150th Anniversary of the 1853 Brussels Maritime Meteorology Conference

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The role of Meteorological ***Societies***

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Introduction

'Veritate duce' - 'Lead on the basis of truth' – sums up the motives of meteorological societies for two centuries. 'Science for its own sake' is the starting point. The enlargement of science, and its application for the benefit of humanity stem from it.

Observing to find the truth about the state of the atmosphere

In practical ancient China, though, application was the main driving force for observing the truth: solar haloes and other optical phenomena were the province of weather clerks who were expected to foretell matters of state - "A conspiracy among the ministers is foreseen. Close the gates! Do not travel!"

In the west, specific observations of the weather – truthful 'facts' -, which are still of historic use today, are rare before the seventeenth century: 935 was a hard winter in England; much snow fell in the Czech Lands on 15 May 975. We have William Merle's diary of the weather in Oxford 1337-1343 and observations by John of Kunovice in Moravia in the 1530s.

Following the invention of the barometer in Italy around 1640, and meetings in Oxford in 1645, King Charles II of England and Scotland, in 1662 founded the Royal Society in London - essentially because he could foresee the practical advantages of an Academy of Idealistic Seekers after Truth. Robert Hooke, Secretary of the Society 1677-1682, produced a scheme for recording the weather systematically, with annotations. He suggests, for example, "A little before the last great wind, and till the wind rose at its highest, the quicksilver (old-fashioned English for mercury) continued descending till it came very low after which it began to ascend…"

At the same time, observations were made regularly at sea by masters of ships totally dependent on the wind. In Ireland a weather diary of 1711-1725 is detailed enough for statistics to be derived from it.

Similarly in Scandinavia, individual scientists worked in meteorology and academies of science were founded, under the patronage of the great.

By the late 18th century, regular observing programs were running. In France, the Société Royale de Médicine de Paris was founded in 1776, mostly to explore links between weather and health. It set up a western European weather observing network, with printed registers and regular returns, by post. By 1783, in an interlude of peace between France, Great Britain and the new United States of America, the network extended from New York to St Petersburg.

The beginning of understanding of weather on the synoptic scale

The first society devoted specifically to meteorology, though, was the Meteorological Society (founded 1780) of the Palatinate (SW Germany, on the border with Lorraine), not far from EUMETSAT! Still under patronage, its standardized network including that of the French Society, had 50 stations by 1786, including Cambridge, Massachusetts, Godthaab in Greenland and Moscow. An important part of the work was systematic publication of results, which, for example, led to Brandes (1777-1834, Universities of Breslau and Leipzig) subsequently drawing the first synoptic charts, using differences of pressure from normal.

This society collapsed in the conflicts of 1792. After the French Revolution and the age of patronage, out of the salons of Europe arrived the age of the idealistic individual cultivator of knowledge. In London, in 1823, a number of them formed the first private, voluntary, meteorological society I know of: The Meteorological Society of London (1823-1832). It "fell into a state of rest" in 1832, from lack of dynamism. Revived in 1836, it failed in 1843 from lack of funds. (It overspent on publishing its Transactions.) A new society formed in 1848 was taken over by astrologers and its more scientific members wound it up when the British Meteorological Society formed in 1850. As the Royal Meteorological Society, but still a private voluntary club of individual enthusiasts, some professional and some amateur, the British Meteorological Society flourishes today, having merged with the Scottish Meteorological Society (founded 1855), in 1921. International from its beginning, its prime aim was, and is, the advancement and extension of meteorological science (which these days includes related sciences, such as oceanography and hydrology, and applications): the prime purpose of most Meteorological Societies.

