



Proceedings of the

# 10th EGOWS meeting

held at KNMI, De Bilt, Netherlands, 7-10 June 1999



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# Organization

The 10th meeting of the European Working Group on Operational Meteorological Workstations, EGOWS, was hosted by KNMI, Netherlands.

## *Organizing committee*

Willy de Bruin  
Peter Lagerweij  
Ben Wichers Schreur  
Dick Blaauboer

## *Acknowledgement*

Hewlett Packard Netherlands and SUN Microsystems have kindly provided workstations for demonstration purposes.

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## Introduction

The 10th meeting of the European Working Group on Operational Meteorological Workstations, EGOWS, was held at KNMI De Bilt, the Netherlands.

During his opening speech director of KNMI, Dr. Harry Fijnaut, welcomed 33 participants from 15 countries. He also memorized not only to discuss developments of workstation systems used by forecasters but also not to forget end user systems. During the meeting many discussions of both types of systems took place.

The 10th anniversary (or really the 9th anniversary, but the 10th meeting) of the EGOWS was memorized with a special EGOWS pie. Since 1990 every year a meeting has been organized:

1990: Oslo (DNMI)  
1991: Paris (MF)  
1992: Helsinki (FMI)  
1993: Offenbach (DWD)  
1994: Copenhagen (DMI)  
1995: Vienna (ZAMG)  
1996: Reading (UKMO)  
1997: Toulouse (MF)  
1998: Norrköping (SMHI)  
1999: De Bilt (KNMI)

EGOWS was initiated by Sigbjørn Grønås (DNMI) and Jean Coiffier (MF).

After mentioning a short note from Patrick Bénichou from Météo-France, who couldn't attend the meeting because of a change of position at MF, the 10th EGOWS started with an interesting presentation of invited speaker Edward Verbree from Delft University of Technology about 3D interaction with GIS (Geographical Information Systems). During the next sessions many valuable presentations were given by the participants, both on recent developments and future plans with respect to meteorological workstations and on graphical interactions and production systems. The "miscellaneous" session comprised some special meteorological applications.

In parallel with the presentation sessions also 12 systems were demonstrated, some of them with real time data. Both operational systems and prototypes of systems under developments were presented.

Furthermore sub-group discussions were organized on three themes:

Visualization Techniques;  
Interaction Design;  
Graphical Interaction and Meteorological Objects.

Reports of the presentations and of the group discussions, including valuable recommendations, can be found below. Apart from the organized discussions a lot of informal discussions took place between sessions. The informal character of the EGOWS meeting is still felt as a very useful way of exchanging experience and exploring possible fields of cooperation. In this perspective the initiation of the Working Group on Meteorological

Objects and Grids in Graphical Interaction has been announced. This working group, recommended by the COST-78 International Workshop on Graphical Interaction with Gridded Fields, and initiated by Météo-France and KNMI is aiming for further definition and evaluation of the concept of Meteorological Objects which tend to become increasingly important in current operational practice. The working group is chaired by Eric Brun from MF and will have its first meeting on September 17th, 1999 in Norrköping (in parallel with ECAM-99).

The final discussions on Thursday 10th of June concluded a very successful 10th EGOWS meeting. Participants were thanked for their contributions and the local organizing committee was thanked for their work. The participants hoped to meet again next year. Shortly after the meeting it became clear that FMI was willing to host next year's meeting. Since SMA, Switzerland and Jersey Meteorological Department showed their interest for hosting the meeting during the years after 2000 we now have the following list of future organizers:

2000: FMI, Finland,  
2001: SMA, Switzerland  
2002: JMD, Jersey/UK

Thank you Juha, Paolo, Anthony for taking care of that and good luck!

See you hopefully next year.

Dick Blaauboer

**Edward Verbree: Delft University of Technology, Netherlands**

## 3D interaction with GIS



## 3D Interaction with GIS



**Edward Verbree**  
**Delft University of Technology**  
**Department of Geodetic Engineering**  
**Section GIS-technology**

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## Contents



- **Case: Integrated GIS & Virtual Environments**
  - Planning and Design of Infrastructure (rail / road)
- **Multi-View Approach**
- **GIS / VE interaction**
  - Map-Use-Cube
- **Virtual Environments**
  - Characteristics / Systems
- **Linking VE to GIS**
  - Visual Interaction
- **Conclusions**



- **Objectives**

- Development of an operational system for modelling, manipulation and analysis of spatial (GIS) data within a Virtual Environment
- Two way link:
  - Visualise GIS-Data within a Virtual-Environment
  - VR-interaction / manipulation controls GIS-Data
- Multi-Systems (NT / UNIX - Monitor / 3D-Projection)
- The final GIS&VR System (Karma) has to be an operational tool for planning and development of new infrastructure (rail / road)

- **Main design phases**

- Orientation and Planning Survey
  - Exploration of all relevant information and relations
  - Benefits and necessity of project
- Design and Modeling
  - Global design
    - Multiple alternatives for routes
  - Local design
    - Two or three proposed routes and constructions
- Presentation and Decision-making





## Planning Process (2/3)

- **Design and Modeling**
  - **Global design for multiple alternatives**
    - Impact of design on its global environment
      - Mostly ecological / landscape related
      - Use of (2D)-GIS calculations and analyses (what if..)
    - Quantitative to compare alternatives
  - **Local design for two or three 'best' alternatives**
    - Impact of design on its local environment
      - Mostly social / visual / noise nuisance related
      - Use of 3D-GIS visual analyses
    - Qualitative to get 'best' design



## Planning Process (3/3)

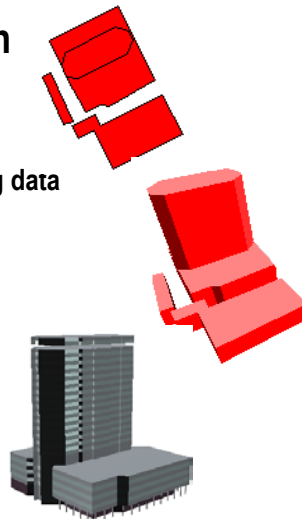
- **Presentation and Decision-making**
  - **Participants**
    - Designers (Best construction)
    - Politicians
    - Citizens (Not in my Backyard)
  - **Presentation of design**
    - Maps / CAD renderings/ Photo-collages / Scale models



- **Dimension of Spatial Data**
  - 2D layers, 2½D surfaces, 3D geo-objects
  - Objects are representations of ‘real-world’ objects
  - Double or triple representation is possible
- **Operations, manipulations and analyses**
  - Interaction on geo-objects
  - Shift from quantitative to qualitative analyses
    - Impact, sight, shadow
    - Impression, perception

