On the way to the basement housing the current exhibition one can easily imagine natural philosophers there with their retorts and their candles.

The way to the basement is past two ancient clock mechanisms, a large reflecting telescope with a focal length of 12 feet, and a wall-hung meridian that was originally part of the Radcliffe Observatory. Through the doorway (headed 'Officina Chemica') we reach a succession of display cases and panels. In the first is a copy of a fourteenth-century commentary on Aristotle's *Meteorologica*, followed by a two portable German sundials of 1557 and 1678 having a length of string as the gnomon and two little weathervanes.

Other exhibits include a typhoon barometer from a Dutch ship that plied between Amsterdam and the East Indies, with a needle showing the distance to the predicted typhoon; manuscript rainfall records made at the Radcliffe Observatory in 1773 (these are still continued, making them the longest for the UK for one site); some of the handwritten weather records made by Dr John Lee at Hartwell House, for the month of October 1850 (the Royal Meteorological Society grew out of a meeting hosted by Dr Lee at Hartwell on 3 April that year); a barometer and weather glass that belonged to Captain (later Admiral) Fitzroy; a radiosonde that fell on to the roof of the museum in 1976; a radiometer designed by Sir John Houghton; and a photograph of the delegates attending a conference on atmospheric physics inOxford in 1934. Among the people in the photograph are R.Ladenburg, F.J.W.Whipple (after whom Cambridge's history of science museum is named), A.R.Meetham, and F.A.Lindemann (all the seven women are in the front row). There is also a spectrograph designed and built by Gordon Dobson.

The exhibition ends with some spacecraft observations of both other planets' atmospheres and the earth's atmosphere.

It took me about an hour to go round, but one could easily do it in half an hour.

The Museum is open, free of charge, from:
12 noon to 5.00pm on Tuesdays, Wednesdays, Thursdays and Fridays;
10.00am to 5.00pm on Saturdays;
2.00 to 5.00pm on Sundays.
It is not open on Mondays.

The Museum of the History of Science is in Broad Street, Oxford, OX1 3AZ. Do not plan to park nearby: there is a very good park-and-ride service; phone 01865 277280; website http://www.mhs.ox.ac.uk/events/.

ALL AT SEA … ANOTHER UNSUNG HERO OF METEOROLOGY by Alan Heasman

Charles Edward (Eddie) Nowell Frankcom was born in Wraxall, Wiltshire on 12 July 1903. Despite being born far from the sea, 'Eddie' was destined to follow a similar career path as his illustrious predecessor, Vice Admiral Robert FitzRoy with a thorough grounding in seamanship followed by a significant contribution to marine meteorology.

Initially, Eddie trained in the Royal Navy aboard HMSs *Conway* and *Argus* (an early aircraft carrier) between 1918 and 1920. In 1921, he moved to the merchant shipping fleet and an apprenticeship with the Royal Mail Line, gaining his Second Mate's Certificate by 1924 and progressing to junior officer serving in cargo and passenger ships. By 1930, he had his Extra Master's Certificate, moved to Bristol City Lines as a Chief Officer and by 1931 was master of the 2000 ton coal-fired steamship *New York City* sailing between Bristol, New York and Buenos Aires. By 1936, as the prospects of war loomed, he was called for Royal Naval Reserve (RNR) training – in submarines.

From 1936 to 1939, he worked at the Board of Trade (as Robert FitzRoy had done from 1854 to 1865) as a Nautical Surveyor and later as Examiner of Masters and Mates in London. Early in 1939, he successfully applied to the Meteorological Office and became the Marine Superintendent in charge of the quite small department which had been established by FitzRoy in 1855 as the embryo Meteorological Office.

By 1939, marine meteorology was in many ways subservient to the rapid expansion of aviation meteorology since the First World War, but the gathering of ship-borne weather and other marine observations was still crucial to marine climatology as well as providing scattered but vital synoptic observations. Eddie was quickly plunged into organizing the supply of worldwide marine climatological charts for the Royal Navy to meet wartime requirements. However, by late 1939 his RNR obligations resulted in him re-joining the Navy in which he had distinguished service in Home Waters (for which he was awarded the OBE) and in the Mediterranean including the landings in Sicily and Anzio.

In late 1945, Commander Frankcom as he was by then, returned to duty as Marine Superintendent. He faced two daunting tasks.

First, he had to re-establish the traditional role of the UK merchant 'Voluntary Observing Fleet' (VOF), as established by FitzRoy, for gathering meteorological data at sea. The VOF had been decimated by the war. Eddie quickly re-established contacts and agreements with remnant UK shipping companies and somehow in the time of post-war shortages, supplied them with appropriate observing equipment etc. The re-establishment of observing fleets was not confined to the UK. It was an international requirement. As Marine Superintendent, 'Eddie' was a member of the Commission for Maritime Meteorology (CMM), part of the World Meteorological Organization (WMO), and he rapidly found himself as President of the CMM from 1946 until 1956! His leadership as President quickly helped to re-establish international co-operation in the observing fleets.

His second key task in 1946 was to help establish the North Atlantic Ocean Observing System. This was an agreement between several countries with meteorological interests in the North Atlantic to establish a network of specially designated 'Ocean Weather Ships' (OWS) to provide regular and detailed weather observations for synoptic purposes at near-fixed locations scattered across the North Atlantic.

As well as carrying out synoptic observations, the OWS would make regular upper-air soundings by radio-sonde and would also make surface and deep sea measurements. In addition, they would act as navigation beacons for transatlantic aircraft and provide search and rescue facilities for shipping and aircraft. Eddie quickly acquired surplus 'Flower' class corvettes from the Royal Navy, had them converted to requirement and staffed by regular crew and 'volunteer' meteorologists. He negotiated with the other countries involved in the scheme which included the United States, France, the Netherlands and Norway to allocate the OWS 'stations' and the protocols required – all innovative decision making.

The first UK OWS was 'on station' by August 1947 – a remarkable achievement. Later, he oversaw their replacement with the improved 'Castle' class frigates during 1958 to 1960. As Marine Superintendent, he managed the UK OWS and the Marine Section of the Met Office until his retirement in 1969. By that time, improved radio beacon navigation and embryo satellite observations – and rising costs – were already sounding the end of the full OWS network.

In addition to his Marine Superintendent duties, Eddie served on and chaired several international committees concerned with safety at sea and the climatological hazards of the transport of cargoes (the early stages of ship routing). His reputation and leadership resulted in him becoming a Liveryman of the Honourable Company of Master Mariners, a Fellow of the Institute of Navigation, a member of the Challenger Society and a member of the Society for Underwater Technology – and a Freeman of the City of London! He wrote numerous articles on ocean observing networks, ocean currents and the weather routing of ships – much as FitzRoy had done exactly 100 years previously. In addition, he was a leading light in the social life of the Met Office, especially in sport and amateur dramatics, both at its Harrow location and later at Bracknell.

When I was recruited to the Met Office as a Scientific Assistant in late 1963, my first job was in the Marine Section, then abbreviated to MO1. Prior to my first meeting with Cmdr Frankcom, friendly colleagues briefed me about the importance of MO1 as the embryo Met Office and advised me not to show too much interest in acting in case the boss 'press ganged' me into 'The Meteors', the Met Office Amateur Dramatics society ! When I did meet Cmdr. Frankcom I was impressed. Even then, at age 60, he was a tall, upright and imposing figure with thinning white hair, magnificent white 'mutton chop' sideburns (as befits an old 'sea captain') and a booming 'theatrical' voice! He dressed immaculately – even theatrically – a far cry from the old tweed jackets and corduroy trousers of the standard Met Office staff at that time. I well recall him heading for meetings in London dressed in a beautifully tailored grey suit, white shirt, red tie, a red rose in his lapel, bowler hat, kid gloves and a silver-topped walking cane!

'Eddie' Frankcom was regarded as one of the last of the age of 'gentleman sailors'. After retirement, he spent a few years in Malta before returning to Gillingham in Dorset. He died at the grand age of 96 on 17 August 1999. His pivotal role in marine meteorology and maritime safety was recognised by detailed obituaries in both *The Times* and *Daily Telegraph* newspapers.