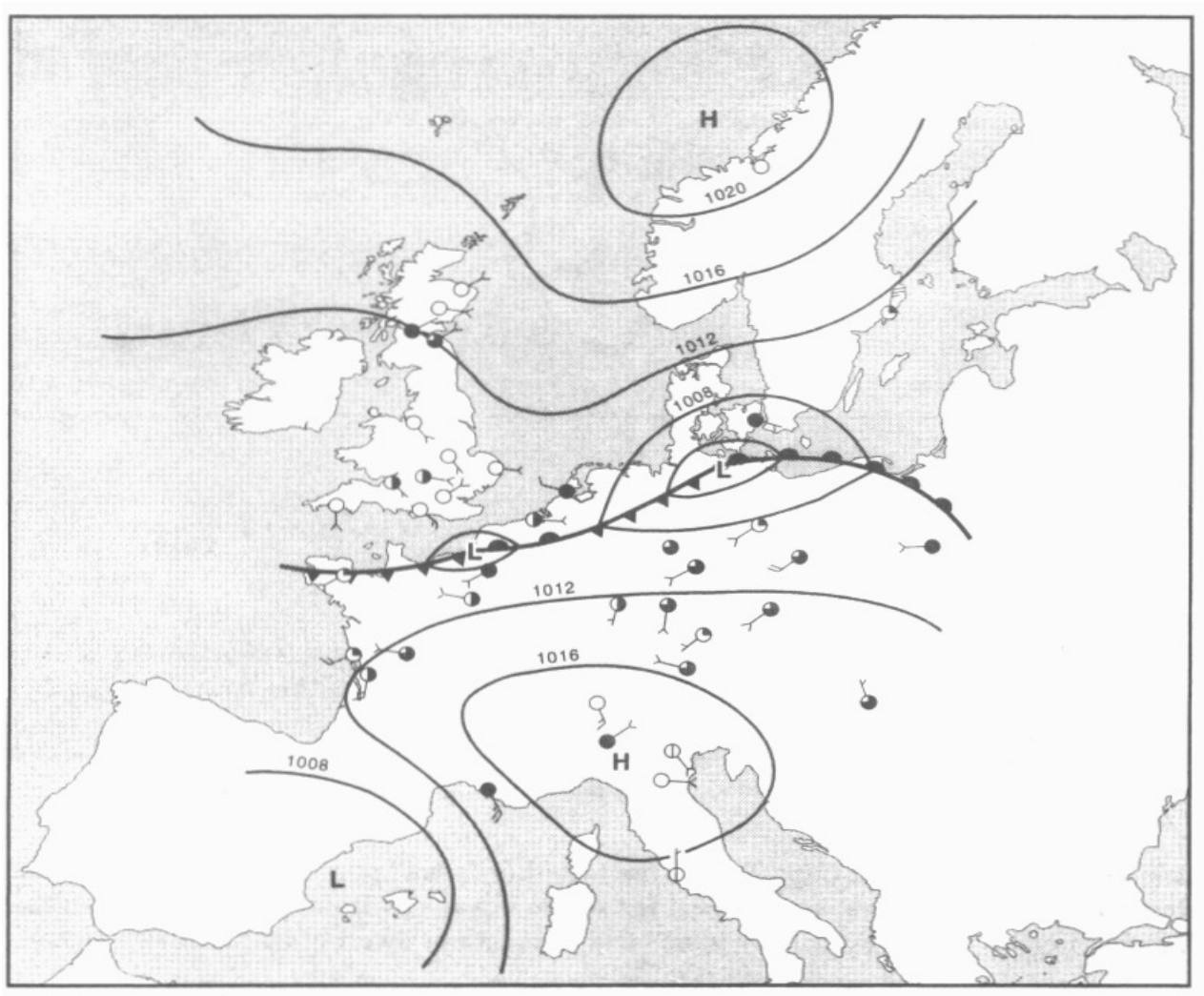

Figure 1. Chart drawn by J. A. Kington (1974), using observations collected by the Societas Meteorologica Palatina and the Société Royale de Médécine de Paris for 13 May 1787 (the day of the sailing of 'The 'First Fleet' for Australia) and analysis techniques of the mid-twentieth century.