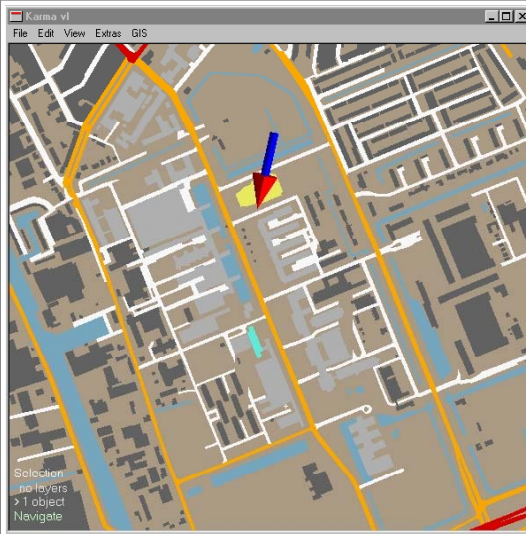
- **Fit System / View / Dimension**

- Plan view
  - 2D (symbolic) representation
  - Specifying, selecting and exploring data
- Model view
  - 2.5D Scale model
  - Manipulation
- World view
  - 3D Realism / Immerse
  - Navigation and evaluation





## Plan View



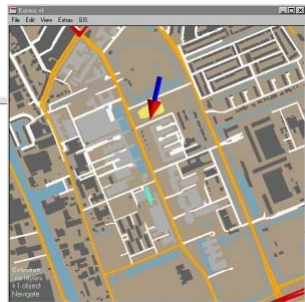
GEODESIE  
TU Delft



## Model View

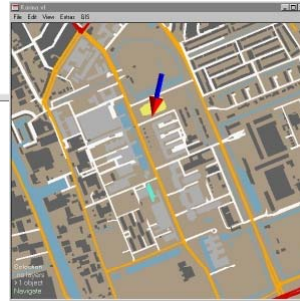


GEODESIE  
TU Delft



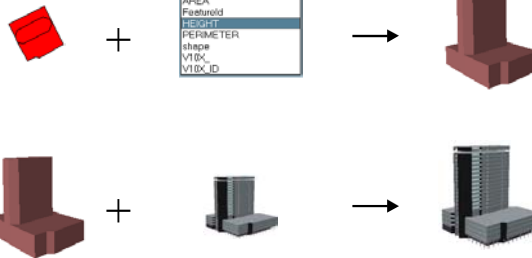


# World View

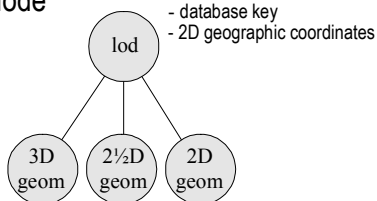


# Data model

## Karma



## Level-Of-Distance Node





## Karma Functionality

- **Karma = GIS + CAD + VR**
  - GIS
    - SDE-API
      - Spatial Indexing / Generalization / Overlay / Buffering
  - CAD
    - File-based (3DS, DXF, etc.)
  - VR
    - WTK-API
      - Stereo / High performance / Multi-Platform



## Characteristics of Virtual Environments

- **Immersion**
  - The sensation of 'being in' the environment
- **Interactivity**
  - System or user controlled manipulation of:
    - scene viewpoint (e.g. panning, zooming, rotating)
    - scene contents (e.g. geographical objects and features)
- **Information representation**
  - The detail and dimension of with which objects and features of a virtual environment are represented (level of detail)
- **Intelligence of display objects**
  - The extent of context-sensitive 'behaviors' / 'awareness'

- **Map-Use-Cube**

- MacEachren (1994)

- Use

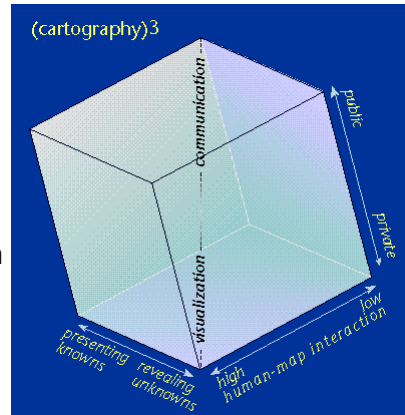
- Private / Public

- Information

- Exploration / Presentation

- Human-map interaction

- High / Low



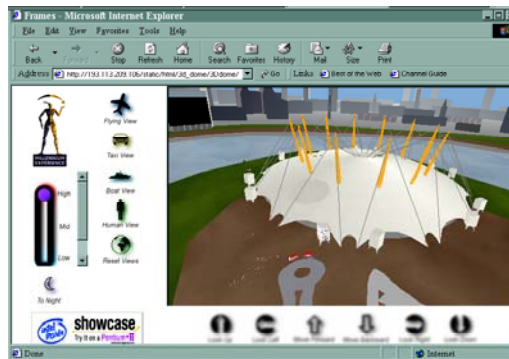
- **GIS / VE Interaction**

- Switch constantly between visualization and communication

- **VISCAPE** [http://193.113.209.106/static/html/3d\\_dome/3Ddome/modell/index.htm](http://193.113.209.106/static/html/3d_dome/3Ddome/modell/index.htm)

- Communication

- use
  - public
- information
  - presentation
- interaction
  - low

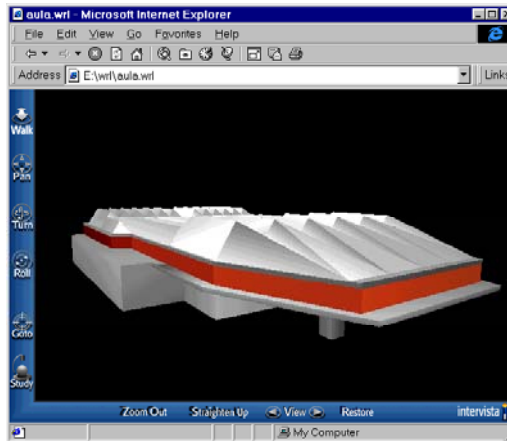


## Non-Immerse Virtual Environments

- **VRML**

- **Communication**

- **use**
      - public
    - **information**
      - presentation
    - **interaction**
      - low



## Immerse Virtual Environments

- **Head Mounted Display**

- **Totally immersed = no communication !**



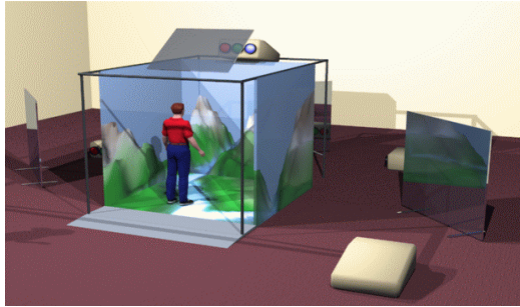


## Immerse Virtual Environments

- **Projection**

- Partly immersed = communication !

- CAVE (SARA)
    - Theater VR (TNO-FEL / TUD-Geodesy)

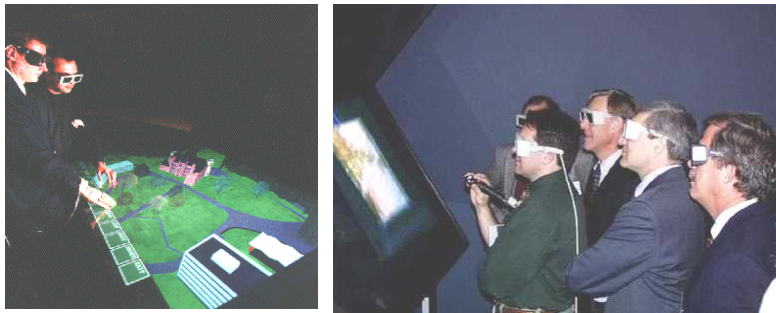


## Immerse Virtual Environments

- **Projection**

- Partly immersed = communication !

