ADDING VALUE – THE FORECASTER'S ROLE

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1. Introduction

With numerical models improving all the time and increasing volumes of forecast data freely available there has been a changing role for the human forecaster over the years. We have now reached the point where raw model forecast data is good enough for many customers. They accept that it will be incorrect on occasions but prefer an automated, fast feed of information to one that could be potentially delayed by human intervention. Other customers are prepared to pay for a service with 'added value' (e.g. consultancies, operations involving risk). Of course, the 'added value' needs to be verified in order to assess the gain over using raw model data. Such verification schemes can be difficult to devise and cannot be based purely on RMS errors. However, if the forecaster is seen to not be adding value then the arguments for maintaining and funding the human element is potentially undermined.

2. The story so far

Forecasters at the Met Office developed a new approach to medium range forecasting a few years ago by using the principle of the 'preferred solution' with a confidence attached whilst allowing the possibility for alternative scenarios when there were large divergences between model solutions (Grahame, 2000). The forecaster makes a subjective assessment of the available model data (from both deterministic solutions and those from Ensemble Prediction Systems) before producing guidance. Raw model data is modified in a consistent manner using On Screen Field Modification (OSFM) and the technique has been documented by Carroll (1997). Subjective verification (based on pressure patterns) has shown that the 'preferred solution' has performed better than any one deterministic model taken in isolation (see Figure 1). The aim now is to extend the on-screen modification technique to the shorter term and tackle smaller-scale and sometimes more subtle 'weather' elements such as cloud cover, rain/snow, mist/fog and surface temperature (in addition to synoptic scale aspects such as surface pressure). Potential vorticity is still used to impose consistency of the dynamical fields with pragmatic cut, paste and advection tools for 'sensible' weather. The upgraded technique has been called OSFM2.

3. Recent developments in short-term guidance

The principles behind modifying smaller-scale elements of model data are essentially the same as for the larger-scale aspects in the medium range. It is very important that the forecaster has a good understanding of model characteristics (strengths, weaknesses, biases), especially in relation to the model on which the short term forecast is based. In our case, we use the Met Office mesoscale model (approx. 12km resolution in the horizontal). Data from

other available models is also taken into account of course as well as the identification of errors in the initial fields (e.g. a misplaced rain band).

At the same time as introducing short term modifications, it was decided to change the whole structure of central guidance to a web based product using more graphics and less text. The set of modified charts form the basis of this guidance (see Figure 2) whilst forecasters have the option of importing additional graphical products from the HORACE workstation (e.g. other model fields, satellite images etc.). Figures 3 and 4 provide working examples. The trial of the new procedures started at the end of October 2002 and has been running since then. The advantage to the user is that 'added value' is shown graphically and forecasters are very good at assimilating information in this format. Feedback from the regional forecasting centres across the UK has been very favourable.

4. The future

The modified fields and parameters are only displayed at present but the aim is to replace the raw data stream to automated systems with the modified data stream. The advantage of this is that there will be a consistent set of products produced centrally – a concept known as 'change once, use many'. However, it must be proved that the forecaster is adding value and this is where the choice of verification scheme is so important. It is acknowledged that verifying spatially incoherent fields in a meaningful way is rather difficult. The other potential problem of modifying fields is that this post-processing takes time so some delay in transmission is inevitable (relative to a raw model data stream). It is up to the customer to decide if such a delay can be tolerated and it is up to the forecaster to justify this delay by adding sufficient value. This is the challenge that all forecasters will face eventually.

References

Carroll, E.B. (1997) A technique for consistent alteration of NWP output fields. Meteorol Appl. **4**, pp 171-178

Grahame, N.S. (2000) Portraying uncertainty in medium range guidance. WGCEF Newsletter No. 5, pp 46-50

