

History of Aviation Forecasting and the new "Handbook of Meteorological Forecasting for Soaring Flight"

Dr Sepp Froeschl, Supervisor BPQ-A.E.S. / Canada

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I would like to take this opportunity to congratulate our hosts on their excellent local organization and for setting up a "Mini-Met.-Office" with all the facilities needed to cope with this tremendous task, namely to provide these World Championships with meteorological forecasts, consultation and advice. These arrangements are certainly a formidable help for both the official forecasters and us the team meteorologists who have come here in such a great number.

Also I would like to express my own appreciation and praise for the forecasting which has been done up to now by my old friends Norbert Gerbier and Norbert Saccitani and their assistants and crew. Many thanks and please keep it up.

When I was asked by the Chairman of the Scientific Section of OSTIV to change the original title of my paper from: "Aviation Forecasting Past, Present and Future, with a special emphasis on Forecasting for Gliding/ Soaring" to the one printed in the programme, I was quite willing to comply. Even though this meant a lot of work to be accomplished within a short period of time I accepted the challenge since the reason given, namely to introduce the newly printed ICAO Tech. Mem.

"Manual for Forecasters for Gliding/ Soaring" warranted this additional effort. The more so since I am, rightly or wrongly, considering myself as one of the fathers of this publication, and there are quite a number of co-fathers and not just God-fathers, some of them being right here in this room or at least here in Châteauroux acting as team meteorologists for their respective countries and crews. Needless to say, it is both a great honour and a pleasure to me to have had the opportunity to contribute to such a noble cause and now to be chosen to present the "Manual".

Before turning to the paper proper, I

would like to add a few more introductory and explanatory remarks. I find this necessary since I know very well that the form of presentation is unconventional and the approach controversial and all in all most subjective. Being aware of all this I feel an obligation to stress that the ideas I am expressing and trying to sell are neither the thinking within A. E. S. nor that in OSTIV, but simply my own. I am by choice an operational meteorologist with an academical background (a doctorate from the University of Vienna) and a pilot for almost 40 years, with experience covering a wide range from the old SG-38 right through to multi-engined aeroplanes including both military and civil jets. Knowing both sides of the fence, so to speak, I feel that my ideas, together with some constructive criticism, might be worth your while.

In admitting controversy I am far from accepting defeat a priori and I hope you are not thinking along the line of the French proverb: Qui s'excuse s'accuse. Au contraire I am consciously and explicitly deviating from the usual style of presenting a paper. The stereotype (too often "sterile type") of reading some notes to a highly sophisticated and/or scholarly oriented group does not appeal to me. And if you will be missing all sorts of integrals and Greek letters during these 20 minutes I can assure you that I consider this audience as a group of people who have one thing in common, namely an active interest in applied meteorology and soaring and gliding.

After this rather lengthy, though necessary introduction, I shall now try to deliver my so-to-speak message. Weather always was and will remain an important factor with respect to aircraft operations, and the challenge for the aviation forecaster has not changed much up to now and will not do so for the foreseeable future. The only change

is the ever widening spectrum of user needs and interests, and consequently an increased request for more detailed or better still tailor-made forecasts and consultation.

Whilst the challenge remains almost unchanged there is a noticeable change with regard to technological progress on the side of aeroplane technology and also within the field of meteorology. With respect to the latter the changes again have been mainly confined to technology. Satellites and ever developing radar systems have increased the coverage of observation in both time and space; more powerful computers have opened hitherto closed avenues for meteorological research and are more and more utilised right down the line into operational offices as valuable aids for the daily routine of the forecaster.

The PAST, which encompasses the time from the very beginning of organized forecast services rendered to aviation until the beginning of the jet-age, was dominated by synoptic meteorology with the forecast resulting from extrapolation with a strong subjective influence on the end product. As World War II was playing an important role in this time span the Categorical type and form, complying with military thinking, was rapidly and solidly established and remained widely used and accepted until recently. This period was also marked by a close cooperation and understanding between the meteorologist and the respective users, almost exclusively pilots in those days. This happy marriage and two way street deteriorated as time went on and unfortunately there is little left nowadays; the gliding community being and remaining the exception rather than the rule.

The Present, ranging from the doorsteps of the so-called jet-age to this very day, is in my mind best considered as a transition period. Changes and developments were and still are going on, being rather explosive at times. These changes, being as mentioned earlier mainly of a technological nature, altered the demands on the user side where the range of equipment stretches now from SST to STOL in the commercial sector, from multi-Mach aircraft down to helicopters with the military, and almost the whole spectrum for the so-called general aviation family, also other flying interests such as ballooning, hang-gliding and sky diving.

There were also important technological changes within the science of meteorology. These changes made me think that

it would be most correct to describe this period as transitional, hopefully leading to solutions which allow our services to continue to be a means to an end, and not to become an end in themselves, the end being the best service to and for the aviation interest and community. Since these changes were explosive at times and there was no time for the necessary adaptations as the user continued to request forecasts, the seeming deterioration of the quality (which was contradictory to the expectations resulting from technological development) needs some corrections in the minds of the users.

The changes with respect to the present "state of the art" are only incorporated rather slowly into the system. The utilization of computers, satellites, and radar to an ever increasing extent necessitates a great number of procedural amendments and adaptations.

The hitherto untouchable concept of more or less Categorical Forecasts is no longer acceptable to the user. Whilst Safety, which was the main if not the sole reason for the forecast in the past, particularly in the very early days, remains unquestionably an important factor there is a new aspect coming up, namely Economy; the latter is growing rapidly in importance owing to energy problems in general and to the spiralling Fuel Costs in particular.