- Virtual Workbench (TUD)





## Virtual Environments and Multi Views

- **Plan View (2D)**
  - Mono-Projection: Monitor
- **Model View (2½D)**
  - Mono-Projection: Monitor
  - Stereo-Projection: Workbench
- **World View (3D)**
  - Mono-Projection: Monitor
  - Stereo-Projection: Cave



## Linking Virtual Environments to GIS

- **Link is based on direct visual interaction**
  - **Orientation and navigation**
    - Identification and interpretation
    - Cartographic representation
  - **Selection and query**
    - Virtual and real input-controls in Virtual Environment
    - Processing in (3D)-GIS
    - Schematic and thematic output in Virtual Environment
  - **Manipulation and analysis**
    - Performs subset of analysis via scenarios or variables



## Visual Interaction Tools

- **Immersed:**
  - **Basis interactivity for scene viewpoint**
    - Head / eye tracking, 3D-mouse
  - **Basis interactivity for scene contents**
    - Pointer, headlight
  - **Information representation**
    - Level of realism (cartographic, geometric, texture-mapping)
    - Multi scale and multi views
  - **Intelligence of geo-objects**
    - Virtual guide, speech, sound



## Conclusions

- **Use Virtual Environment as GIS-interface**
- **Design tools for visual interaction in 3D**
  - Compare map-interaction in 2D-GIS
- **Fit GIS / Virtual Environment to support workflow**
  - Compare map-use in 2D-GIS

**Jacob Brock: DMI, Denmark**

## Update on recent developments at DMI

## **Update on recent developments at DMI for the EGOWS 10 meeting**

*Jacob Brock, Head of Graphical Applications Development*

### **Year 2000 problem**

As probably in most computer related businesses, a substantial amount of work has been - and still has to be - put into checking the behaviour of programs at the coming turn of the year.

The first analysis was an evaluation of each and every operational program by a programmer to determine whether the program has no Y2K problem, is dependent on another program, which might have a Y2K problem, might have a Y2K problem or definitely has a Y2K problem. Not unexpectedly, most of the programs were categorized as potentially problematic or dependent on such a program.

But the biggest problem has turned out to be, how to get relevant test data. Some standardized GRIB and BUFR data are available, but often data has to be generated by a new program, which in turn might produce erroneous data.

Another major problem for developers of end-user programs is that they are at the end of the data stream, and people upstream are not through with their Y2K-tests and corrections yet.

At present (end of May '99) nearly 60% of our programs are declared Y2K ready and we have got until end of September as our internal deadline to get the rest done.

A lot of work is being spent in this area. As a positive spin-off some older programs are being renovated, and we are getting an improved documentation on the configuration of and data streams used by the programs.

### **The continued growth of the web**

An ever increasing amount of data are being presented on the web.

Current weather, based on observations, are updated at 3-hourly intervals. Some climatological data are now available on our homepage, covering the norm and the last 2 1/2 years of observations.

The pages are partly in traditional fixed layout, but as the amount of data is increasing, it is not feasible to produce everything in advance, and a number of features have been implemented using Java applets.

We are also looking into customized pages, which will start up the way you configured them on your last visit.

The present traffic is at 106000 pages/13000 user sessions on average per day.

Our OPMET service (aviation forecast, TAFs, METARs etc.) is being moved onto the internet just now. This means that users in the future will connect using telnet instead of a modem line. The service, which is only for registered users, who are danish or operate in danish territory, is mainly text based, but certain graphical products (SIGWX, Windcharts) can be downloaded as pdf-files. This new service has been approved by the aviational authorities as an official source of aviational forecasts.

Another new feature on the web is yachting forecast, giving forecasts of waves and wind for - mainly - domestic waters. In this setup, our 15 km HIRLAM model drives a WAM (from ECMWF) to produce wave forecasts, whereas the wind forecasts are from our 5 km model.

### **Media production**

At the moment, the forecasters are producing a number of similar products for end users. The contents of the products are nearly the same, only the methods of presentation vary. Hence, at the moment, we are working on a new system for the production of external presentations, in

which the forecaster will do one general, but detailed forecast. Then the system will take over and derive end products in all the different flavours required by the customers. It is not intended to be a fully automatic production. The system will generate end products, which are ready for delivery, but if required, any product can be edited manually before it is sent.

We are still in the early part of this project, which eventually will affect most of the production environment, and will have an impact on the working process of the forecasters.

Forced by the real world, we had to do a lot of work in the area of newspapers right from the beginning. So far the weather information had been edited by the newspapers themselves, based on a number of texts and table data from us. But suddenly, there was a request to get the weather box ready to print.

At that stage, we had only limited, but at least some experience on delivering products ready to print, using Adobe Illustrator. But within a few weeks, we were able to deliver a complete product to the first newspaper. Quite a lot had to be done by hand in the first version, but since then, a lot of the information is put in automatically, and most of the papers get the weather information ready-to-print by now.

We have gained a lot of experience in this process from which we can benefit in the continued development of our new media production system.

### Ship routeing and performance analysis

In the area of ship routeing, we have been able to get rid of the old style telex communication, as we have bought a system from the company ComText. This system, which is running under Window 95, takes care of sending messages and of monitoring the transmissions. We just have to send the messages to ComText, which takes care of the delivery that might include steps like trying different satellite channels, retransmission and so on. In this way a lot of the tedious administrative work has been removed from the routeing people.

As part of the ship routeing area, we are also able to do performance analysis on voyages. The performance analysis gathers information on the speed of the ship, the weather conditions and other data, and produces amongst other things an estimate of the fuel consumption, which can be compared to the reported consumption.

The analysis system obviously requires a good deal of daily information from the vessel. This information is gathered by the captain and was previously sent as a sort of free-style essay text on a telex. The relevant data then had to be typed in manually to update the performance analysis system.

This winter, the reporting was formalized in an e-mail template. The report from the ship is written in a fixed (although still freehand) format and sent to the shipping company, which send a copy to us. Then it is ingested (under supervision) by the performance system. By now, nearly all reports (currently from approx. 50 ships every day) can be read automatically by the mail reader.

### Road condition modelling and presentation

The system for forecasting the road conditions (during the winter period) is being further developed. The presentation part of it has reached a level, where only minor changes are needed. Instead, we are going to improve on the model used.

The model depends on the data obtained by the approx. 275 "road stations" as we term them. A road station is an automatic observation station, which delivers data every 10 minutes, and as a minimum gives air, dew point and road surface temperatures. Some give more parameters like road surface resistance and wind speed and direction.

So far, the model has been a 1D energy balance model for the surface, and a number of layers below the surface. The starting values for the model are forced by data obtained by the road

stations, and the forecast are forced by our HIRLAM model. If there is no observation for a station, no model will be run for that point.