Fifteen months later, a society with similar aims was founded in Mauritius, under its dynamic Scottish Secretary, Charles Meldrum (1821-1901). The society published the first (still

non-real time) synoptic charts of the Indian Ocean and, so, of the southern hemisphere. Others had theorized on the effects of the rotation of the earth, but it was the Mauritius Society which established that winds in the southern hemisphere go around highs and lows in the opposite sense to those in the northern hemisphere. The first chart shows some ships' noon observations, made before the Brussels 1853 conference. There are no pressures, for example. Meldrum strongly favoured publishing results, aware that the value of data increases the more they are used. Seven and a half years after the conference, Meldrum was able to publish daily, quasi-synoptic, charts of the Indian Ocean, integrating ships' noon observations, with isobars. At around the same time, the better known Alexander Buchan, Secretary of the Scottish Meteorological Society in Edinburgh, was doing the same thing for the north Atlantic.

In France too, people realized that meteorology was possible only if they worked together: a society was needed to run a world-wide observing system. The Société Météorologique de France (SMF) formed in 1852. SMF undertook all the work to do with making observations and using them. The aim was to pursue the advancement of meteorology and the physics of the earth, and, especially, to make the climate of France, and its relationship to agriculture, health and industry, well known.

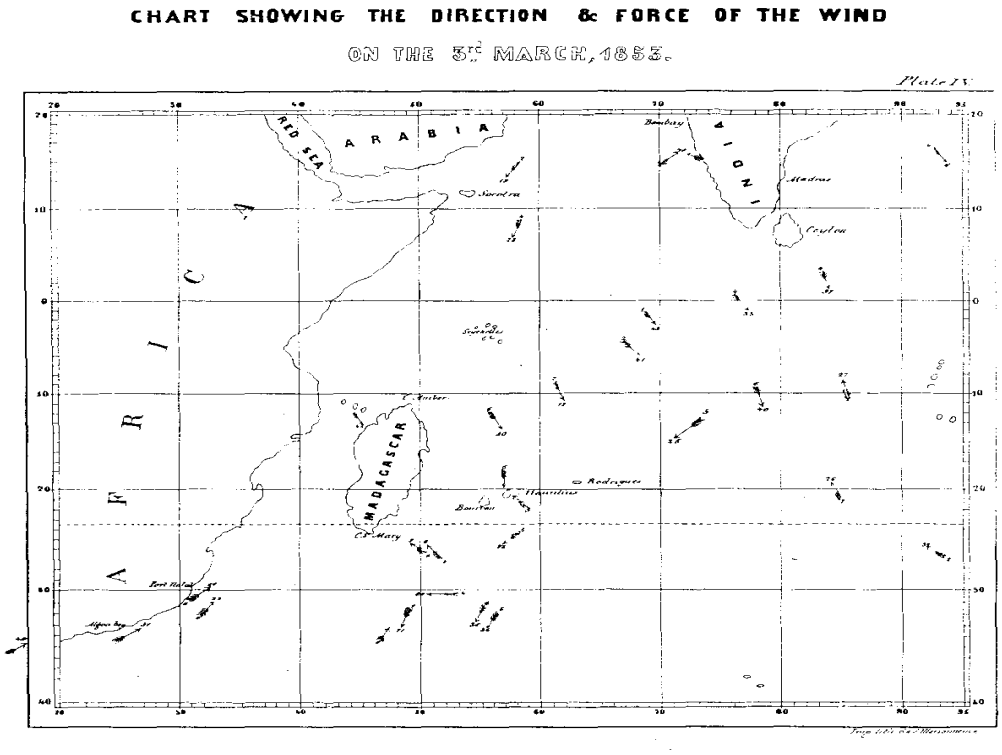

Figure 2. Chart showing winds over the Indian Ocean at local noon on 3 March 1853 (before the Brussels Conference), compiled by Charles Meldrum, as Secretary of the Mauritius Meteorological Society, from the logs of ships passing through the harbour of Port St Louis. (Printed original in the archives of the Meteorological Office, UK.)