His key legacy was undoubtedly the UK OWS network. This important part of the UK's history of meteorology will be acknowledged in greater detail during a planned meeting of the History Group in March 2014. Details will be announced later. If by chance you served in the OWS or have an interest in OWS and may wish to contribute to the meeting, then the History Group would be pleased to hear from you. Please contact Alan Heasman:
via e-mail alanj_heasman@btinternet.com
or telephone 01672 540818.

C.K.M.DOUGLAS AND EARLY METEOROLOGICAL RESEARCH USING AEROPLANES AS A PLATFORM FOR CARRYING INSTRUMENTS
by Brian Booth

The advent of the aeroplane at the beginning of the twentieth century provided meteorologists with a means of measuring upper air temperatures in real-time, rather than relying on the rather cumbersome kites or free-flying balloons that were the norm. Assmann in Germany is probably the man who first proposed aeroplanes could be used for meteorological purposes, which led to an Euler monoplane being fitted with a meteorograph for an ascent in 1913. In the event, the instrument proved insufficiently robust as engine vibration contaminated the temperature and pressure traces. Subsequent attempts were interrupted by World War I, and when Assmann died in 1918 little practical progress had been made.

In the United Kingdom, G.M.B.Dobson, working with the Experimental Flight of the Central Flying School at Upavon in 1915, quickly realised that the Dines balloon meteorograph was unsuitable for aeroplanes for the same reason as Assmann. This prompted him to develop his own instrument during the summer of 1916 – a barothermograph – in which the effects of vibration were all but eliminated. His prime interest at the time was in developing an instrument for use in determining aeroplane performance, but he drew the attention of the meteorological establishment to the barothermograph's potential for research.

Although a meteorological office was established at the Royal Aircraft Factory at South Farnborough in December 1913, no attempt appears to have been made to use aeroplanes as platforms for carrying instruments – this despite the fact that J.S.Dines, the meteorologist-in-charge, had a specific remit to explore the atmosphere. Similarly when Major G.I.Taylor, Royal Flying Corps (RFC), was given the same remit on appointment as Professor of Meteorology at the airfield in 1916, he also failed to see a way forward. He fell into the same trap as

others in trying to modify a meteorograph to record temperatures – with equally poor results.

Probably the main reason for this unsatisfactory state of affairs was to be that meteorologists had long been conditioned to record the mean state of the atmosphere and departures there-from, while giving little thought as to how real-time data could be utilised.

In the event, it fell not to a meteorologist but a young officer in the RFC to demonstrate just what could be achieved.

Charles Kenneth MacKinnon Douglas (Figure 1) had just completed the second year of a mathematics degree at Kings College, Cambridge, when he accepted a commission in the 13th Royal Scots, an infantry battalion, at the end of December 1914. Just six months later, in June 1915, he transferred to the RFC to start training as an observer with 15 Squadron at Dover.

Figure 1. C K M Douglas, circa 1920

There was no organized training syllabus for observers at the time and little opportunity to fly; indeed, the unit's rôle was to improve the rudimentary skills of its pilots, most of whom had only minimal flying experience on joining the squadron. At the end of October Douglas transferred to 18 Squadron, and by the third week in November was at Treizennes in France. He made his first sortie, a reconnaissance patrol, on 26 November.

Although not a meteorologist, Douglas had a passion for meteorology, but it was a passion unaffected by conventional ideas. He realised from the outset that aviation provided the means to observe the atmosphere, and in particular clouds, at close quarters. He used his opportunity to good effect and by August 1916 had completed his first paper, *Weather observation from an aeroplane* (published in the Journal of the Scottish Meteorological Society at the end of the year).

Thereafter, a stream of papers flowed from his pen, all based on his experiences during and immediately after the war. His early papers went straight to what he saw as the heart of the problem, not mean temperatures but how clouds and associated phenomena related to variations of temperature with height – lapse rates.

For all their uniqueness, Douglas's papers are frustrating for an historian, for he omits the important details as to when he started his records and how he measured temperatures and pressures. In one of his later papers he wrote that he had started observing clouds from aeroplanes in 1915, yet none of his published papers refer to this period.

The earliest date to which he refers is 31 March 1916, but an entry in his RFC Observer's log-book, referring to a sortie being abandoned due to '*heavy clouds and snow over the lines; temperature at 5000 ft 17ºF*' on the 6th March, shows he was using a thermometer earlier in the month.

However, an even earlier date can be found in an unpublished, undated and type-written paper, *Meteorological Notes,* in the Meteorological Office library. In what is undoubtedly a draft of his first published paper he refers to the temperature on the ground being the same as at 6000 feet at 7am on 29 November; although no year is given this is unquestionably 1915 (he'd returned to England in November 1916).

The date is actually in error as Douglas's log-book shows he did not fly on the 29th, but made two sorties lasting a total of nearly four hours on the 28th – two days after his first sortie in France. The aeroplane in which he made the flight was a Vickers Gunbus, No 2345 (Figure 2)[2]. In this pusher-engined biplane, Douglas, as the observer, sat in the cramped front cockpit of the nacelle, bereft of any fitted instruments.

[2] A replica of this aeroplane, built during 1965, performed at a number of displays between 1966 and 1968. It is now on display at the RAF Museum at Hendon.

Figure 2. Vickers Gunbus 2345, photographed at South Farnborough in September 1915. The gun mounting on which Douglas probably fitted his thermometer is clearly visible at the front.

In his first published paper, Douglas describes his thermometers as being fully exposed to the wind; consequently it is unlikely that '*thermometers*' refers to anything other than a mercury in glass thermometer. To be '*fully exposed to the wind*' implies the thermometer was fitted to the gun mounting, not only for ease of reference but from which it could be quickly removed when necessary.

Height readings were almost certainly obtained from a standard issue wristlet altimeter (Figure 3), although it is conceivable that Douglas acquired his own instrument for convenience, reliability and consistency.

Douglas returned home in the autumn of 1916 having been hospitalised by wounds received during a ferocious air combat with a German aircraft on 16 October. During the previous eleven months his research had been constrained not so much by inadequate instruments, but rather the poor performance of the flimsy and underpowered aeroplanes of the time. None of those in which he flew was capable of reaching altitudes above 10,000 ft, yet despite this limitation, and using the simplest of instruments, he achieved more in respect of a practical understanding of the atmosphere during 1916 than probably anyone else during the war. Perhaps this is even more remarkable considering he was not flying from a safe airfield in the United Kingdom, but on combat duty over the battlefields of France.

That he was carrying a thermometer during the sortie on the 28 November 1915 makes it the first recorded instance of a British aeroplane being used for meteorological research – albeit unofficially. It would not have been a spur-of-the-moment decision, and one can only speculate that he adopted the practice of carrying a thermometer during training flights, although accounts by others suggest opportunities for flights were limited and took place at relatively low level.

Figure 3: An example of a wristlet altimeter used by RFC pilots and observers; this version is graduated in 100s of feet to 10,000 feet.

METRICATION
by Norman Lynagh

I started work as an Assistant at Prestwick Airport in August 1961, i.e. just after the change to the use of Celsius. As pointed out in the article by Malcolm Walker in Newsletter 1, 2012, p.19, the Americans continued to use Fahrenheit for a long time after this. This caused something of a quandary at Prestwick (and, presumably, other Met Offices) where a so-called North Atlantic Chart was plotted every six hours.

This chart extended from western USSR across Europe and the North Atlantic and right across North America to the west coast and right up to the North Pole. The chart was a very large bit of paper and many observations had to be plotted on it, often with two assistants plotting simultaneously.

It was desirable that only one temperature scale was used on the chart and, although there were many more observations from North America and

American ships than there were from Europe and European ships, it was decided that all temperatures on this chart should be plotted in Celsius, as the conversion could be done 'on the fly' while the chart was being plotted. To this day, I can give the Fahrenheit equivalent of almost any Celsius temperature between -20 and +40 without thinking about it.

There was a similar, but more difficult, problem with upper-air charts. North Atlantic charts at 850mb, 700mb, 500mb, 300mb and 200mb were plotted every 12 hours. Europe, including the UK, reported heights in metres, while North America reported in feet. Because the number of observations from North America was much greater than from Europe, it was decided that these charts would be plotted using heights in feet. This was much more of a chore and was too complicated to do 'on the fly' while the charts were being plotted. The quickest method was to go through the teleprinter messages from the European sites as they came in, scribbling the heights in feet on them before plotting the information. We called this task 'de-metering'.