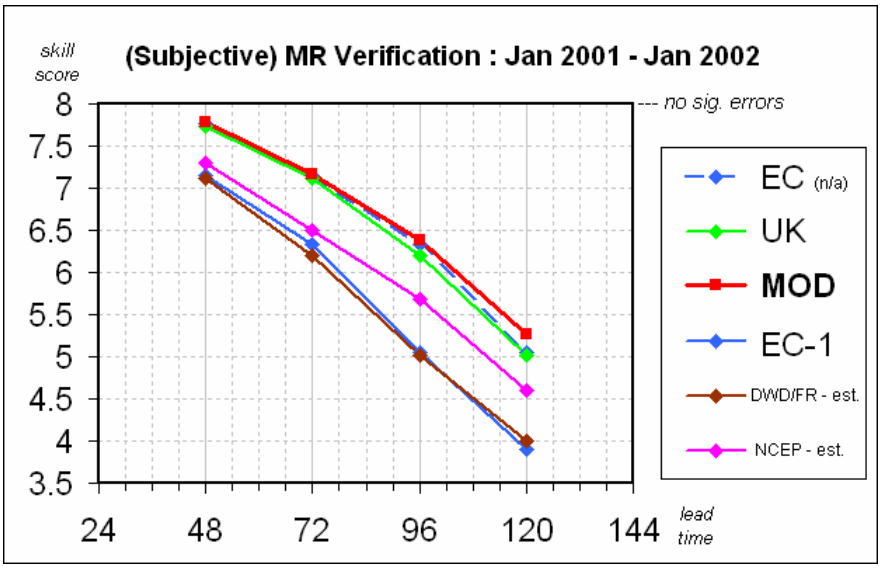

Figure 1. Subjective skill scores for various lead times. The red line represents the 'preferred solution' issued by Met Office forecasters. This provides better guidance than any other single deterministic solution.