In a new setup, our 5 km model D05 is going to assimilate observations from the road stations of which even more are planned to be installed. It will not be using all of the available data, but the model will be able to utilize the fact, that new observations arrive every 10 minutes. This gives the possibility to do a spatial adjustment of the model if for instance the observations start to report a clearing of the sky in an area.

### The methods group

This group is concentrating on standardizing our mainly non-graphical production system. A large number of usually small, but custom made programs are being replaced by a production system under SAFE; Semi Automatic Forecasting Environment. SAFE contains data in gridded form as GRIB fields. The data in SAFE is taken from direct model output to which information from for instance Kalman filtered observations are applied.

Media production as described above is going to be implemented within SAFE. The country will be divided into a (small) number of areas, and a first guess for the forecast will be derived from SAFE. The forecaster will then apply his knowledge to the data, and the area forecast will become the origin of a number of forecast products, including some in media production. What is going to be edited in the area forecast editor are for each area the parameters day maximum temperature, night minimum temperature, wind, windgust, mean cloud coverage, type and amount of precipitation and significant weather for the next 5 or 6 days.

### Other aspects

In an attempt to adjust to the ever changing field of programming, about half of the developers have been on a Java course. Java is being used in a few places, mainly for writing applets for the homepage, but we are looking at other internal programs, which it might be useful to implement in Java instead of traditional C, C++ and Motif. We are gaining experience on this field, particularly trying to evaluate the platform independency between Microsoft Windows and Solaris. This has brought forward a small mismatch in the naming convention of the Swing component classes, but otherwise, we are looking for a useful development tool to use on Solaris.

Due to increasing demand, our ftp-servers have been upgraded, and delivery of products as e-mails have started too, though only as a secondary means of delivery, due to the problems of checking whether an e-mail reaches its destination within a specified time limit.

Upgrading a pair of SGI-servers, which are used for postprocessing of model output, running the road condition models, plotting of model output and a number of other things turned out to be much harder than expected. We started the upgrade in the autumn of '98, and due to their key role in nearly every product which need model output, the system must have a very high uptime and a big disk resource. The idea was to have two identical machines, of which one is primary, doing operational jobs and controlling a big disk-raid, and the other being a hot stand by, which can be used for development until the primary falls over and it will have to take over as primary. But we have had numerous problems in achieving this goal, and it hasn't been reached completely yet.

Storm surge warnings and general water level monitoring has taken up some resources as well. We get information from at least 6 different sources and it was in just as many formats. The resources have been spent on standardizing internally on BUFR format.

**Lars Sveen: DNMI, Norway**

# Recent developments at The Norwegian Meteorological Institute



## *EGOWS 1999*

### Recent developments at The Norwegian Meteorological Institute

- Interactive system for offshore forecasting
- Ongoing modernisation activities:
  - ⌘ Quality assured point forecast database
  - ⌘ On-screen analysis

Prepared by:

- ⌘ Lars Brusletto Sveen
- ⌘ Audun Christoffersen

DNMI – Research and Development Division, June 1999



### *Offshore forecasting*

The first version of an interactive production system for offshore forecasts is operational

Offshore forecasts consist of structured texts. They are:

- ⌘ point forecasts for oil rigs, ships etc
- ⌘ tailor-made for each user
- ⌘ subject to strict quality control and monitoring

The forecasts are produced by editing time-series graphically

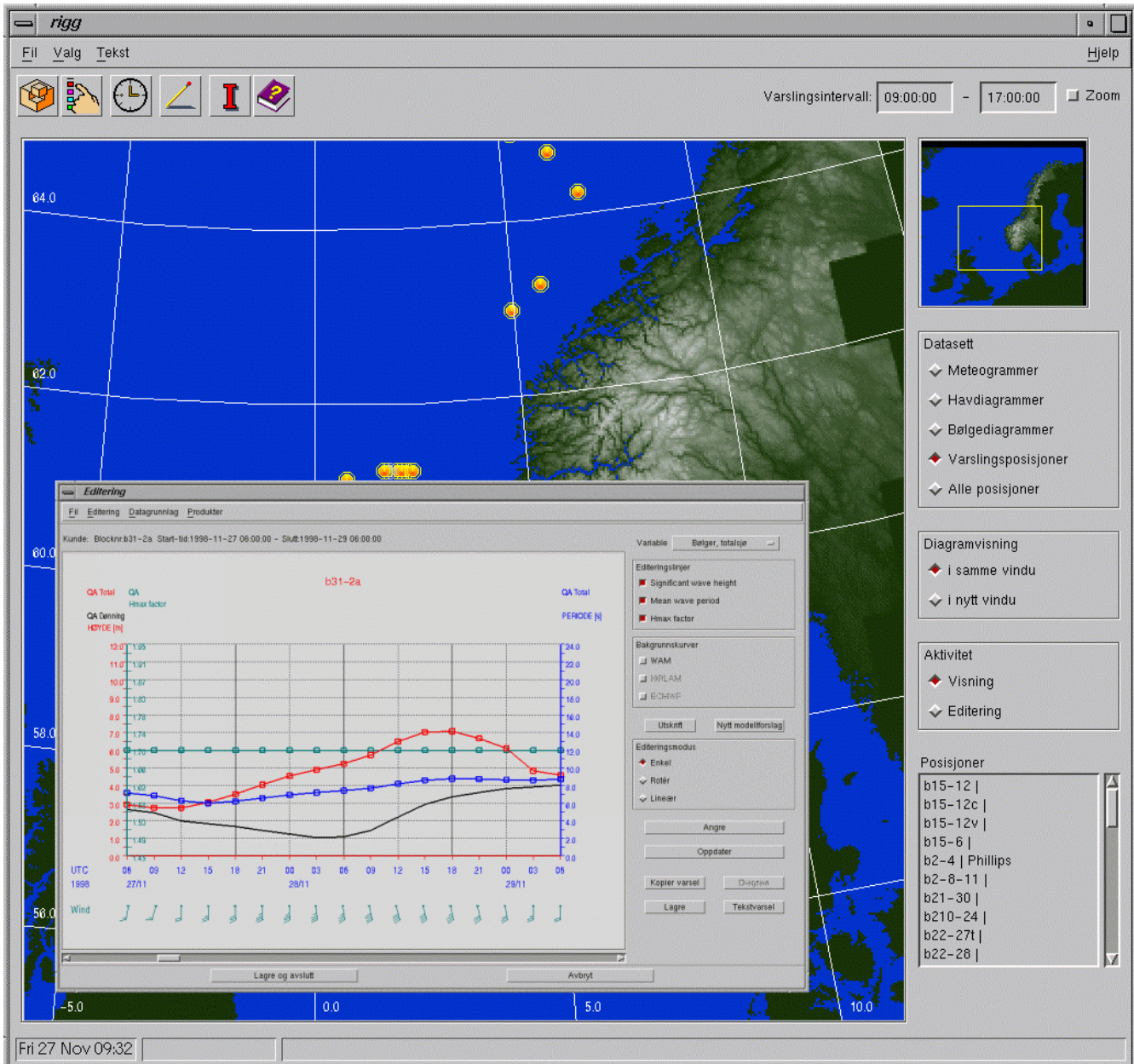
Text forecasts in several languages are automatically generated

In addition, graphical products are generated



# User interface

Sample view of the user interface:



## *Automatically generated text forecast*

**Tekstvarsel**

Editing

Tekstvarsel for kunde: Posisjon: 60.75 3.41667

SYNOPTISK SITUASJON Nord (synoptic) ▾

Synoptic situation on Friday 27 November 1998 at 03 utc  
Low 970 hPa southwest of Iceland, moving slowly northeast.  
Low 975 hPa, west of Scotland, expected 985 hPa, near Stad  
tonight. At the same time a new low is expected 975 hPa, west  
of Scotland, moving northeast, expected 960hPa, just east of  
Iceland by Thursday evening, later filling slowly.