I was at Prestwick until the spring of 1963 and these conversions continued until at least then.

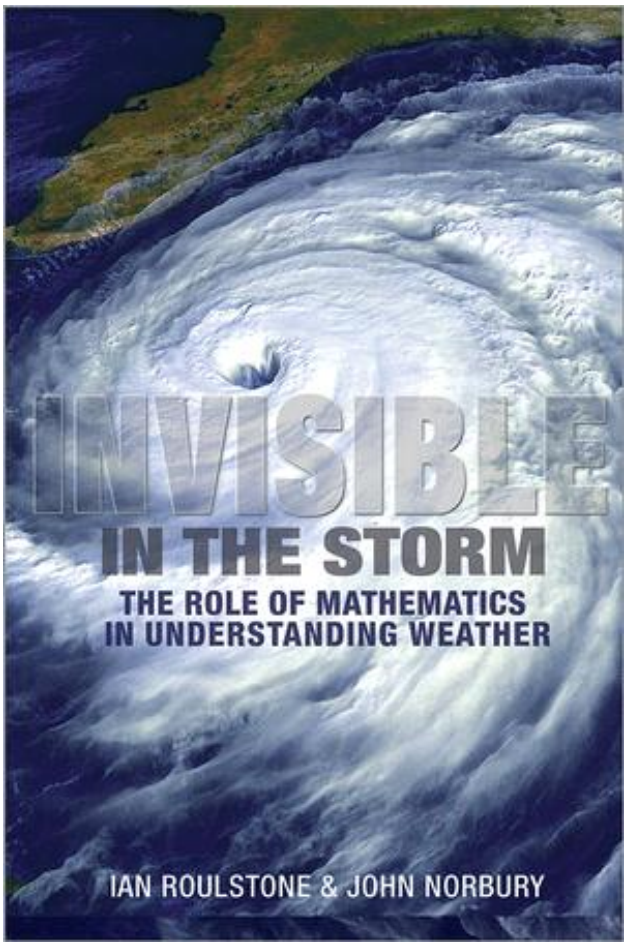
NEW BOOK

In the words of the blurb, *Invisible in the Storm* is the first book to recount the history, personalities, and ideas behind one of the greatest scientific successes of modern times – the use of mathematics in weather prediction. Although humans have tried to forecast weather for millennia, mathematical principles were used in meteorology only after the turn of the twentieth century. From the first proposal for using mathematics to predict weather, to the supercomputers that now process meteorological information gathered from satellites and weather stations, Ian Roulstone and John Norbury narrate the ground-breaking evolution of modern forecasting.

The authors begin with Vilhelm Bjerknes, a Norwegian physicist and meteorologist who in 1904 came up with a method now known as numerical weather prediction. Although his proposed calculations could not be implemented without computers, his early attempts, along with those of Lewis Fry Richardson, marked a turning point in atmospheric science. Roulstone and Norbury describe the discovery of chaos theory's butterfly effect, in which tiny variations in initial conditions produce large variations in the long-term behaviour of a system – dashing the hopes of perfect predictability for weather patterns. They explore how weather forecasters today formulate their ideas through state-of-the-art mathematics, taking into account limitations to predictability. Millions of variables – known, unknown, and approximate – as well as billions of calculations, are involved in every forecast, producing informative and fascinating modern computer simulations of the Earth system.

Accessible and timely, *Invisible in the Storm* explains the crucial role of mathematics in understanding the ever-changing weather.

Published by Princeton University Press, 2013
Cloth: £24.95. ISBN: 9780691152721



REVIEW OF EXHIBITION IN ITALY
by Anita McConnell

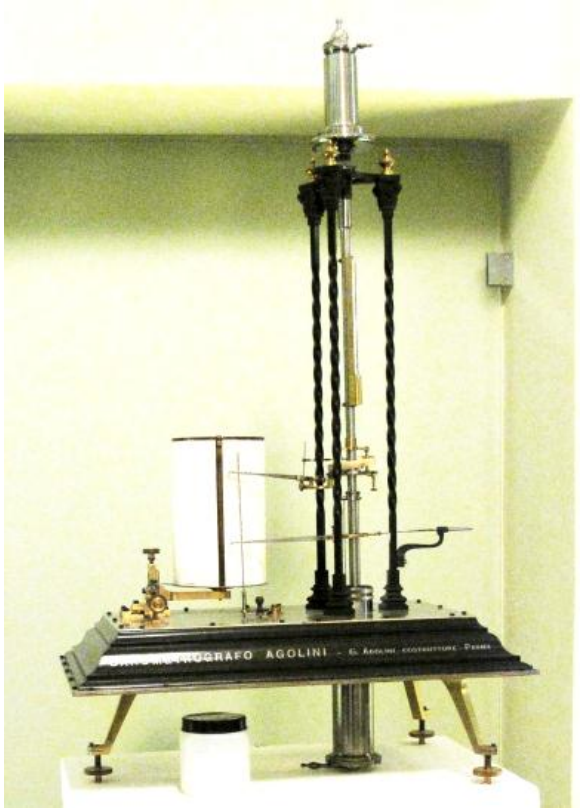
Dal Cielo alla Terra

Florence, Italy, 17 January to 31 May 2013.
Free admission

This exhibition is housed in the fifteenth century Palazzo Medici Riccardi and occupies the long carriage hall under the Palazzo, between via Cavour and via Ginori. It presents some eighty items – meteorological instruments and seismological apparatus of the late eighteenth, nineteenth and early twentieth centuries, including prototypes, locally-produced instruments, and those of standard Italian and European manufacture. These have come from various Italian observatories, plus one seismograph each from Barcelona and Coimbra. The information in the gallery is, at the time of opening, rather scanty, but it is intended to complete the videos which demonstrate the working of certain items. Seismographs are seldom seen on display in Britain, but Italians are familiar with earthquakes and volcanoes; school parties are among the visitors, and it is hoped can be informed by their teachers. Some items can be seen at www.dalcieloallaterra.it/

The meteorological instruments are mostly standard, as required for international comparison. My own favourite is the barometrograph by Giuseppe Agolini of Parma, who in 1912 constructed an elaborate recording mercury barometer and bimetallic thermometer whose design had eluded Christopher Wren and Robert Hooke. After satisfactory testing at Brera (Milan) Observatory, Agolini began producing instruments for other Italian observatories, but this production was cut short by the First World War when the factory switched to altimeters and other aircraft instruments. The description below is taken from the Catalogue of the Brera Astronomical Museum.

> The mercury barometer holds 18 kg of mercury, the column being immersed in a base comprising two parts, the upper of which can be isolated from the main tank. The base rests on three legs, with levelling screws. The tube has a cylinder at its upper end within which the free surface of the mercury column is located. A disc float resting on this transmits the height variations of the mercury column to the writing instrument by means of a rigid structure. A rod is fixed to the float and drops into the mercury column as far as the lower structure. Here the end of the rod connects with a cross to which three thin vertical mounts are attached outside the barometric tube. The upper part of these mounts emerges from the mercury and the arm of the lower writing needle is attached to them. The mount complex can only move vertically, as a collar is fixed to its upper part, fitted with small rollers. This rigid group is designed to avoid introducing resistances or errors in the indication of the mercury level due to thermal expansion.
>
> Temperatures are measured by means of a bimetal spring connected to the upper writing needle. The two needles write on paper mounted on a rotating cylinder driven by clockwork, to revolve once a week.



Agolini's 'barometrografo'

The oldest meteorological items have come from the nearby Osservatorio Ximeniano, a building within a complex granted to the Jesuits in 1554 and expanded by them to include a college. Here Leonardo Ximenes (1716-1786) arrived in 1748 to teach and to make astronomical observations. When the Jesuits were supressed in 1773, the college was passed to the Scolopian order, who also had an educational mission and a commitment to science. Ximenes was able to continue his work in astronomy, physics, and meteorology, and to be involved in the topographical surveys then in progress in Tuscany and elsewhere in Europe. At his death, he bequeathed his instruments to the Scolopians, to which later directors of the college added other apparatus, now on display, and a rotating dome housing a Newtonian telescope. The library has books and runs of journals dating from the seventeenth century, and a wealth of scientific

data gathered over the period between 1750 and 1850, when it was the most illustrious scientific institution in Florence. Nowadays, the upper floor of the building houses the department of urban climatology, and its instruments are set up on the roof terrace. The observatory is not open to the public but admission can be requested.

