

Meteorology

Its importance and limitations

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THE Meteorological (Met) branch in IAF, basically, caters for providing weather information to its various users for the safe conduct of air operations, both during peace and war. Thus, judging by the nature of its task, Met branch can be classified as a service providing organisation. For any organization providing services, the most important aspect is to gear up for its user's requirement. In case it fails to do so, it slowly loses its importance. Likewise, for Met branch in IAF, the assessment of the user's (mainly aviators) requirement in order to meet the constantly changing flying environment is a continuous process and requires periodic review.

The aim of this article is to make the initial assessment of the limitations of the Met branch vis-a-vis requirements of its users in IAF and suggest measures for the benefit of Flight Safety.

ASSESSMENT

We require to assess the following three aspects of the present meteorological organisation in IAF.

- (a) The existing position of Met branch with respect to its resources.
- (b) The current requirements of the user and the extent to which Met branch can meet these requirements.
- (c) The extent to which Met branch can meet user's requirements in future.

MET RESOURCES

IAF Met branch is presently dependent upon India Meteorological Department (IMD) and its allied civil agencies for the desired basic met information i.e. the synoptic network (Weather charts and associated information). Besides, IAF Met has a small network (like Tropo communication channels and Met W/T) to cater for its special needs. IAF Met also has modern met instruments like DIRECT

RECEPTION SYSTEM (a satellite link for providing met data disseminated by IMD), SATELLITE IMAGERIES RECEPTION AND VIDEO DISPLAY SYSTEM (a system for obtaining INSAT satellite imageries processed and disseminated by IMD) and Meteorological Message Handling system (A sub unit to DIRECT RECEPTION SYSTEM for storage and handling of the data) at almost all the flying stations. Having determined the resources, it is not very difficult to assess our strengths and limitations and decide as to what Met branch can provide to the users.

PRESENT REQUIREMENTS OF USER

The next stage is to know and assess the user's requirement. This is where the requirement of bridging the gap between the position of Met branch and the user's requirement comes. Probably, it is the most difficult part of the exercise. Presently, Met branch may not be in a position to bridge this gap to the desired extent because of its limitations. Therefore a compromise may have to be reached for the interim period. The most important aspect of such an exercise shall be to make both Met branch and users aware about the existing gap and compromise.

FUTURE REQUIREMENTS OF USER

The last stage is to undertake the task of research and development in order to reduce the existing gap. This will also help the Met branch to

know as to what it should develop now in order to meet the future requirements of the user.

DIMENSIONS OF USER'S REQUIREMENT & LIMITATIONS OF MET

FROM AVIATION point of view, aircrew would like to have forecast of in-flight visibility, severe turbulence, wind shear, icing, CAT and other significant weather conditions. At the first analysis itself, one can assess that the current data network of Met branch is insufficient to fulfil most of these needs, that too accurately. The insufficiency basically relates to two factors:-

(a) Completeness of the desired input available to IAF Met.

(b) Reliability of such inputs.

Let us now consider a few of the aviator's requirements in greater details:-

(a) Aircrew would like to have the slant visibility along the glide path. The maximum that Met can provide them is an assessment of the horizontal visibility or Runway Visual Range (RVR), which in some cases may be quite different from reported slant visibility.

(b) Aircrew would like to know cloud base overhead, down-wind and along the glide path. Without any measuring instrument, what Met can provide them is the estimated cloud height taken at hourly or half hourly interval.

(c) Aircrew would like to have a very high degree of accuracy in Now-casting (Weather Warning/CMR).

But sometimes what Met can provide them is the Now casting of a relatively lower accuracy. This is because of the absence of the desired inputs available to Met for Now-casting.

(d) Aircrew (in particular, pilots at fighter base) would like to have continuous flow of information about the weather approaching the base and local flying area from a Weather Radar, but what Met can provide is purely a generalised inference based on a satellite picture covering a larger area with relatively poor resolution (than Radar), at an interval of three hours.