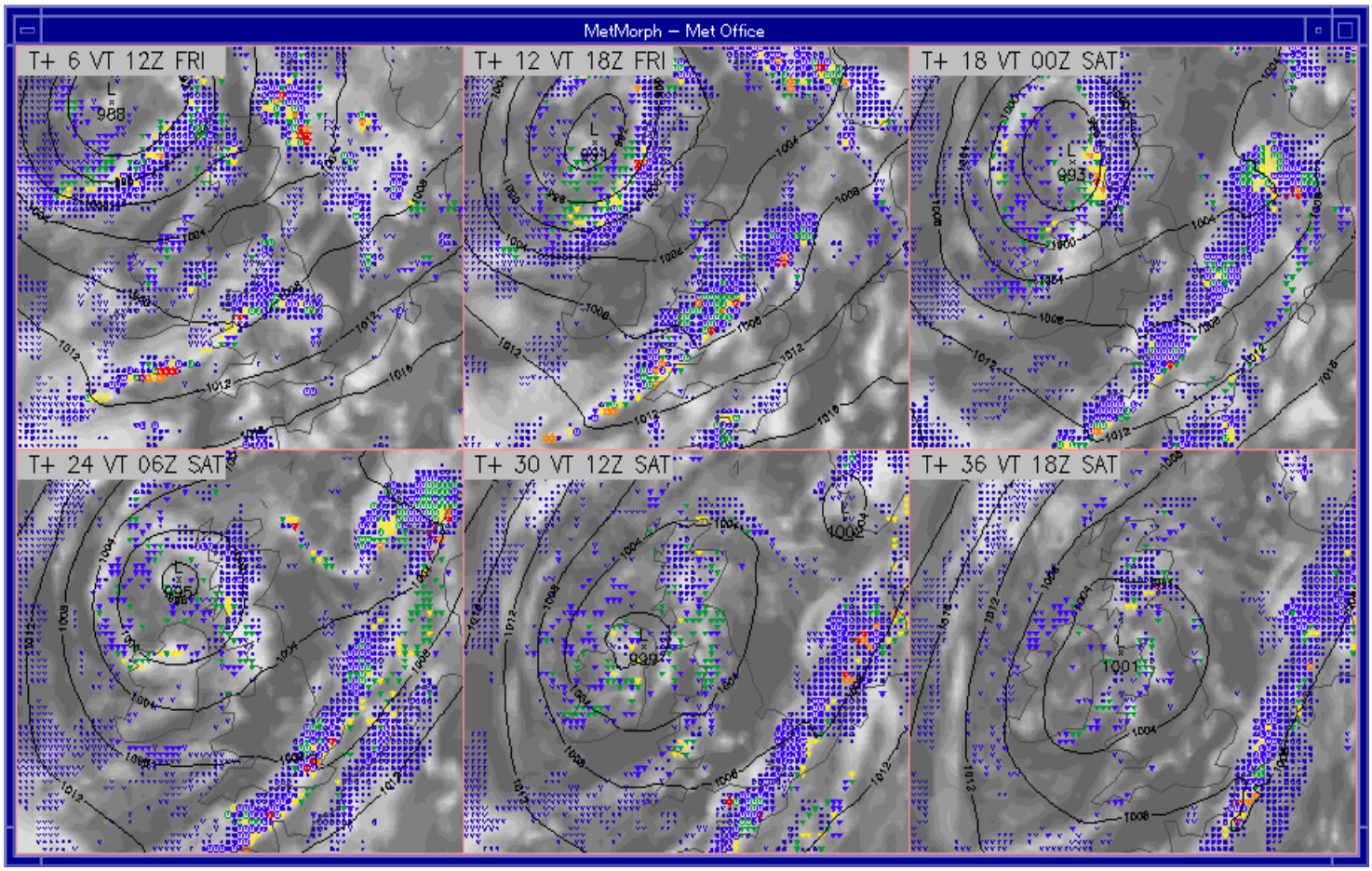

Figure 2. Modified fields of precipitation (colours mimic radar rates) and total cloud cover every 6 hours from T+6 to T+36.