See http://89.97.253.238/home.php

Osservatorio Ximeniano, Florence

Barometers from the observatory

A WINTER'S TALE
retold by Alan Heasman

On 2 February 1799, a farmer's wife, Elizabeth Woodcock, was returning from market in Cambridge, England, to her home near the village of Impingham when she was caught in a severe snowstorm. She took shelter under a hedge but was soon entombed in a giant snowdrift and unable to dig herself out. There she was to remain for eight days! Apparently she could still hear the nearby church bells and so was able to keep track of time. She survived by drinking melted snow and eating the contents of her basket. Her tiny igloo remained relatively warm until a thaw began. Then water ran into her clothes and she became much colder. She attached her handkerchief to her stick and pushed it up through the drift but it was not spotted until the eighth day by a passing farmer. As a result of her ordeal, she lost all her toes and part of her feet. News of her miraculous survival reached far and wide and for a short while she became something of a national sensation. She received gifts intended to speed her recovery . This included much alcoholic drink and this may have led to her demise because she died the following July, 'depressed and enfeebled'. A poem was published about her and a memorial was erected on the site of her ordeal. The original stone is now in a local museum but a replacement stone still exists near to the original site. More details can be found at www.hisimp.net

There is no mention of whether her husband or others had searched for the poor woman! One wonders in this day and age and in similar circumstances whether her mobile phone could have been used from her frozen cave to summon assistance?

DEDICATION OF MEMORIALS TO METEOROLOGISTS KILLED WHILST ON DUTY DURING THE 20TH CENTURY
by Brian Booth

Most organizations maintain Rolls of Honour for the staff who made the ultimate sacrifice during the two World Wars. The Meteorological Office is no different, and its Roll of Honour remembers five men who died during World War I, together with 64 men and women who died during World War II.

Not remembered, unfortunately, are the names of six men who died whilst performing their duty during peacetime. Actually, that is not strictly true, as two, Maurice Giblett and Jack Flawn, were remembered, but their memorials were never replaced when the Met Office moved from Bracknell to Exeter. During the research into the lives of the men a further wartime casualty was discovered who should have been recorded on the Roll of Honour.

This sad omission was rectified on 27 September 2012, when the Dean of Exeter, watched by the families of the men, dedicated seven plaques to their memory in the Headquarters foyer of the Met Office. During the moving ceremony, a beautiful wreath was laid beneath the plaques.

Those now remembered are:

IN MEMORY OF
JAMES CHARLES LISTER
SCIENTIFIC ASSISTANT
AGE 19
SERVING HIS NATIONAL SERVICE AS AN
AIR METEOROLOGICAL OBSERVER
WITH 202 SQUADRON
WHO DIED IN AN AIRCRAFT ACCIDENT
ON ACHILL ISLAND
ON
16 JUNE 1950

IN MEMORY OF
MAURICE ALFRED GIBLETT
SUPERINDENDENT
OF THE
AIRSHIP SERVICES DIVISION
OF THE
METEOROLOGICAL OFFICE
AGE 36
WHO PERISHED IN THE DISASTER TO
H.M.AIRSHIP R.101
NEAR BEAUVAIS, FRANCE,
ON
5 OCTOBER 1930

IN MEMORY OF
STUART GORDON PURCHES
SCIENTIFIC ASSISTANT
AGE 19
SERVING HIS NATIONAL SERVICE AS AN
AIR METEOROLOGICAL OBSERVER
WITH 202 SQUADRON
WHO DIED IN AN AIRCRAFT ACCIDENT
NEAR THE ISLE OF BARRA
ON
29 DECEMBER 1950

IN MEMORY OF
GERALD WILLIAM WALKLATE
SCIENTIFIC ASSISTANT
AGE 20
SERVING HIS NATIONAL SERVICE AS AN
AIR METEOROLOGICAL OBSERVER
WITH 202 SQUADRON
WHO DIED IN AN AIRCRAFT ACCIDENT
NEAR THE ISLE OF BARRA
ON
29 DECEMBER 1950

IN MEMORY OF
JACK ALAN FLAWN
SENIOR SCIENTIFIC OFFICER
AGE 55
WHO DIED ON 8 DECEMBER 1977
FROM INJURIES RECEIVED THE PREVIOUS DAY
WHEN AN USAF U2 AEROPLANE
CRASHED INTO
THE METEOROLOGICAL OFFICE
AT RAF AKROTIRI

IN MEMORY OF
RAYMOND SYDNEY HEWER
SCIENTIFIC ASSISTANT
AGE 49
WHO WAS KILLED BY AN INTRUDER
WHILE WORKING ALONE
IN THE OBSERVING OFFICE
AT BIRMINGHAM AIRPORT
ON
7 MARCH 1982

IN MEMORY OF
WILLIAM DENNIS FLOWER
SERVING AS THE SUDAN GOVERNMENT
METEOROLOGIST
AGE 37
WHO DIED IN AN AIRCRAFT ACCIDENT
AT
EL FASHER, SUDAN
ON
16 SEPTEMBER 1942

It is hoped that the full biographies will appear on the Met Office website in due course.

THE BRITISH ANTARCTIC EXPEDITION (BAE) 1910-1913: THE METEOROLOGICAL LEGACY

by Alan Heasman

In Parts I through VIII of this series, I have endeavoured to summarize the progress of the BAE from the euphoria of the departure from the United Kingdom in June 1910 until the subdued departure from Cape Evans of the rump of the expedition on board their ship *Terra Nova* on 18 January 1913, all with the emphasis on the meteorology of the expedition. Even on the return voyage, the *Terra Nova* stopped off at two locations on the Victoria Land coast to retrieve geological specimens cached from earlier sledging journeys, thus continuing Scott's 'mission' to achieve a comprehensive scientific expedition as well as hoping to be the first to reach the South Pole. *Terra Nova* arrived off New Zealand on 10 February 1913 and the news was relayed ashore and onward by telegraph and radio to the world that Captain Robert Scott, Dr Edward Wilson, Henry 'Birdie' Bowers, Lawrence 'Soldier' Oates, and Edgar 'Taff' Evans had all died returning from the Pole. It was widely regarded as an 'appalling disaster' and resulted in nationwide mourning in the UK and elsewhere and was undoubtedly a tragedy at the personal level. However, the BAE had achieved remarkable scientific success in a variety of disciplines and widened geographical knowledge with the loss of just five men of a total of 33 who had taken part for some or all of the two years of the BAE often under extreme weather conditions in a hazardous environment with, by today's standards, the most basic of food, equipment, clothing and communications. It bears comparison to the twentieth century 'space race' which for all its 'success' was not without its share of close shaves and tragedy.

Terra Nova brought to New Zealand the remaining weather data collected in the 12 months since George Simpson, the chief meteorologist, had had to leave the Antarctic to return to meteorological duties in India. Most of this last year of data was collected at the HQ at Cape Evans but there were still a few sledging trips undertaken just before the polar winter of May to August 1912 and from October 1912 to early January 1913. It also carried the poignant weather diaries of the main Polar Party recovered from the tent where Scott and his companions' bodies were found. All these records were (by previous agreement) initially examined by the Australian Met service. Thereafter, the data were sent by late 1913 to George Simpson in Simla in India where he already had the data from the early part of the BAE. He was now faced with the daunting task of summarizing and analysing thousands of weather observations and associated measurements from the Cape Evans base camp, the secondary base at Cape Adare, from the main trek to the South Pole and also from the many sledging trips and exploratory journeys. His aim was to give some insight into the meteorology of this area of the Antarctic, the first part of the vast continent to be examined in detail. He had some help from two of the India meteorological service staff to 'work up' the data, but most of the work fell to George in his 'spare time' outside official duties. The task was further marginalised by the outbreak of World War I in August 1914.