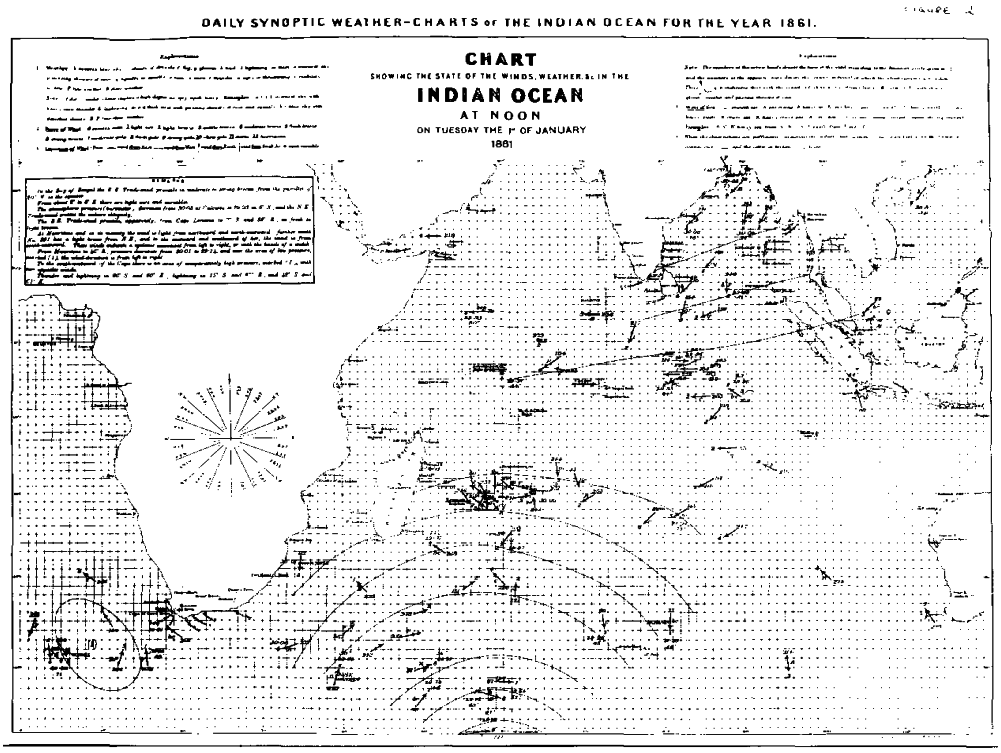

Figure 3. Chart for local noon on 1 January 1861(after the Brussels Conference), compiled by Charles Meldrum of the Mauritius Meteorological Society from the logs of ships passing through the harbour of Port St Louis. (Printed original in the archives of the Meteorological Office, UK. See also, Cornford (1997).)

Maritime meteorology, the first application of the new knowledge

So too in Britain, it was the Society which set up and ran the network of meteorological observing stations on land, while the newly founded Meteorological Department of the Board of Trade (later called the Meteorological Office) concentrated on stimulating, collecting and processing observations from ships - especially to reduce the duration of long voyages.

The electric telegraph: Societies and others can collect observations from land stations in real time

The widespread introduction of the electric telegraph permitted the collection of land observations in real time (though from ships at sea that had to wait another 50–60 years and the arrival of shipboard wireless telegraphy). A chart using a system of repeatable symbols was on sale in 1861, with observations from the Meteorological Society, the Board of Trade (i.e. Meteorological Office) and Trinity House (which runs British lighthouses). By 1878 running a network routinely became too much for SMF and the predecessor of Météo-France was born. In Britain, too, the observing role of the Meteorological Office grew, but Meteorological Society stations reported to the Meteorological Office by telegraph throughout the 19th century, and climate stations continued to do so monthly into the 1920s. A separate British Rainfall Organization (formed initially under Society auspices) merged with the Meteorological Office in 1919.

Italy was not far behind. The SMI was established in 1865. After some vicissitudes, it is still manages the Moncalieri observatory today. In the nineteenth century, it linked the existing,

mostly mountain, observatories and founded its own network of low-level stations. Like many other Meteorological Societies, it publishes a peer-reviewed journal - *Nimbus.*

A German Society was founded in 1883. The present DMG is a scientific society of meteorologists, and those with an interest in the subject, operating on a non-profit basis. This charitable element is a common feature of Meteorological Societies. DMG offers a forum for spreading meteorological knowledge and promotes interdisciplinary contacts. Education was also a driving force in founding our host Belgian Society (1894).