HOVEDVARSEL

1. Forecast (12 hours) valid 270600-271800 UTC

W I N D  
at 10 m (kts): S 15, later incr 25  
at 50 m (kts): S 20, late incr 35

T O T A L S E A  
sign wave ht(m): 3.0, late incr 3.5  
max wave ht (m): 5.0, late incr 6.0  
mean period (s): 6-7

S W E L L  
dir/sign ht (m): W 2.5, decr 2.0  
mean period (s): 12

W E A T H E R  
weather : dry, later showers  
visibility (km): 10, later 4-10 in showers  
air temp (C): 8  
confidence tag : medium

UTSIKT Nord (outlook) ▾

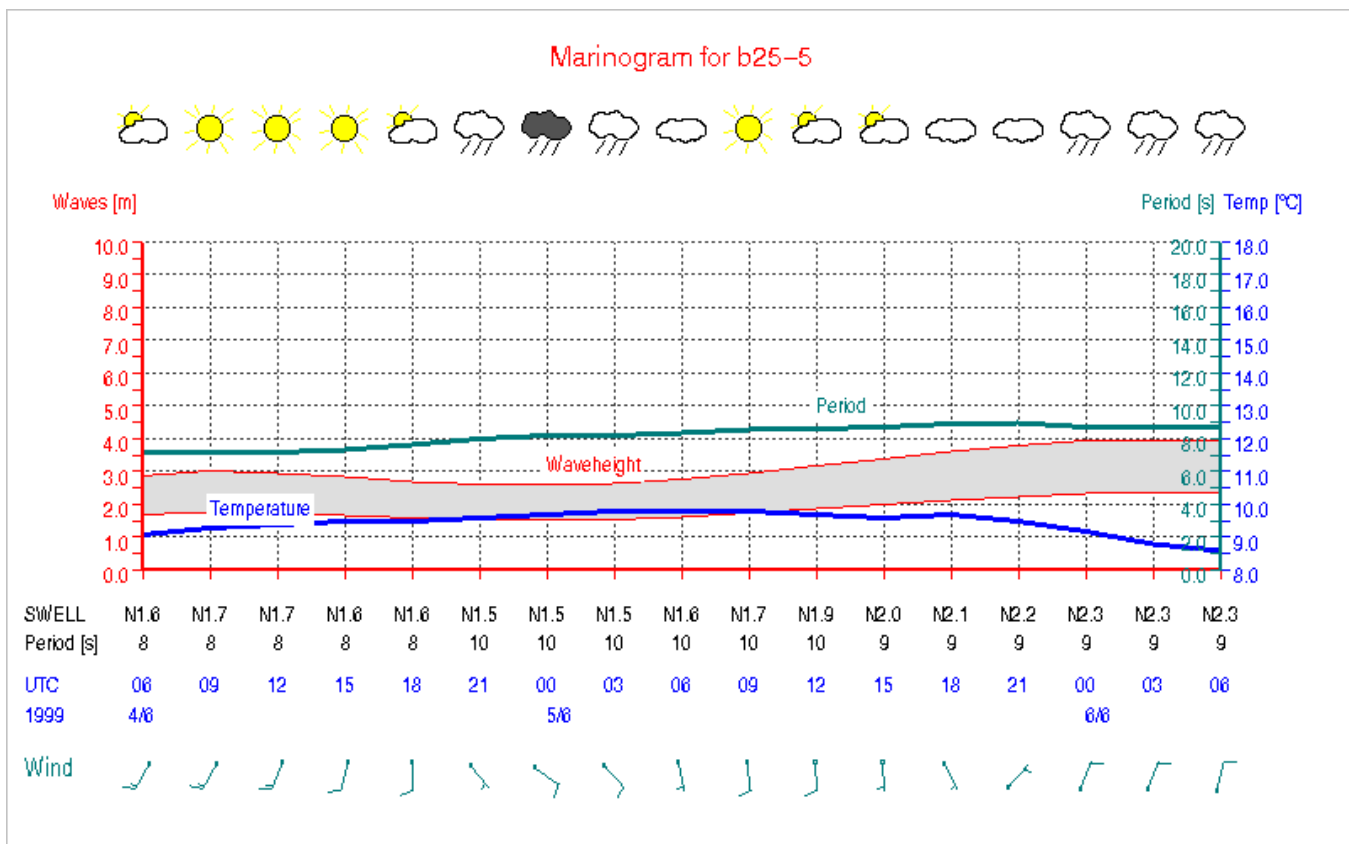
4. outlook (72 hours) for day 3, 4 and 5

W I N D  
at 10 m [kts]: sw 20-30, decr w-ly 15, for a time nw 25

Godkjenn Avbryt

# Sample graphical product

This so-called 'marinogram' presents most of the parameters of the text forecast in a condensed form:



## *Quality Assured Database (QUBA)*

- A new database structure for timeseries has been designed
- The QUBA base is to be fed with data by forecasters through a graphical editor based on the one from the offshore system
- Customised products will be automatically generated based on a database of product specifications and customer profiles
- Products will be made for, among others,
  - ⌘ Media (graphics for newspapers, TV, Web)
  - ⌘ Maritime users (text and graphics)
  - ⌘ Electric power industry (graphics)
  - ⌘ Road authorities (graphics)
- A verification system for both external and internal uses will be integrated



## *Digital analysis system (DIANA)*

A system for interactive on-screen digital analysis is under development to replace today's manual paper-and-pencil-based production

Goals:

- ⌘ Improve quality and efficiency
- ⌘ Better co-ordination of work between regional offices
- ⌘ To get verifiable, digital analyses

Requirements:

- ⌘ Plotting of background fields, observations, satellite and radar images
- ⌘ Rudimentary field modification
- ⌘ Drawing of objects



**Marie-Françoise Voidrot: Météo-France, France**

Current improvements on the Synergie  
software and hardware

# Current improvements on the Synergie software and hardware

*Marie-Françoise Voidrot*  
METEO\_FRANCE  
Egows 99- De Bilt

---

## Plan

- Main improvements of release 3.2.0
- Main improvements expected with release 3.3.0
- Task manager
- Availability manager
- Alerts
- Hardware renewal

## Release 3.2.0 main improvements

- Operational since December 98
- Developments dedicated to specific forecasters:
  - Marine : Waves models visualisation ...
  - Aeronautics : Specific pre-processing (icing, jets..), Significant weather charts,...
  - Local forecasts : Time series, Metgrams, Hovmöller...
- Postscript driver
- .....