His first results entitled 'Discussion' were completed by April 1916, but the war took priority in London and he received scant help with publication. Matters improved a bit by 1918 and eventually he was given permission to print the first volume in India, and it was published in 1919. Simpson stressed in the Preface that "the keynote of my work has been the physics and I have attempted to find the physical explanation of each of the meteorological phenomena observed". This he does in great detail through over 300 pages, liberally illustrated with diagrams and maps. In this, he benefitted greatly by an unplanned coincidence. For much of the period from early 1911 to early 1912, there were detailed and simultaneous observations being made at three static points on the borders of the Antarctic continent. These were at the BAE HQ at Cape Evans, the secondary base at Cape Adare and fortuitously at Amundsen's base camp ' Framheim' at the Bay of Whales, all hundreds of miles apart. These observations, supplemented by the irregular sledging observations, enabled Simpson to draw simple synoptic and climatological maps. These 'Weather Maps and Pressure Curves' are the main feature of the 140 pages of Simpson's second volume of results also published in 1919. These were to be the only substantial weather charts of the area until well after World War II when permanent scientific bases began to be established, especially at the time of the International Geophysical Year 1957-1958. Finally, in 1923, Simpson published his vast Volume 3 of 'Tables' of over 800 pages which, in Simpson's words, "with very few exceptions ... contain a record of every meteorological observation taken on Captain Scott's last expedition

...". It also contains the weather data from 'Framheim', Amundsen's base camp. There are over 250 pages of statistical tables, 450 pages of individual observations and 100 pages of observations made on board *Terra Nova* during her various BAE voyages. All in all, these three volumes are a truly monumental summary of the meteorology of the BAE and one which, again in Simpson's own words, he "longed to be able to show to Captain Scott for there was hardly a problem of Antarctic weather which we had not discussed together".

As most readers will know, George Simpson had returned from India in 1919 to become Director of the UK Meteorological Office, a post he held until 1938. In Volume III, he records that "the original BAE records and papers used in the working up of the observations are stored in the Library of the Meteorological Office, South Kensington, where they may be examined by permission of the Director". Thus, George was able to keep a close eye on the unique records. As I have reported elsewhere, most of the original notebooks of the BAE and some associated documents and letters have survived in remarkably good condition and remain in the National Meteorological Archive, now at Exeter. Sadly, there are no signs of the tabulated sheets used during the BAE and afterwards to 'work up' the data. Simpson's three-volume summary and analysis appear to have had rather limited distribution, mainly to scientific institutions. They are rarely found in bookshops etc these days. A copy is held at the National Meteorological Library where it may be examined but not borrowed. Other copies may be found at the Scott Polar Research Institute, the British Antarctic Survey (both in Cambridge) and the Royal Geographical Society in London.[3]

Overall, the BAE was a great scientific achievement, especially in the fields of geology, geophysics, marine science, and meteorology and other associated fields; and comparisons are hard to find, even in the 100 years since the BAE ended.

Note. Part VI of this series dealt mainly with the death of the main Polar Party. I wrote that after 21 March they were "confined to their tent for days by howling winds and the persistent minus 40°F temperatures". This was based on my conjecture following the series of minus 35 to minus 40°F temperatures recorded in the weather log and Scott's personal diary from 6 March until 19 March. I have no direct evidence that the temperatures remained at or about minus 40°F after the 19th until they died sometime about 29 March.

[3] All three volumes have been digitized and are now available on the web:
http://archive.org/details/meteorology01simp
http://archive.org/details/meteorology02simp
http://archive.org/details/meteorology03simp

THE LAST EXECUTION AT THE TOWER OF LONDON
by Howard Oliver

On the night of 31 January 1941, a parachutist landed at Dovehouse farm in Ramsay, Huntingdonshire. Locals, Charles Baldock and Harry Coulson, alerted to his position by pistol shots firing into the air, found a man in a flying suit who was unable to move owing to an injured leg. They contacted a local Home Guard member, Mr Godfrey [not from Warmington-on-Sea], who then contacted the police. After binding his leg, his commanding officer, Captain Newton [sadly not Mainwaring], searched him and found about £500 in one pound notes, an attaché case and various papers [subsequently found to be forged]. He was then taken by horse and cart to Ramsay police station where the case was found to contain a wireless set, headphones and batteries which was later confirmed to be capable of transmitting to the continent.

Following his transfer to New Scotland Yard, he was eventually charged with *"Committing treachery in that you at Ramsay in Huntingdonshire on the night of 31 January 1941/1 Febrary 1941 descended by parachute with intent to help the enemy."*

What is this account doing in this newsletter? The person captured was Josef Jakobs. He was born in Luxembourg in 1898 of German parents and by the end of World War I had reached the rank of Lieutenant in the German Foot Guards. Owing to criminal convictions in Switzerland during the 1930s, he was only allowed to serve as an NCO during World War II. He was drafted into the *Meteorologischen Dienst* [meterological service] and subsequently into the intelligence department of the German Army. Having received only rudimentary cloud and weather system identification training, some Morse code instruction, and with inadequate parachute experience, he was dropped into Britain with the aim of sending weather reports back to Germany. However the plan came to nothing as he

badly injured his right ankle leaving the plane and his right leg on landing.

As he was found wearing a military flying suit he was treated as a serving enemy combatant and therefore tried by a court martial rather than a civil court. He was sentenced to death by firing squad, and this was carried out at the Tower of London on 15 August 1941 with him sitting in a chair as he was still unable to stand properly. He was buried in an unmarked grave at St Mary's Roman Catholic cemetery in Kensal Green. His wife received a standard Red Cross letter informing her of her husband's death but without giving any details. The British authorities failed to forward his last letter to her after the war and it has only much more recently reached the remaining family.

If you are interested in following this story further there is quite a lot of information, and misinformation, on the web. A reliable source seems to be via

www.stephen-stratford.co.uk.

Do beware though, as a World War I German flying ace was also called Josef Jacobs

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SOME LITTLE-KNOWN WARTIME METEOROLOGICAL ACTIVITIES by Malcolm Walker

The following has been taken almost verbatim from my book: *History of the Meteorological Office* (Cambridge University Press, 2012, pp.293-294).

Accounts of wartime meteorological activities at outstations at home and abroad can be found in a number of publications, but articles which contain reminiscences of meteorologists in the field in war zones are few in number.

One such was written by Gren Neilson, who told in an article published in *Weather* in 1992 (Vol.47, pp.430-435) of his experiences when in action in North Africa and (from November 1943) Italy. His work consisted mainly of making pilot-balloon ascents to provide information about the upper air for the artillery and was generally routine in nature. There was, however, a break from routine on 15 December 1943, when two senior members of the Meteorological Office visited his unit, Group Captain Stagg and Wing Commander Meade.[4] Stagg had by then been designated Chief Meteorological Officer for Operation Overlord and was making familiarization visits to units in the field. Neilson commented in his article that the official history of the Meteorological Office's work during World War II contains no reference to the presence of a meteorological unit at Anzio and wondered whether any meteorological personnel other than himself and a fellow aircraftman were on the beach head.[5]

A graphic account of wartime meteorological work has been supplied by Ken Anderson.[6] It is based upon his personal diary and tells the story of his experiences in central and western Belgium and the Nord-Pas-De-Calais in May 1940 whilst close to the front line and during the retreat to Dunkirk. In the most perilous circumstances, Anderson and other members of a special Weather Unit made meteorological observations, including pilot-balloon ascents, and succeeded in passing them by telephone to the headquarters of the Second Survey Regiment, Royal Artillery. For bravery, defiance, resourcefulness and disregard for personal safety, this story of meteorological activities in wartime has no equal.

The wartime experiences of Morris Albert Oliver and John Oswald Weston were also remarkable. Oliver was a member of the crew of a bomber which had to be abandoned over Belgium on 3 June 1940 when an engine caught fire. He was captured and taken to Stalag Luft III. Weston joined the Meteorological Branch of the Royal Air Force Volunteer Reserve in August 1939 and led an adventurous life as a meteorologist (mainly in the Sudan and Egypt) before being captured at Sternes on Crete on 29 May 1941. From a Prisoner-of-War camp on that island, he was moved to Stalag Luft VIII B in October 1941 and Stalag Luft III in May 1942.

Oliver and Weston began a meteorological collaboration soon after the latter's arrival at Stalag Luft III. On Weston's initiative, they set up a weather station and taught fellow prisoners meteorology. Permission was granted for the station to be set up but no instruments were forthcoming. However, a couple of fellow prisoners constructed for them a thermometer screen to Meteorological Office

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[4] Meade referred to this visit in 'Operation TORCH and follow-up operations: meteorological aspects', published in *Meteorology and World War II* (edited by Brian D Giles, published by the Royal Meteorological Society in 2004).