The impact of aviation

Just as the electric telegraph had made possible the collection of observations in real time in the mid-nineteenth century, so civil aviation after the First World War motivated greater effort in accurate weather forecasting. The State organs of meteorology grew, especially to meet this demand, and the Societies concentrated on their more academic roles as custodians of scientific integrity, especially through organizing meetings where new science was reviewed and criticized, and through peer-review of papers to be published in journals.

Also in the aftermath of the First World War, came the founding of the American Meteorological Society (AMS) in 1919. Its aim was "to promote the development and dissemination of information and education on the atmospheric and related oceanic and hydrologic sciences". No direct 'advancement of the science' itself, at this stage, (perhaps the realm of the universities?), but rather promotion of the 'interests' of the science (promotion which would advance it indirectly).

War, the most intense of human activities

During the Second World War, many meteorologists were needed on both sides, above all to serve aviation, though operations at sea were often weather-dependent and navies had their own meteorological advisers.

Their proven effectiveness led to a post-war boom in interest and in the usefulness of the subject in other fields; though this was also fuelled by further growth in civil aviation, itself an outcome of wartime experience. This growing need was largely met by the national meteorological services, chiefly on the operational side; Meteorological Societies retained their mainly learned society roles.

The growth of commercial providers of meteorological services

In the United States, though, a commercial forecasting profession grew up and, in 1957, AMS instituted a professional certification program. In Europe the private sector grew more slowly and State national meteorological services mostly controlled their own professional and ethical standards. Then, RMetS instituted a Chartered Meteorologist scheme in 1993 and the European Meteorological Society (EMS) (founded in 1999) very soon set up an Accreditation Committee.

Control of professional standards

As well as their fundamental, academic, scientific, role, societies had taken the first steps towards controlling standards in the profession applying the science. AMS, in 1957, showed the way. DMG in 1989 and RMetS in 1993 have set standards roughly equivalent to Chartered

Engineer. EMS has an Accreditation Committee poised to do the same thing on a Europe-wide level. Some TV presentations too, benefit from some publicly recognized 'seal of approval'. An important aspect of these recognitions of competence is people's continuing development of their competence. Closely linked with competence is the question of professional ethics. Most responsible advisory professions have codes of ethics. There is, however, some lack of symmetry between the apparent need for a code of ethics for practitioners and the peer-maintained integrity, independence and impartiality of their 'pure scientist' brothers.

More countries, more meteorological societies

Also after the Second World War, increasing numbers of countries gained independence. The Indian Society formed in 1956, very much on the AMS model. In Canada and Australia, national branches of the RMetS formed which each moved on to become independent national meteorological societies in their own right, covering the whole spectrum of activity covered by the older, larger societies. Some, such as the Nigerian Society, emphasized primarily the applications side.

Many other voluntary, nonprofit-making (and mostly national) Meteorological Societies have formed in recent years. In 2002, according to the WMO web site, there were 37. The web site lists their contact points, and there are electronic links between the web home pages of some societies.

Meteorology and oceanography

There were also 21 Societies devoted to oceanography, either as a separate society or in partnership with meteorology, or geophysics generally. Such statistics, of course, although good indicators, hide a good deal. Societies are complex. The one I know best for example, RMetS, has always had an interest in the oceans. Henry Newton Dickson, President of RMetS 1911-1912, had served as a student on the *Challenger* expedition (1872-1876). A paper of his on *The circulation of waters in the North Atlantic Ocean* is in the *Philosophical Transactions* of the Royal Society for 1901. An earlier President was John Knox Laughton (1882 and 1883) whose theory that ocean currents were driven by winds alone ran against contemporary and modern opinion. Then, more recently, we have the two HC's — Henry Charnock, President 1982-84, Editor of the *Quarterly Journal* and great encourager of co-operation between the two disciplines, and Howard Cattle, our current President, and my friend, who, glacier-like, has broken off from land-based meteorology, spent years in sea-ice and representing sea and air together, and is now part of oceanography at Southampton. This is not to mention people like our Chairman this morning, Bob Shearman, who, whilst representing RMetS here, has also represented his country at WMO's Commission for Marine Meteorology, and served as the Commission's President.