The widening of the range of aircraft within the aviation community necessitates the development of a new system with organizational adaptations to the qualified demands of the users. Instead of the traditional forecast, and the attempts to stretch the validity period, a more and more tailor-made forecast coupled with specified and specialized advice and consultation services becomes the order of the day. Increased accuracy, for which shorter time spans are fully accepted by the user, together with some practical methods of transmitting Real Time information to the Pilot, have to be introduced as soon as possible. There is no doubt that this conversion and adaptation process is time consuming and unfortunately it is also expensive. In order to achieve this change both understanding and cooperation between the parties is essential. There is a considerable change already in progress within the educational and training systems in the various meteorological services throughout the world, greatly helped by the formidable projects carried out under WMO and known as GARP, on which our Chairman, of this session, Dr Kuettner, as

one of its directors, can easily bring you up to date. But there is also a demand for a change of training and instruction on the pilot's side.

In this time and process of change, the transitional period, I am tempted to compare applied meteorology with an industrial complex having a wide and unfortunately incoherent group on the **receiving end of the conveyor belt** and an almost completely missing "sales organization".

This present state of affairs is not new and led in the past to a split up of national meteorological services; and I am very pleased to mention here the fact that in Canada the very healthy and realistic approach of maintaining a single centralized met. office, the CMC, the Canadian Meteorological Corporation in Montreal. Such a split up is no help in the future development and there remain the main groups, namely the powerful military, the dominating commercial interests on the civil side, and last but certainly not least the silent majority composed of many hundred thousand pilots who are in dire need of special meteorological advice and consultation. This latter group, including the gliding and soaring community, as another splinter group is unheard by many legislators and often simply forgotten by the respective met. services proper.

With a marked tendency in the weather services and organizations towards budgetary restraints and automation, aeronautical meteorology is facing an extremely hard situation if it wants to reach its goal and achieve the needed and desired standard since it must, in order to remain within those restraints, improve productivity, which means in simplified language "Do more with less (with respect to manpower)". The meteorological situation is aggravated by the fact that weather services by their nature are labour intensive and this, coupled with an increase in service particularly for the soaring community, dramatizes the relevance of "doing more with less".

If we consider the second challenge we have to learn to differentiate in our verification system between operational hits and misses and a system of verifying the forecasting of weather parameters not having an operational impact. The third challenge is self-explanatory and poses undoubtedly the biggest professional as well as technical challenge to our trade; the latter being extremely valid for the forecasts for soaring activity. The general trend in all the

meteorological services, to cut man-years and increase services, goes hand in hand with another modern trend, namely increased automation and centralization, a development leading to a tendency to change from MAN-produced forecasts to MACHINE-products. A number of team meteorologists as early as 1970 in Marfa organized a working group to counteract or at least to try to balance the consequences of this tendency.

Two working meetings in Zell-am-See and Oerlinghausen, attended by more than a dozen highly qualified and experienced soaring forecasters representing as many countries, laid the foundation of Technical Note 158 Handbook of Meteorological Forecasting for Soaring Flight on behalf of OSTIV and prepared in collaboration with WMO.

It is simply a fact of life that the needs of the soaring pilot and for that matter the majority of general aviation pilots and certainly all the other part-time aviators — like balloonists, hand-gliding enthusiasts and sky-divers — for detailed and highly accurate forecasts for a relative short time span and a limited area. Whilst these people are depending more and more on adequate meteorological advice and assistance they are almost everywhere grossly neglected with respect to meeting their fully justified demands. For this group, an ever growing community within the whole big family of aviators, tailor-made forecasts amplified by thorough consultation and advice by highly qualified and experienced professionals is, and remains for quite some time, a strict MUST.

The increasing tendency towards the use of Models in operational forecasting, which cuts down manpower requirements, results in a decrease in the number of experts working in the field of meteorology. I should mention here that I am the last one to play down or question the value of the models for the whole forecasting system. Au contraire I am personally very much in favour of this kind of development — with one very important proviso, however — and this is a philosophy rooted in the conviction that Man should make full use of the Machine but never let it be that he is used by the machine. Therefore I am standing up for the "3M" forecast system, the 3M's standing for Man-Machine MIX.

There is no doubt amongst the great majority of meteorologists, from the line forecaster all the way through to the more scholarly types in our profession,

that the model alone cannot answer the multitude of questions raised by the user or solve all the equations not followed by the atmosphere. Let me quote myself here: In a speech given as the guest speaker during an annual meeting of the Canadian Meteorological Society I made the remark that I am pretty sure that the atmosphere is illiterate and missed a number of courses in maths and physics, since otherwise she, he or it would read our forecasts and/or understand our equations and consequently act accordingly. Now it is the hope that this "Manual", together with the planned seminar to be

held presumably next spring and more than likely in the German Federal Republic with Dr Manfred Reinhart and the DVFLR as our host, could fill or at least close the otherwise widening gap between meteorologist and pilot, for a start within the soaring community. Both the manual and the upcoming seminar should become a "first" in the following:

- a) Establishing a worldwide concerted effort to further standardization in forecasting for soaring activities of all sorts.
- b) Setting up a "brains trust" and a data bank drawing upon the vast ex-

perience of many qualified forecasters who are willing to contribute to this effort — their professionalism and enthusiasm being the source and the motor of the whole undertaking. Only thus is it possible to go ahead despite the budgetary constraints.

- c) Last but not least enhancing and initiating a research programme based on methodical sampling and structured investigation of both pilot reports (debriefings) and forecasts as such.

The lecturer then dealt with questions on the "Manual" from members of the audience.