PROVISION OF GRAPHICS AND IMAGERY TO FORECASTERS WITHIN CENTRAL FORECASTING OFFICE UK MET. OFFICE.

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1.   Introduction

The Central Forecasting Office of the UK Meteorological Office has a variety of operational commitments, which are supported by numerous soft and hard copy facilities. The forecaster has access via alphanumeric and graphical programs to meteorological observations and to the output of the NWP models. Examples will be shown of the graphical display of such data, and of the superposition of observations or imagery on numerical forecast fields.

The CFO has a variety of graphical display devices, but only the IBM 5080 (a powerful graphics terminal) has the facilities suitable for displaying imagery. Display programs are written using GKS (an international standard plotting package) wherever possible, unfortunately GKS does not support imagery in an acceptable manner. The display software involving imagery has thus been written in low-level code for the 5080.

2.   Display software for CFO

All CFO graphics are provided on terminals which are connected to the IBM mainframe. The forecaster interacts with the display system via a series of menus, so he need not know

anything about the underlying software. These menus give the forecaster a selection of the display options which are available on that device. The appearance of and interaction with these menus cannot be entirely uniform because of the differing software packages used by the various programs.

Three display facilities will be shown, illustrating the use of GKS and of low-level 5080-specific code. The first, which has been written using GKS, displays observations over a NWP field. The second displays imagery held on an image database. The third displays selected model fields, with the option of animating the sequence of fields or of superposing on available imagery. These last two options have been written using low-level code for the 5080.

2.1 Displaying observations against NWP field

This facility displays observations against a forecast field. The observations are taken from the Synoptic Data Bank (SDB). The user chooses the data date and time, the 'level' of the data (surface or upper-air), the background field and the chart area of interest.

The display initially shows only those observations which do not meet the SDB quality control, or which disagree with the background field. The user can switch on or off each type of observation, can switch in the non-flagged observations, can zoom and pan about the chart area and can display the full observation at a position. This observation is displayed in a separate box at the top of the screen. The observation closest to the chosen position is chosen initially, but the forecaster can search in turn through all the observations within 1 degree latitude and longitude of the chosen position.

2.2 Displaying Imagery

This option can display any images which are held within the IBM image database. The forecaster can restrict the choice of images via an initial selection panel, eg define a time of image validity. The database is then searched and a list of all available images which satisfy the selection criteria is displayed. The user then selects one or more images to be displayed.

The user can choose the colours used in displaying the image from a pre-defined set of colour tables. Where appropriate, the user can also change the contrast stretching to be applied to the image - concentrating on a range of pixel values of interest.

2.3 Displaying forecast products with imagery

This option displays selected products from the NWP suite, with the option of superposing imagery when available. A fixed set of chart areas have been defined. Forecast products are graphically realised (as contours or symbols as appropriate) on these chart areas and then held as graphical 'metafiles' on a graphical products database, currently these data are stored in a 'home-grown' format. These products are produced routinely as part of the NWP suite. Imagery is composited and reprojected onto these chart areas, as the imagery becomes available on the IBM mainframe. The resulting reprojected imagery is held on the image database.

The forecaster can restrict the choice of products via an initial selection panel, eg fine mesh products only. The database is then searched and a list of all available products which satisfy the selection criteria is displayed. The user then selects up to four products to be displayed at one time. These products have to be on the same chart area.

Each graphical metafile contains a series of product
fields for all verifying times within a forecast run. The user
decides how to step through this time sequence (backwards or
forwards), making choices via program function keys. If the
user chooses to display an image, the image database will be
searched to find a suitable image. If such an image is found,
the image will be superposed on the graphical products, if one
cannot be found a suitable message is displayed within the
titling.

The sequence of products can be animated, but storage
limitations on the graphics device may truncate the sequence
if a large number of complicated fields are superposed.
Storage limitations also prevent animation if imagery is
superposed.

3.   Future Work

The option to display observations against NWP products
is being developed so the forecaster can reject or correct
observations.

It is planned to introduce the superposition of
observations, NWP products and imagery.

A new satellite data system is being introduced, which
will supply an increased quantity of data, much of which will
be digital. The displays of imagery will be upgraded to make
use of such data.

It is planned to progressively transfer the products and
image databases over to holding data in a standard metafile
format, eg CGM.

Software will be changed over to using GKS as the
features of the implementation are upgraded.

It is planned to move over to a consistent user interface, as the software permits.

More powerful work stations, with improved response time, and better handling of imagery may come into use.