Continent-wide meteorological societies

Then came the continent-wide society. In 1971, a new European Geophysical Society joined together individuals working in the earth sciences to "promote the cooperation of scientists in the promotion of the sciences of the Earth and its environment, and of planetary and space sciences". It formed a meteorological section. In 1988, we have the formation of the first specifically meteorological continent-wide society: the African Meteorological Society, devoted to the "development and the dissemination of meteorology and atmospheric science, and the advancement of its professional ideals". The word "ideals" is significant. Another grouping is by language, as in the Federation of Latin American and Iberian Meteorological Societies, and in

DACH, the informal grouping of German-speaking Societies mentioned by Professor Wehry in his address yesterday.

Just as the role of MSs followed technological change when the electric telegraph came into daily use, when nationally controlled meteorological services became more effective by routinely using radio-sondes and thinking three-dimensionally, so a mood of political change in Europe led to the formation of a European Meteorological Society in 1999. Like those of the European Union as a whole, the role, structure and purpose of EMS have been crafted to meet demands which will evolve for foreseeable time.

Whilst other societies have had corporate members as well as individual, personal, members, the structure of EMS is quite different. Its Members are (mostly national) MSs. But, it also has Associate Members, including Europe-wide organizations, such as European Centre for Medium-Range Weather Forecasts (ECMWF), the European Space Agency (ESA) and the European Meteorological Satellite Organization (EUMETSAT), national meteorological services, companies providing meteorological services and companies developing and providing equipment. These Associate Members expect to play a significant role in the development of EMS and of its activities. EMS has twin aims of advancing meteorology and sciences related to it at the Europe-wide level, and also the development of applications - for the public benefit of the peoples of Europe and elsewhere. It is careful to benefit its member societies and not to undertake activities which compete with them.

So, EMS embraces the whole range of Meteorological Society roles, including awards (at this stage mostly student bursaries), the promotion of professional meteorology (at present, mostly in the media, but with a more general accreditation scheme in the offing) and 'school and public education in meteorology'.

Interlude

Life in these societies is not all serious and academic. Occasionally they break out: as in Cambridge on RMetS's 150th birthday. Clusters of buoyant balloons were released (on the command of the Secretary-General of WMO, Professor Obasi) from the corners of a 150m side square, to show watchers diffusion in the atmosphere in action. Students of transboundary transport of materials compared the plume with current computer models. One balloon reached Chavannes, Switzerland, not too far from Geneva.

At the time, we did not know that this echoed a similar event to mark the 75th anniversary of RMetS in 1925. That balloon release, from Hyde Park in London, was organized by L. F. Richardson on behalf of the League of Nations Union – a quarter of a century before his oceanic diffusion experiment with parsnips.

Statements of position

Another role adopted by some societies is that of issuing 'statements of position'. These may be on topical issues such as rain-making some years ago, climate change or the free international exchange of meteorological data. They are intended to be the most authoritative, impartial advice available. Other societies have found that they could not agree internally a unanimous position on a controversial issue, or have seen issuing them as prejudicing their position as impartial bodies. This last is the present position of EMS, which sets out, impartially, to provide

a neutral forum for debate, but not to adopt a position in it. At some meetings, what is said is not recorded or reported. Something like Chatham House rules apply.

However, the effectiveness of professional opinion may be judged from the success of the Norwegian Meteorological Society, which, given the importance of the Gulf Stream in determining the climate of western Europe, has successfully argued for the retention of the Ocean Weather Ship *Polar Front*.