## Next Release 3.3.0

- Will be operational in September 99
- Many improvements expected but major ones:
  - Task manager
  - Availability manager
  - Alerts



## Task manager

- New homemade cron-like tool
- 3 possible behaviours on local or UTC time condition :
  - 1 Send a message to GUI or visualisation process
  - 2 Execute a command and send a report to GUI
  - 3 Execute a first command and then a second one depending on the report of the first one. Then send a report to GUI

## Example of report

From Monday 03 May 1999 at 14:11:10 to Monday 03 May 1999 at 14:11:11

Command :

message\_to\_ihm MSG « AGENDA Tea time » MYDISPLAY

Report :

message\_to\_ihm : MYDISPLAY cannot be opened

---

From Wednesday 05 May 1999 at 15:27:06 to Wednesday 05 May 1999 at 15:27:06

Command :

find ~/data/nebul -mtime +0 -type f -exec rm -f {} \;

Report : OK

Generated message :

Success of the command find ~/data/nebul -mtime +0 -type f -exec rm -f {} \;

## Availability manager

- Based on the resources concept (one or more data)
- Checks the data arriving into the DBMS
- Updates the resources
- If a resource is complete ->action (pre or postprocessing, message to the forecaster...)
- If the resource is still uncomplete at time limit : -> another action

## Alerts

- Semantic data watch
- If value>threshold then alert to clients
- Updates a colored GUI
- Based on 3D domains eventually with masked dots or areas

## Hardware renewal

### Why ?

- Old parc installed from 1993 to 1994
- Maintenance becoming expensive
- Potential Y2K problems for some platforms
- Global and continuous computers improvement (Fujitsu, Telecommunications...)
- More and more fonctionnalités ( Alerts...)
- More and more production tools
- Cost of permanent upgrades

## Decision

- Change all the platforms before end of 1999 (~30 servers and 80 clients)
- Improve the time response by a minimum factor of 5
- Put 2 to 3 screens everywhere
- Global budget equivalent to the previous investments

## How ?

- Public procedure insuring a clear competition
- HP, SGI, SUN, Digital
- Choice criteria
  - Fit the technical needs that could be specified
  - Best Cost/Performance ratio (based on benchmarks)
  - Best after sells services (including overseas territories)

## Choice

- SUN
- Servers: (no clusters by now)
  - E3500, 4x300 MHz, 1Gb, 80 GB ( Raid 5)
  - E450, 2x400MHz, 512Gb, 72 GB (Raid 1)
  - E250, 2x250 MHz, 256Gb, 27GB
- Clients:
  - Ultra 60, 2x300 MHz, 256 Mb min, 9GB
  - Ultra 10, 1x333 MHz, 128 Mb min, 9GB
- 100 MB dedicated ethernet link

## Current status

- National center totally renewed
- Regional servers OK
- Regional clients should be delivered this week
- Overseas territories this summer

## First feedback

*At last forecasters seem to be fully happy  
with the time response*

**Oldřich Španiel: SHMI, Slovakia**

**Meteosoft MSS**

# Meteorological Workstation Software Package

## Meteosoft MSS

Oldřich Španiel  
Slovak Hydrometeorological Institute

Meteosoft MSS - co-operation between SHMI and private software company.

1. good experience with previous co-operation  
project IMS – Integrated Meteorological System for meteorological observer  
joint our professional meteorological, theoretical and practical experience & programmer skill
2. concern our experts in project -> decreasing so call “black box” risk -> guarantee next development in future
3. financial aspect

main parts of project

1. environment
2. communication
3. user function
4. functions over alphanumeric data
5. graphic functions

### ***1. environment***

- a) UNIX, C language
- b) Support for two physical screens ( monitors )

### ***2. communication***

- a) FTP,TCP-sockets or async lines will be supported

### ***3. user function***

- a) Monitor for generation of warnings. It checks all the incoming message (TAF, METAR, SYNOP, TEMP, messages from automatic stations ) for operator-defined limits and on exceeding of limit pops-up the warning window announcing the exceptional situation , list of customers which have to be informed and source message type.  
Several limit levels can be defined for one station.
- b) Mailer

### ***4. functions over alphanumeric data***

- a) presentation of actual data ( METAR/SPECI, TAFs, SIGMET, SYNOP, TEMP ) with simple decoding. Capability of preset lists of stations/locations e.g. for flight routes, areas etc. The windows are automatically updated on receiving of new data.



- b) generation of preflight documentation for defined lists of station/locations according ICAO form model A2. It includes printing of a weather codes, used ICAO location indicators and METAR/TAF/SIGMET data defined and displayed in windows.
- c) pre-definable forecast forms to be generated automatically or manually on operator request.
- d) visualization comparison of actual messages (METAR) and airdrome forecast (TAF). The difference will be shown in a table form comparing each parameter of forecast and actual weather. The final deviation in percent will be computed.
- e) viewer of all available bulletins.

### **5. *graphic functions***

- a) displayed area is selected from earth globe by drawing a rectangle or it can be chosen from a pre-defined set.

Result might be displayed in several projection:

- polar stereographic
- mercator
- lambert
- spaceview

Several parameters can be superimposed on the same map over each other in order to give complex weather information.

The superimposed information might be computed in several time points and can be displayed like a movie.

Separate parameters are computed in “layers”, each of them contains only one parameter, select able from which center it will be taken, in which way the computed data will be displayed in composite map ( iso-lines, wind barbs, arrows, “spiders” – their resolution depends on the room in the map), has its own transparency level, and has defined operation (the relation) with other layers – to perform operations between layers ( subtraction, addition, multiplication, division, power, square root and fixed value ).

Also radar and satellite images can be used in a display “layers”.

- b) Routines for decoding of GRID/GRIB/BUFER data  
Vertical cross section for given flight routes displaying chosen parameters that comes from computed composite map.
- c) Vertical time cross section for selected point.
- d) Meteograph ( time cross section ) containing on curve drawn from actual parameter reported by a station ( TEMP/SYNOP)
- d) Graphic weather map editor supporting several types of lines and symbols.
- e) Any generated map can be encoded into T4,GIF,TIFF images and/or printed.

**Dirk Heizenreder: DWD, Germany**

# Workstation Systems at DWD - Recent Developments

## **Workstation Systems at DWD - Recent Developments**

Dirk Heizenreder, DWD, EGOWS 10.06.1999

To assist the Forecaster at DWD MAP, IGS and TriVis has been developed since 1990.

### **(1) MAP - The Meteorological Application and Presentation System**

MAP is the main visualisation tool for the meteorologists within the forecasting process at DWD. More than 100 MAP workstations (SGI) are installed at DWD at the regional offices and the central forecast office.

MAP is based on a client server architecture. The user can choose one of the operational data server as database directly on top of the GUI. Due to the fast data link between the server and the clients used at DWD the performance of MAP is very high also in the case that the server is not installed at the local machine. The MAP server receive the data via satellite link which can be easy installed or via the direct WAN link to the central forecast office. The MAP data server can be configured. To use several sever as data archive the user has only to define the length of stay of the appropriate data type.