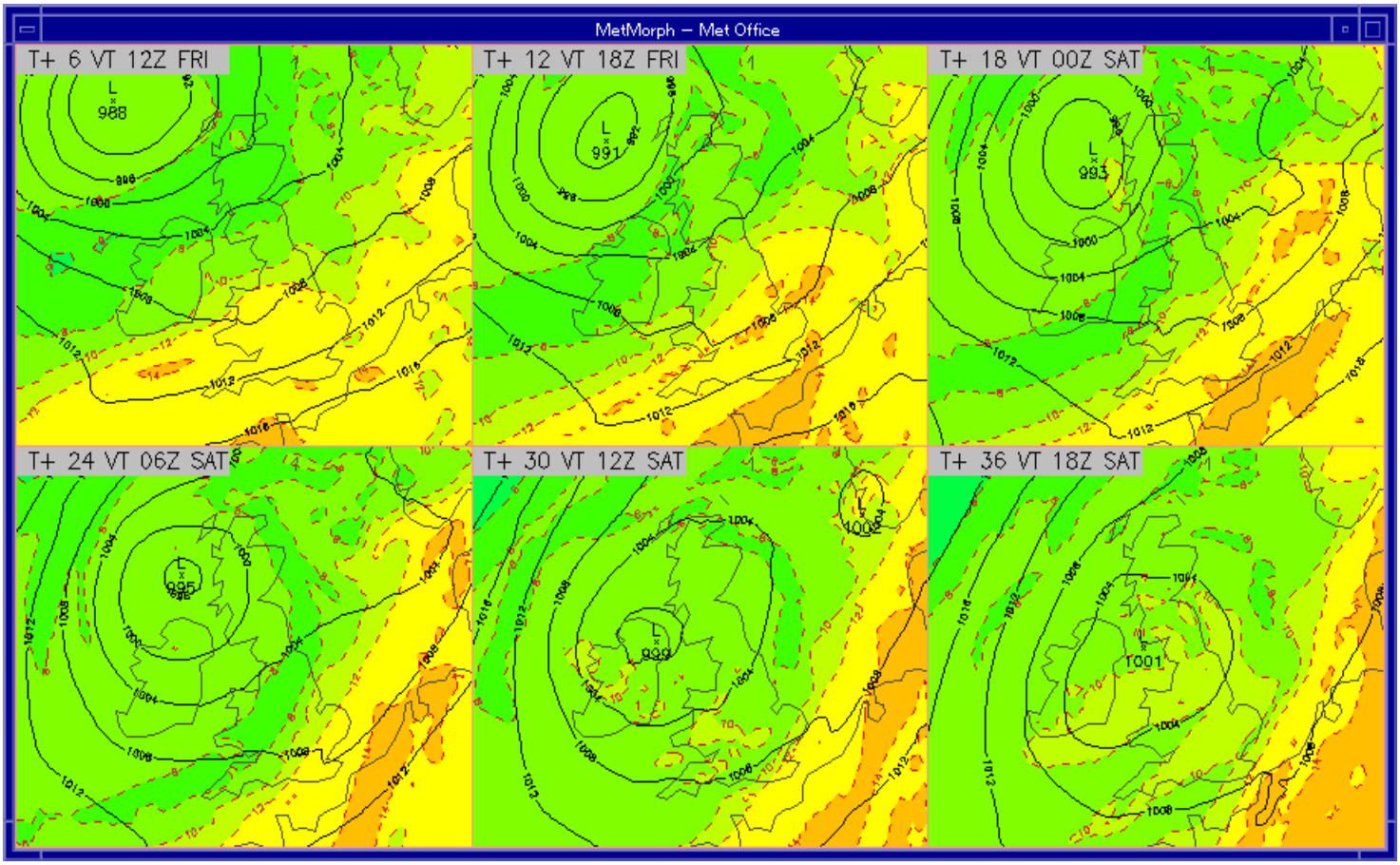

Figure 3. Example of additional modified fields that can be added to web based graphical guidance (10m temperature and surface pressure).

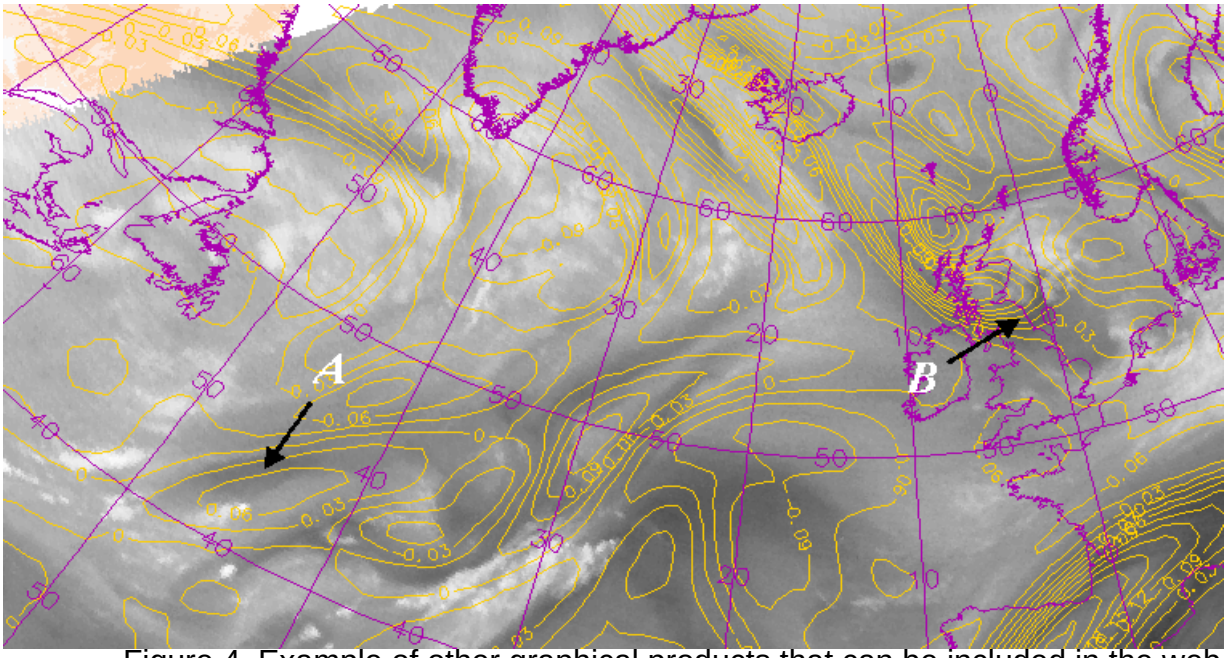

Figure 4. Example of other graphical products that can be included in the web based guidance. Here the water vapour image has an equivalent model diagnostic superimposed and mismatches are pointed out (A and B).