The Intergovernmental Panel on Climate Change, set up by intergovernmental WMO and UNEP, was initially criticized by some climate treaty negotiators as being neither intergovernmental nor impartial and independent. However, many of the scientists are members of meteorological societies and exercise their traditional integrity and independence. IPCC undoubtedly gives the most expert, authoritative and impartial advice available to governments. Might it offer a model for Meteorological Societies to join together to make position statements on other issues – perhaps as a group of non-governmental organizations in conjunction with WMO? (As a representative of EMS at this meeting, I must say that this is my personal question and does not, in any way, reflect EMS policy.)

Dialogue with the public

Education of the public in meteorology, especially through schoolchildren and their teachers has been an activity of Meteorological Societies, especially since the Second World War. Recently the term 'education' has begun to be seen as patronizing. Instead, societies are beginning 'to engage in a dialogue with the public'. The Netherlands Society NVBM has been particularly energetic in this field, not least on a Europe-wide level.

An incompatibility between science and its applications?

For the broadest growth of knowledge, science is pursued for its own sake, independently and impartially. It grows as we go round the cycle of 'observation', 'knowledge', 'hypothesis', 'testing' and 'observation'.

Science needs applications, for its own sake, for its sources of funding and for the services it provides to scientists as private individuals within a community. Applications need science if they are to improve. However, applications organizations have their own interests to pursue; they take on almost human personality and foibles. In the long-term, though, it is in their own best interests to support science more generally and not even try to influence its direction, extent or content. We cannot know the extent of our ignorance: there is no reason to suppose that it is not vast on many different scales and in many dimensions. Nor do we know what is discoverable which may be potentially valuable. The prime role of Meteorological Societies is to guarantee the quality of new knowledge. They are the cultivators of our science. To change the metaphor, they ensure that the structure of science uses good bricks.

Inconsistencies

The comprehensive Meteorological Society then:

1. positively helps the advancement of the science;
2. guards the quality of published material;

3. positively advances the practice of meteorology, to ensure it is used to the greatest public good, and
4. ensures high standards of competence, integrity and service in practitioners.

It must also, however,

5. keep itself financially sound, yet independent and impartial;
6. achieve a place in public regard which ensures that meteorological knowledge is used to the greatest public good, and
7. cope with human and even, external political factors.

The final three of these factors may be inconsistent with the first four and give rise to stresses within a society and, possibly, between societies with different priorities. How is this likely to affect the future, in which society generally is likely to become ever more complex and weather-sensitive? Better services to governments and public may continue to reduce the annual number of deaths from extreme or unusual weather events, but economic impacts are likely to increase, as economies thrive and ever more assets are placed at risk. Increasingly, meteorology will be concerned with long-term planning of economic infrastructure. Its day-to-day value to governments should become more widely recognized (whereas in the past its value was in the short-term, peaking at times of threats to national survival). The economic value of meteorology will increase the stresses caused by the inconsistencies mentioned above. To prevent schism, Meteorological Societies may well need to consider how to reduce the stress between ‘ideals’ and ‘interests’. But there is no need to ‘close the gates and not travel’.

Whatever the outcomes may be, one principle is essential if ideals are to be maintained: Societies must ‘Lead on the basis of truth’.

ACKNOWLEDGEMENTS

Many colleagues in meteorological societies around the world responded to emails asking for something their society's aims, and its history. This is really a compilation of their contributions. I apologize that time and space do not permit me to mention them all. Societies' web sites have also been invaluable, as have been articles in the RMetS magazine *Weather*, especially the series of Pen Portraits of RMetS Presidents and articles by Dr J. M. Burton and Messrs J. A. Kington and J. M. Walker. As always, the staff of the National Meteorological Library, Bracknell, UK, have been helpful beyond the call of duty, and Sir Napier Shaw's *Manual of Meteorology*, **1,** (1926), Cambridge University Press, on the history of the subject, an inspiration. Some illustrations have been used from Longman's (1989) excellent *Chronicle of the French Revolution.* The log of HMS *Experiment* for 1697 is shown by courtesy of the National Maritime Museum, Greenwich, UK.

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