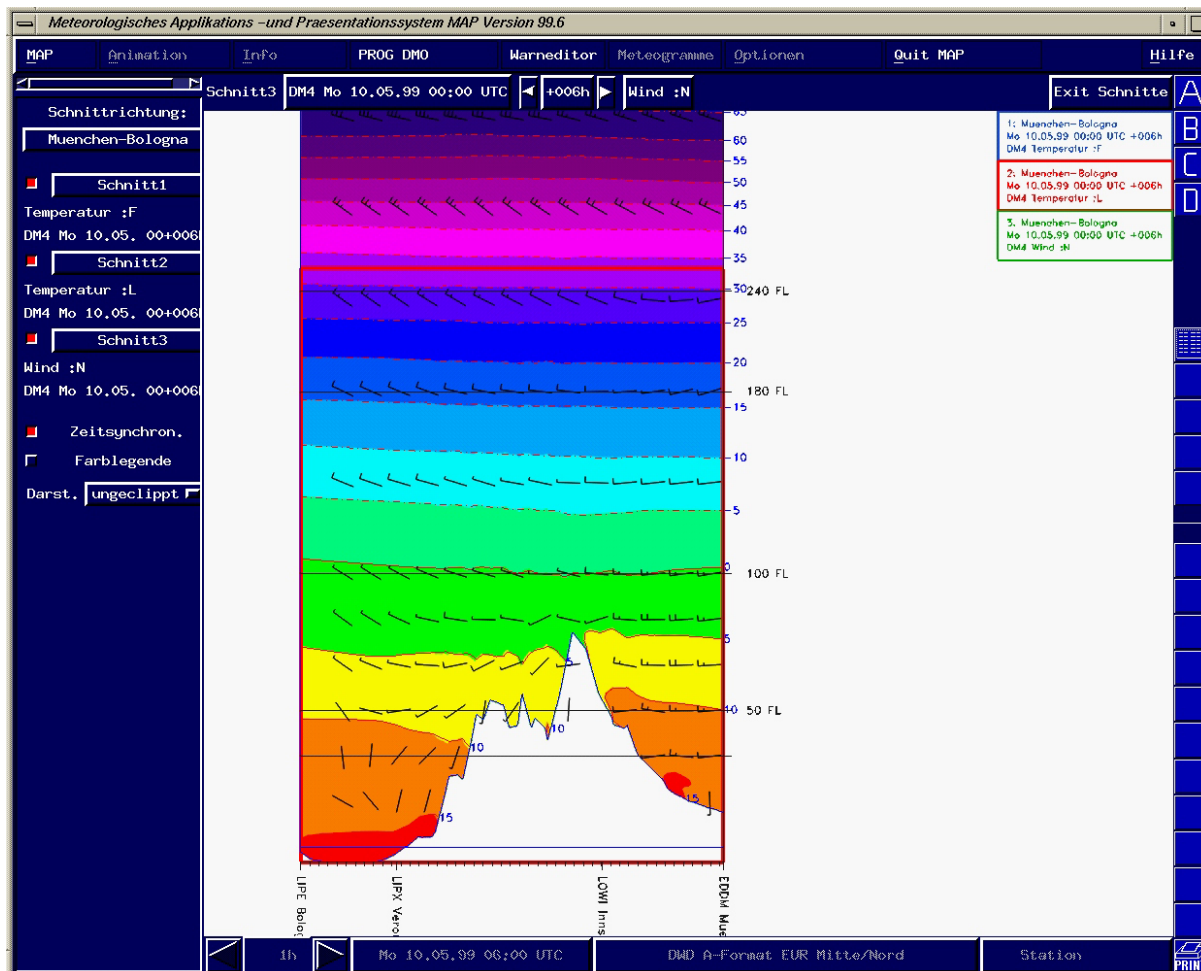
The following data types are provided within MAP: Observational data, Soundings, Satellite data, radar data, Lightning data, model fields (GRIB or pre computed graphical objects), Trajectories, Geographical data ...

All of the data types can be visualised in user defined geographical regions, at user defined dates and with the possibility of zoom in, animations or manual step trough the data. Each of the data types can be switched on or off, so the presentation of one data type together with other data types is of course possible. Several operations concerning the visualised data are possible (Calculation of isolines, Calculation of the differences between observation and forecasted values ...). The graphical user interface has been designed to provide a flexible, self explaining and fast accessible interface to the Forecaster.

The newest MAP release (1999) will come up with a lot of new useful features for the meteorologists. First of all the visualisation of the new DWD model chain (LM, GME) will be possible. GRIB's, pre computed graphical objects and TriVis MPEG videos of the new model data can be visualised.

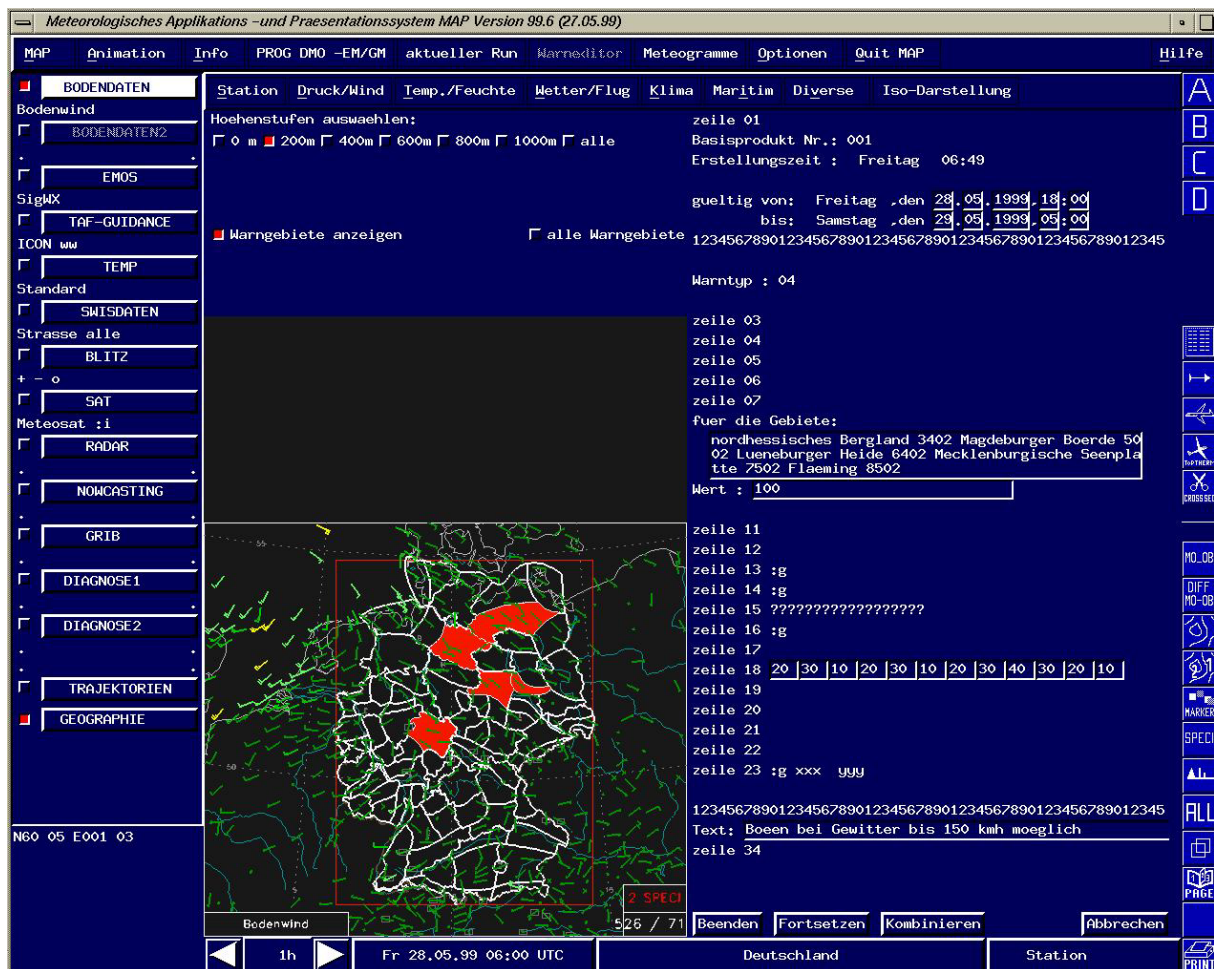
To provide the best available geographical background data a concept of using the GTOPO30 data, the DCW data and special german digital data on the basis of Oracal8 was developed. The object oriented data base will allow attributes for the objects to use the intelligent zoom in or priority functionality. The realisation of the developed concept will be performed within 1999.