[5] *The Second World War, 1939-1945, Meteorology*, published by the Air Ministry in 1954 (AP1134).

[6] 'Weather services at war', by K D Anderson, published in 2009 by the Royal Meteorological Society (*Occasional Papers on Meteorological History*, No.7, 17 pp).

specification and another made a rain gauge out of Red Cross food tins. Others made a nephoscope, an aneroid barometer and an anemometer, though it hardly needs to be said that none of these instruments met the Office's rigorous calibration standards! Bribery of guards helped Weston and Oliver obtain thermometers; and they acquired through the British Red Cross Brunt's *Physical and dynamical meteorology* and two of the Office publications, *A short course in elementary meteorology* by W H Pick and *Meteorology for aviators* by R C Sutcliffe. Oliver used these as textbooks for the course on general meteorology which he taught to some fifty fellow prisoners, and Weston used the *Admiralty Weather Manual* when teaching synoptic meteorology. Moreover, the two of them corresponded with J.S.Dines about meteorological matters. Weston and Oliver were transferred to Stalag Luft VI at the end of June 1943 and continued their meteorological activities there, still using equipment made at Stalag Luft III.[7]

There ends the quotation from my book. However, there is more to the story. The prisoners were assisted by the Royal Meteorological Society.

The minutes of the Society's Council meeting on 20 January 1943 contain a section headed 'Red Cross Society', which reads as follows:

> "A letter from a prisoner of war, which had been forwarded by the Red Cross Society, was read. The writer, who hoped to take a degree in meteorology after the war, made a request for meteorological books and for assistance from meteorologists in England to give lectures to his fellow prisoners. The President [David Brunt] expressed concern that many people appeared to think meteorology an easy subject; whereas in reality its difficulty made a career as a meteorologist possible for only a very few persons. Moreover, after the war the present staff of the Meteorological Office would be reduced and would be unlikely to offer openings for newcomers. It was therefore agreed that:
>
> "a. A letter be written to the Red Cross Society pointing out that there would be very few openings for young men who wished to take up meteorology as a career after the war, but meteorology was a subject that helped in many other professions and would be an asset in taking a General Degree such as some universities were considering;
>
> "b. A list of suitable books for the study of elementary meteorology should be sent to the Red Cross Society, who might make use of their funds to purchase some of these;
>
> "c. The Society should send any books which could be spared, including a copy of *Some problems of modern meteorology* to the prison camp concerned;
>
> "d. A notice should be put in the *Quarterly Journal* asking Fellows to send any meteorological books they had to spare to the Red Cross Society for forwarding to the prison camp."

In the minutes of the next meeting of the Society's Council, held on 17 February 1943, it is recorded, under 'Matters Arising', that "(a) the letter recommended by the Council, (b) a list of suitable books and (c) those books which could be spared from the [Society's] Library had all been sent to the Red Cross Society, from whom a letter of thanks had been received. The notice to be put in the *Quarterly Journal* would appear in the April number." Later in the minutes (Minute 4, headed 'Prisoners of War'), it was recorded that "a fund should be raised to buy meteorological books to be sent through the Red Cross to prisoners of war, and that a notice should appear in the *Journal* to this effect".

At the Council meeting a month later, on 17 March 1943, it was announced that Mr I.T.D.Kirkpatrick had offered to pay for "any meteorological books the Council might decide to send to prisoners of war in Germany". The offer was "accepted with gratitude and [Council] expressed deep appreciation of Mr Kirkpatrick's generous action. It was agreed that Miss Herdman of the Red Cross Society should be consulted with regard to the amount and type of literature required". A further development was recorded in the minutes of 17 March (Minute 4, headed 'Red Cross Society'). The Red Cross Society had expressed the hope that "a member of the [Royal Meteorological] Society would undertake the postal tuition of prisoners of war in Stalag Luft III. It was agreed to ask Mr J.S.Dines whether he would undertake the work".

It is recorded in the minutes of the Council's meeting on 21 April 1943 that Mr Dines had "agreed to act as tutor for the prisoners, and the correspondence with the Red Cross Society had therefore been sent to him with a request for his opinion on the books which should be purchased by the [Royal Meteorological] Society". It was further

[7] For details of the work of Oliver and Weston, see 'Meteorology behind the Wire' by J O Weston, published in the *Quarterly Journal of the Royal Meteorological Society* in 1945 (Vol.71, pp.424-426) and 'Meteorological research!' by M A Oliver, published in *Weather* in 1947 (Vol.2, pp.226-230).

agreed that "a note should be put in the *Journal* recording the efforts being made by the Society to assist the prisoners of war in their meteorological studies". This duly appeared in the Society's Annual Report for 1943, published in the January 1944 issue of the *Quarterly Journal of the Royal Meteorological Society* (pages 63 and 70), including an acknowledgement of Mr Kirkpatrick's "generous donation" and a note that Mr Dines had "kindly undertaken supervision of the prisoners' meteorological studies".

In the minutes of the Council meeting held on 19 May 1943, under 'Matters Arising', it was reported that

> "Miss Herdman had written to say that Stalag Luft III was divided into two compounds, for NCOs and Officers. She suggested that as some meteorological books had already been sent to the NCO Compound, those about to be sent under the Society's auspices should go to the Officers' Compound. The Council agreed that as the original request for literature and a tutor had come from the NCO Compound, two-thirds of the books which Miss Herdman had already been requested to send for the Society should allocated to the NCO Compound, and the remaining one-third to the Officers' Compound."

At the first Council meeting after the Summer Recess, held on 20 October 1943, it was reported that "the Red Cross Organization had purchased books to send to prisoners, up to the value of £10.5*s*.0*d*.". The books had all been chosen from the list recommended by Mr Dines; and the minutes added that "it was not yet known if Mr Dines had begun the correspondence course for the prisoners". The minutes show that concern had been expressed that some Fellows might send meteorological books for prisoners direct to the Red Cross, the action that was agreed being that the Society's Assistant Secretary had been "instructed to inform the Society of the titles of meteorological books which had been sent to Miss Herdman without passing through the Society's hands, and to refrain from transmitting to the prisoners any such books as were not approved by the Society".

Thereafter, the minutes of Council meetings contain little about the books and tuition for prisoners. The minutes of the meeting on 10 November 1943 contain a report that "the Red Cross Society had passed on a message of thanks from the prisoners of war for the gift of meteorological books from the [Royal Meteorological] Society", and the minutes of the meeting on 8 December 1943 state that "the scheme for supplying meteorological literature to prisoners of war and Mr J.S.Dines's supervision of their studies should receive mention" in the Annual Report for 1943.

Thereafter, the minutes contain only one more reference to the assistance for prisoners of war. In the minutes of the Council's meeting on 19 April 1944, "it was reported that many more of the books recommended for purchase for the prisoners of war had been sent and that a further expenditure of £10.14*s*.6*d*. had been incurred. This sum would be refunded by cheque from the [Red Cross] Society's Prisoners of War Fund".

The Annual Reports of the Royal Meteorological Society for 1944 and 1945 both contain paragraphs headed 'Meteorological literature and instruction for prisoners of war'. It is recorded in the report for 1944 (published on page 161 of the January 1945 issue of the *Quarterly Journal*) that Mr J.S.Dines had, at the request of the Society's Council, "kindly continued to stand in readiness to give any additional help or advice sought by prisoners to whom modern meteorological books had been distributed by the Society through the Joint Red Cross War Organization". The final reference to meteorological support for prisoners of war can be found on page 122 of the January 1946 issue of the *Quarterly Journal*, in the Annual Report for 1945, where it is stated that "until the cessation of hostilities, Mr J.S.Dines kindly continued to give any help or advice sought by prisoners to whom meteorological books had been distributed by the Society through the medium of the Joint Red Cross War Organization".

And what else do we know of Morris Albert Oliver and John Oswald Weston?