(e) The present density of the synoptic network of met observations in India is by and large sufficient for predictions of large scale systems but at times fails miserably while forecasting Mesoscale systems. As a result, the desired accuracy of Local Forecast, for an area of 25 NM around the base, is a difficult proposition for Met. In the light of this limitation, the accuracy of Weather Warning/CMR applicable to the smaller area (airfield and neighbourhood i.e. approx- imately 5NM around the base) is definitely more difficult.

(f) The reliability of the visual Met observations during night is subjective due to the limitation of human eye itself.

During War, aircrew would like to have precise and accurate information on weather over target area and enroute. In the absence of the precise information available to Met on the location of the target and planned route, it would be always at

a loss to provide the information of the desired accuracy to the user.

APPROACH TO DETERMINE USER'S REQUIREMENTS

Precise and reliable inputs are required from the user in order to know their requirements. We can adopt various approaches to know and assess the user's requirement. The following approaches may be helpful to both Met and its user:-

- (a) Passive Approach
- (b) Active Approach

Passive Approach. This involves the evaluation of the requisitions for forecasts/weather debriefs as and

when received from the user, at field units. Such an approach may provide valuable information concerning some specific decision making, but in general, yield an insufficiently detailed data to tailor the user's requirement.

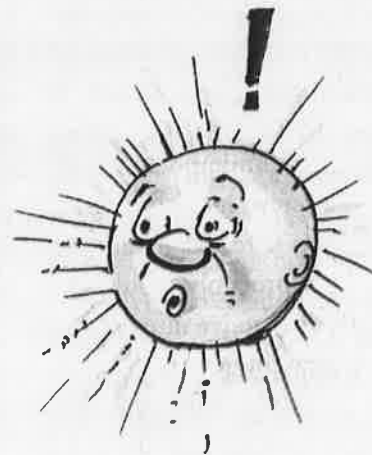
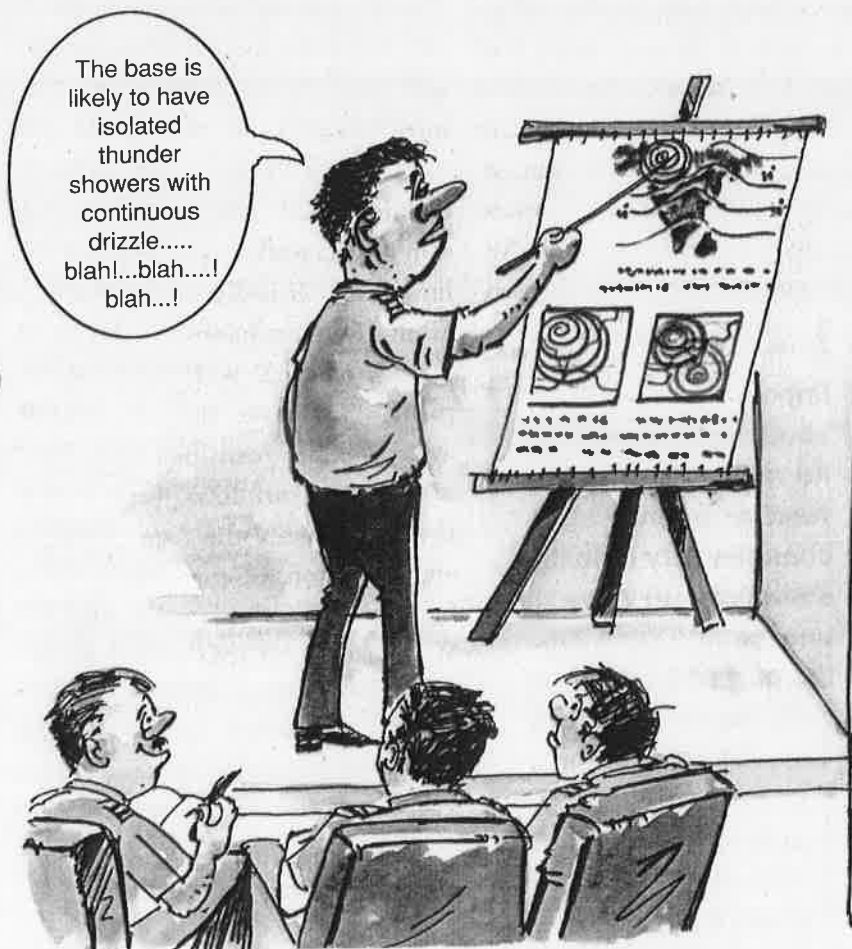
Active Approach. This will involve the requisition and evaluation of periodical surveys/interviews with the relevant users, both at field units and higher formations. However, the quality and utility of data obtained from such an investigation is directly related to the insight and care with which the study is designed and