It was recorded on page 1134 of the *Supplement to the London Gazette* published on 26 February 1946 that Leading Aircraftman John Oswald Weston, Royal Air Force Volunteer Reserve, had been awarded the British Empire Medal (Military Division) "in recognition of distinguished service while a prisoner of war". He was elected a Fellow of the Royal Meteorological Society on 19 June 1946.

Oliver was a Warrant Officer in 1945. Sadly, I know nothing of his life after the war, so I conclude with words from the final paragraph of the article he published in *Weather* in 1947.

> "It was with deep and genuine regret that we said farewell to our [meteorological] station on that

eventful evacuation from Heydekrug [East Prussia] in July 1944. Corporal Weston took the records and I the aneroid barometer which we had received from Switzerland. All attempts to reinstate the station at my next place of residence, Fallingbostel, were frustrated by the Germans. But our barometer was left with us (more by accident than design), and although our camp status as expert meteorologists remained, and lectures were still held, we felt very keenly our reduction to the level of the 'man-who-taps-his-barometer-every-morning'. Never did we observe 'hooked cirrus' without having fond memories of a draught protector masquerading as a Besson's comb nephoscope."

CONGRATULATIONS

Congratulations to Brian Booth, winner of the Jehuda Neumann Memorial Prize for 2012. The citation will be published in the next issue of this newsletter.

BOOK REVIEW
by John Kington

Atmospheric Physics: Background-Methods-Trends. Ulrich Schumann (Editor). Springer-Verlag, Berlin and Heidelberg, 2012. Pp. xxxix, 877.

This book has been published on the occasion of the 50th anniversary of the Institute of Atmospheric Physics (IPA) of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt, DLR), in Oberpfaffenhofen near Munich. The volume addresses topics relevant to aviation and earth observation from space, together with various aerological research projects being undertaken at the DLR.

The book, comprising part of a new DLR-Springer Series, *Research Topics in Aerospace*, is structured into three main parts: firstly, general aspects of the atmosphere; secondly, methods and instruments used for atmospheric research; and thirdly, major trends and topics about present and ongoing research. Each part contains relevant chapters covering specific topics written by members of the IPA and its associated institutes.

The origin of the subject, *Atmospheric Physics* can be traced back to 1890, when Wilhelm von Bezold, director of the Königlich Preussisches Meteorologisches Institut in Berlin, devised the term, *Physik der Atmosphäre* to cover a general programme of research dealing with the upper levels of the atmosphere. Following this development, the Rhön-Rossiten Gesellschaft was, for example, one of the institutional roots of the IPA which, under its director Walter Georgii, deployed gliders and light aircraft to initiate a pioneer investigation of thermals from the Wasserkuppe in the Rhön Mountains during the 1920s (Kington and Selinger, 2006).

Comprising over fifty chapters, this book covers a wide range of topics in the field of *Atmospheric Physics* including articles on weather, climate and forecasting such as: 'Earth's Radiation Budget: The Driver for Weather and Climate'; 'Weather Nowcasting and Short Term Forecasting'; and 'Probabilistic Weather Forecasting'.

Finally, the reviewer concurs with Ulrich Schumann when, in his editorial preface of this handsomely produced volume, he states:

The authors intended to describe their field in a manner understandable to a wide community of readers with little reference to background literature. We hope we succeeded and that the book is of interest and help to all who are related to aspects of atmospheric physics – scientific, institutional, educational or in cooperation.

This book indeed provides an invaluable addition to the literature of our science.

Reference

Kington, J.A. and Selinger, F. 2006: *Wekusta: Luftwaffe Meteorological Reconnaissance Units & Operations 1938-1945*, Crécy Publishing, U.K.

John A. Kington, Visiting Fellow, Climatic Research Unit, School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ.

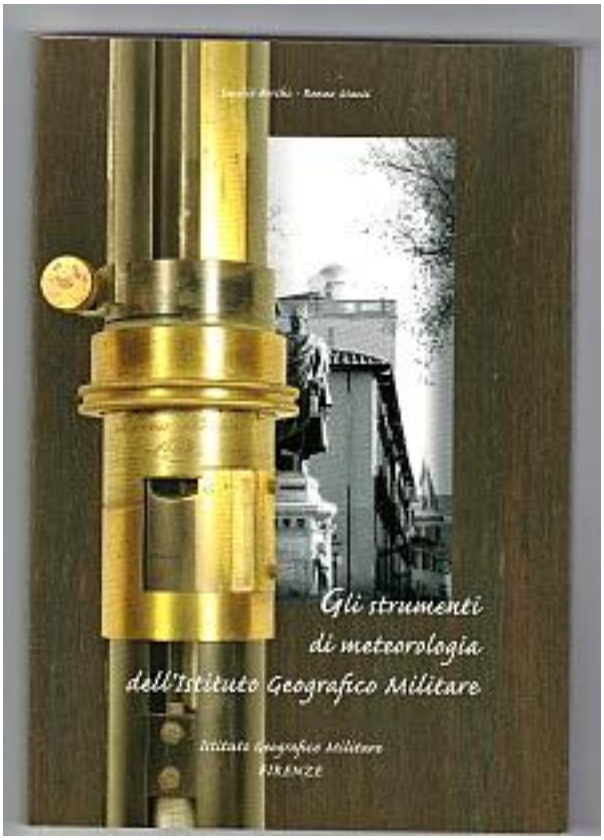
RECENT PUBLICATIONS

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

BONACINA, L.C.W., 2012. 'An estimation of the Great London Fog of 5-8 December 1952'. *Weather*, **67**, 326. [Reprint of article published in 1953]

BOOTH, B.J. 2012. 'Charles Cave, aerial photographer of clouds, at South Farnborough, 1915-1917'. *Weather*, **67**, 291-293.

BORCHI, E. and MACII, R., 2008. *Gli strumenti di meteorologia dell'Istituto Geografico Militare* IGM). Published in Florence by the IGM, 173pp. ISBN 88-523-9139-8.



This is a beautifully-produced book, lavishly illustrated with full views, details, and companion illus-trations (diagrams, advertisements, etc) of the various instruments which were brought together with the independence of Italy, with collections from the Royal Topographical Office of the Kingdom of Naples and that of Sicily. Instruments for measuring pressure, temperature, hypsometry, humidity, evaporation, rainfall, wind and solar radiation are included.

BRAZDIL, R. *et al*, 2012. 'The tornado history of the Czech Lands, AD 1119-2010'. *Atmospheric Research*, **118**, 193-204.

BROWN, A. *et al*, 2012. 'Unified modelling and prediction of weather and climate'. *Bulletin of the American Meteorological Society*, **93**, 1865-1877.

BULKELEY, R., 2013. 'Bellingshausen's first accounts of his Antarctic voyage of 1819–1821'. *Polar Record*, **49**, 9-25.

CARPINE-LANCRE, J. and McCONNELL, A., 2012. 'Prince Albert and J.Y.Buchanan: Mediterranean investigations'. *Places, People, Tools: Oceanography in the Mediterranean and beyond* (Proceedings of the VIIIth International Congress for the History of Oceanography, edited by Christiane Groeben). Napoli: Giannini Editore, pp.253-263. Conference held in 2008, proceedings published in 2012.

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FORTHCOMING EVENTS

☐ **ON WEDNESDAY 26 JUNE 2013**, there will be a meeting at **the National Oceanography Centre, Southampton.** This will begin with coffee/tea at 11.00 am, with talks beginning at 11.15 am. There will be talks on historical and modern oceanographic instruments and advances in observing techniques, and there will be a tour of the Centre. Details of the meeting are as follows:

11:00 Coffee/tea and registration
Booking in advance is ESSENTIAL
11:15 Brief introduction by Malcolm Walker
11:30 Talk by Dr John Gould on 'Ocean observations – from HMS *Challenger* to *Argo* and beyond'
12:00 Talk by Professor Adrian New on 'Oceans and climate – a modelling perspective'
12:30 Lunch break (either bring sandwiches or – recommended – eat in the Centre's cafeteria)
13:30 Tour of the National Oceanography Centre begins, to include:
14:15 Visit to the Centre's Aquarium
14:35 Visit to the British Ocean Sediment Core Research Facility
14:55 Visit to the deep-sea vehicle hangar
15:15 End of tour and end of meeting

The booking form for this meeting will be sent out to all members of the History Group in early April.

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☐ **ON FRIDAY 6 and SATURDAY 7 SEPTEMBER 2013**, there will be a meeting at **the University of East Anglia (UEA), Norwich, to mark the centenary of the birth of Professor Hubert Lamb**, founding Director of UEA's Climatic Research Unit.

The meeting will begin in the early evening of the Friday with a talk and dinner at which we hope members of Hubert's family will be present. The Saturday morning will be given over to talks and the afternoon set aside for a visit to the Climatic Research Unit. Overnight accommodation has been booked.

This meeting is being arranged by staff of the Royal Meteorological Society's Headquarters with assistance from UEA and the History Group. To book to attend the meeting, please contact the Society at 104 Oxford Road, Reading, RG1 7LL.

The programme of talks on the Saturday includes:
* Phil Jones, on 'The Lamb Weather Types'

* Astrid Ogilvie on 'Documentary historical evidence for the climate of northern Europe in the medieval period'
* Chris Sear on 'The volcanic dust veil index'
* Kathleen Pribyl on 'Medieval documentary data sources from England'
* Richard Cornes on 'Storms and instrumental data'
* Dennis Wheeler on 'Ships' logbooks'
* Giles Foden on 'World War II meteorology and literature'.

Members of the History Group will be informed when booking for this meeting begins.

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☐ **PART 3 of the series of meetings on 'THE USE OF AIRCRAFT FOR METEOROLOGICAL PURPOSES'** (from about 1970 onwards) will be held on **Saturday 19 October 2013 in the University of Reading.**

Speakers include:
* Mike Nicholls on 'An era of multinational collaboration'. Brief synopsis: *Aircraft from all over the world were brought together in the GARP Atlantic Tropical Experiment; more secretive bi-national investigations of stratospheric meteorology were needed in support of Concorde development, and of Cold War operations.*
* Geoff Jenkins on 'The Meteorological Research Flight (MRF) in the early 1990s'. Brief synopsis: *This talk will cover MRF activities in the first half of the 1990s, when the range of kit carried by the C-130 continued to expand, particularly in the area of atmospheric chemistry, and more and more flights were carried out jointly with universities and NERC, paving the way for the FAAM collaboration that replaced MRF in 2003*. (FAAM = Facility for Airborne Atmospheric Measurements)
* James Milford on his work with powered gliders in the 1970s.
* A member of the MRF to give a general overview of the development of the MRF and its transition into FAAM since about 1970.
* Jim Haywood on the infamous ash cloud of 2010.
* It is hoped that there will also be talks on (1) the acid-rain studies of the 1980s, (2) the utilization of observations from commercial aircraft for standard Numerical Weather Prediction, and (3) today's uses of unmanned aerial vehicles for meteorological investigations.

Further details of this meeting will be announced soon. The meeting is a National Saturday Meeting of the Royal Meteorological Society, organized by Malcolm Walker, Chairman of the History Group.

☐ **On Thursday 9 January 2014**, there will be a joint meeting with the Environmental Physics Group of the Institute of Physics (IoP) and the Retired Members' Group of the IoP **at the Institute of Physics, 76 Portland Place, London, on The Earth's climate: past, present and future**. The programme is as follows:

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

If you wish to attend, please contact John Belling, john.a.belling.secrems@gmail.com, 07986 379935, 42 Cunningham Park, Harrow, HA1 4QJ. The costs are: £35 with a hot lunch. £10 without lunch.

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☐ There will be a meeting on **the history of weather ships on Saturday 22 March 2014**, **in the Geography Department of the University of Birmingham.**

Further information will be announced fairly soon.

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☐ There will be a meeting **in London** entitled **'The meteorology of D-Day revisited' on Saturday 17 May 2014**

Further information will be announced fairly soon.

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☐ There will be a 'Classic Papers' meeting **in London on Wednesday 15 October 2014** on **the history of studies of the Greenhouse Effect**, to mark the 50th anniversary of the death of G.S.Callendar. This will be a National Wednesday Meeting of the Royal Meteorological Society, organized by the History Group in consultation with Professor Jo Haigh of Imperial College. Further information will be announced in due course.

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☐ A meeting to mark the 50th anniversary of the Met Office beginning operational numerical weather prediction is planned for November 2015.

2013 MEMBERS

Rob Allan (Exeter)
Alberto Ansaloni (Milano Italy)
Oliver Ashford (Didcot)
Graham Bartlett (Slough)
Austen Birchall (Exeter)
Rodney Blackall (Buckingham)
Brian Booth (Devizes, Wiltshire)
Ron Bristow (Maidstone, Kent)
Stephen Burt (Stratfield Mortimer)
Anna Carlsson-Hyslop (Manchester)
Jacqueline Carpine-Lancre (Beausoleil, France)
Victoria Carroll (London)
M J Chapman (Royston)
Alan Cobb (Gerrards Cross)
Mike Collins (Frinton on Sea)
Philip Collins (Merton, Devon)
Andrew Cook (Newport on Tay, Fife)
Stan Cornford (Bracknell)
Maurice Crewe (Watford)
B D Dagnall (Lymington)
Peter Davies (Reading)
Tony de Reuck (London)
Federico de Strobel (La Spezia, Italy)
Margaret Deacon (Callington)
Storm Dunlop (Chichester)
Philip Eden (Luton)
Michael Field (Arundel)
Tom Fitzpatrick (Glasgow)
Robert Gilbert (North Chili, NY, USA)
Brian Giles (Auckland, New Zealand)
John Goulding (Middlesborough)
Valerie Green (London)
Richard Gregory (Woodbridge)
Richard Griffith (Horsham)
Margaret Haggis (Cuxton, Kent)
Alexandra Harris (Oxford)
Eric Harris (Crowthorne, Berkshire)
Alan Heasman (Marlborough, Wiltshire)
Althea Howard (Reading)
A M Hughes (Oxford)
Lord Hunt of Chesterton FRS (London)
Jane Insley (London)
Geoff Jenkins (Yateley)
Arnold Johnson (Maidenhead)
Keith Johnson (Twatt, Orkney)
Simon Keeling (Wombourne, Staffs)
Joan Kenworthy (Satley, County Durham)
Martin Kidds (Biggleswade)
John Kington (Norwich)
Daudu Kuku (London)
Richard Link (Croydon)
Allen Lock (Reading)
Norman Lynagh (Tideswell, Derbyshire)
Joyce MacAdam (Watford)
Ian MacGregor (Ivybridge, Devon)
Julian Mayes (West Molesey)
Anita McConnell (Stowmarket)
Eric Mills (Halifax, Nova Scotia)
Reg Milne (Farnborough)
Alison Morrison-Low (Edinburgh)
John Norris (Gerrards Cross)
Howard Oliver (Swanage)
Alan O'Neill (Twyford)
Sara Osman (London)
Andrew Overton (Doncaster)
Sarah Pankiewicz (Exeter)
David Pedgley (Wallingford)
Anders Persson (Sala, Sweden)
R W Phillips (Lincoln)
Peter Rackliff (Fareham)
Nick Ricketts (Exmouth)
P R Rogers (Sevenoaks)
Catherine Ross (Exeter)
James Rothwell (Southwell)
Peter Rowntree (Crowthorne)
Marjory Roy (Edinburgh)
Andrew Russ-Turner (London)
Joan Self (Exeter)
Ann Shirley (Canterbury)
David Simmons (Cambridge)
Hugh Thomas (Hassocks)
Derry Thorburn (London)
Keith Tinkler (Ontario, Canada)
Jack Underwood (Barham)
Bill Wade (Harrogate)
Diane Walker (Tiverton)
Malcolm Walker (Tiverton)
Catharine Ward (Bury St Edmunds)
Dennis Wheeler (Sunderland)
G D White (Truro)
Peter Wickham (Wokingham)
Clive Wilkinson (Diss)
Christopher Wilson (Cullompton)
John Wilson (Nottingham)
Sir Arnold Wolfendale FRS (Durham)
Mick Wood (Bracknell)

THIS IS <u>YOUR</u> NEWSLETTER

Please send comments and contributions to:
Malcolm Walker, 2 Eastwick Barton, Nomansland, Tiverton, Devon, EX16 8PP.
💻 MetSocHistoryGroup@gmail.com

The next newsletter will be published in June 2013. Please send items for publication to Malcolm Walker by 1 June 2013.

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.