conducted.

ROLE OF METEOROLOGICAL OFFICER DURING PEACE & WAR

Looking on the panorama of the war as a whole, we find that at every stage, there is ample scope for the Met Offr to help in the planning and execution of the air operations. Even during peace, the role of Met Offr remains important in the process of training of aircrew.

Aircraft are highly expensive and complicated equipment, and our aircrew are even more valuable. The Met Offr has, therefore, the moral



responsibility of contributing, to the best of his ability, to the conservation of our aircraft and aircrew. His contributions are not counted in terms of financial implications directly, primarily because he helps to prevent. Prevention is against loss of men and materials, as also against failure in missions.

LET US CONSIDER a situation where the weather may be really marginal for certain type of task. For example when the task requirement is that there should be no rain, and the weather situation is such that "It may or may not rain". In this case, with the clear understanding of the weather situation and limitations of Met branch, a commander or planner can seek the professional advice of Met Offr and take calculated risks. If the Met Offr besides being professional, in addition, is generally aware about the limitations of the aircraft and aircrew, he would be in a better position to render his advice precisely. This probably would be possible if there is active interaction between aircrew and Met Offr. The Met Offr not only volunteers for flying the aircraft as supernumerary crew, but is also encouraged by commanders to do so.

ROLE OF AIRCREW IN UNDERSTANDING THE WEATHER

Aircraft operates in the atmosphere, and Meteorology is the science of the atmosphere. The more the Air Force knows about the weather, the better equipped it is to take advantage

of it. Understanding the weather is of importance to the aircrew as much as to a Met Offr. It is not expected of an aircrew to be a forecaster, but there are many circumstances in which the knowledge of weather may become a matter of success or failure of the mission.

Understanding the fundamental principles of weather will render the advice of Met Offr more intelligible, hence enable the aircrew to interpret the weather conditions. This will assume additional importance when the advice of the Met Offr can not be obtained, for example, during a long flight into enemy territory.

Weather may behave as a useful friend or formidable foe depending upon how it is evaluated and exploited. It is not to be assumed that weather always restricts air operations. By proper planning, even so called "adverse weather" can be turned into an ally to score surprises on enemy. In Oct 1942, the RAF bomber command successfully used

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the extensive cloud cover to cross France in day time, during their raids on Milan in Italy. On the other hand, in Sept 1940, unusually fair weather prevailed over England and it enabled the 'Battle of Britain boys' to spot and chase the German bombers out of their territory.

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CONCLUSION

The Meteorological requirements of Air Force are specialised in nature and are likely to become more so as new aircraft and equipment are introduced in IAF. The existing modern met instruments and communication channels are not the only answer to all the problem areas/limitations. It is desirable for us to assess the user requirements, both at field units as well as higher formations, make the user more aware about the existing limitations of Met and work towards bridging the gap between the requirements and limitations. A compromise can be reached for the interim period. We must have a separate Research and Development cell for assessing and meeting the future requirements. Active interaction between Met Officer and aircrew can be very helpful in the whole exercise. □