New are the pre computed cross sections of the DWD Local Model (horizontal resolution 7km, 35 levels) which will be provided within MAP. As maximum 3 cross sections can be overlaid or switched on and off.. The displayable cross sections are daily produced as graphical objects by the VISUAL server at DWD and than transferred to the several MAP server.



With the new Macro recorder, the user can define the actual MAP screen settings (Geographical region, data types, graphical attributes, ...) as one of the Macros A,B,C or D, which can be switched on or off directly on top of the GUI. So the fast switch between several different MAP visualisation settings are possible. Further Macros can be defined with the appropriate menu.

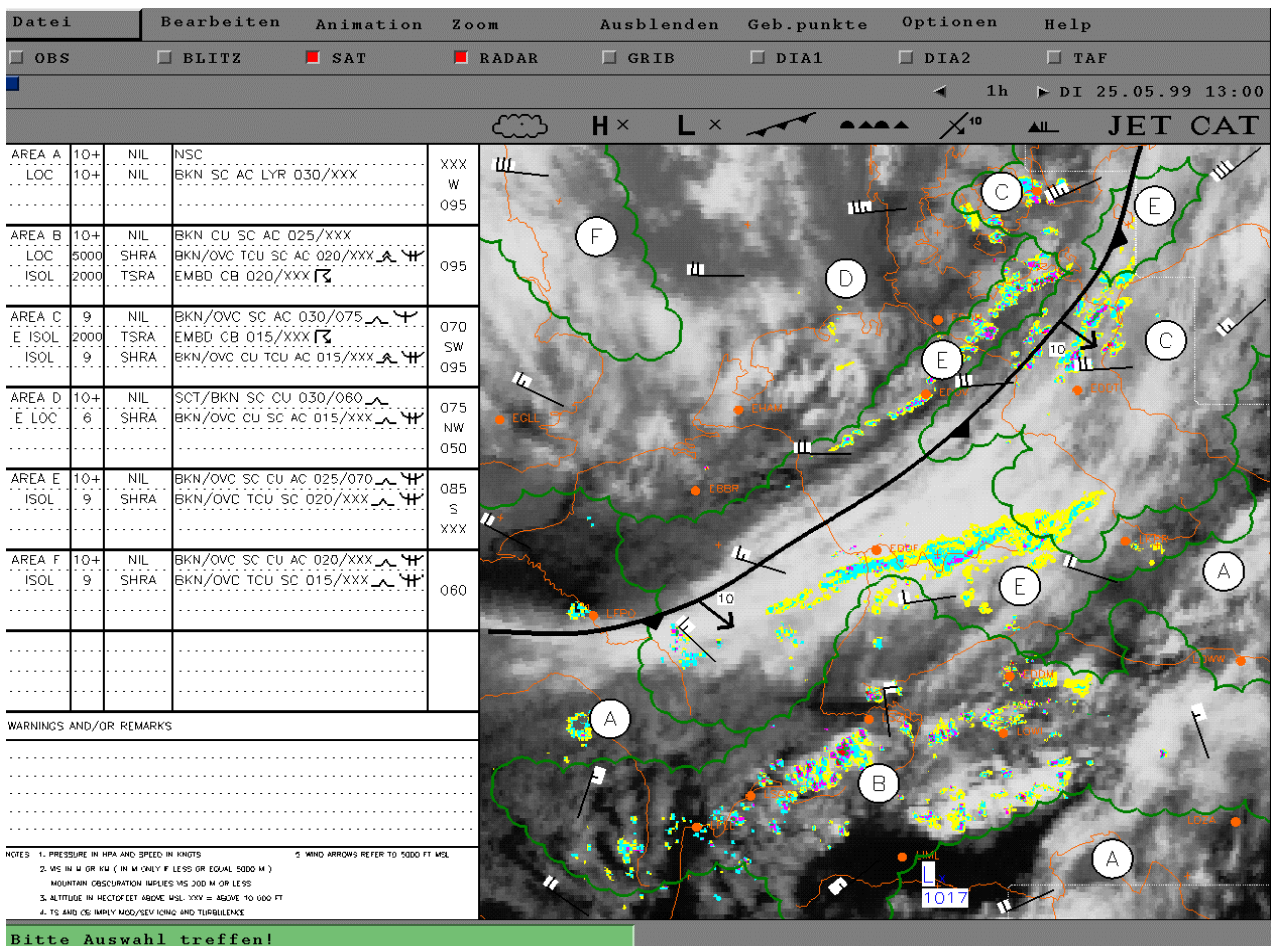
MAP has been extended to fulfil interactive production tasks. The developed editor for warnings assists the meteorologists during the production of warnings. Directly on the screen the Forecaster can choose the warning area via click on the screen, where the necessary actual observational data and the model data are displayed at the same time together with the regions of responsibility for the Forecaster. Several types of warnings can be selected - Wind, Thunderstorm, precipitation, snow, ice ... The produced warnings are stored in the database and can be sent out to the customer automatically.



## (2) IGS - The Interactive Graphical System

The IGS has been developed to produce forecast charts for the customer. The production process starts with a first guess providing a useful graphical purpose for the product consisting of the necessary graphical objects.. The first guess can be edited directly on the screen to produce the final forecast product. The design of the product us configurable. Significant forecast charts (SWC), Surface forecast charts (SFC) and Forecast charts for newspapers are the daily products generated with the IGS at DWD.

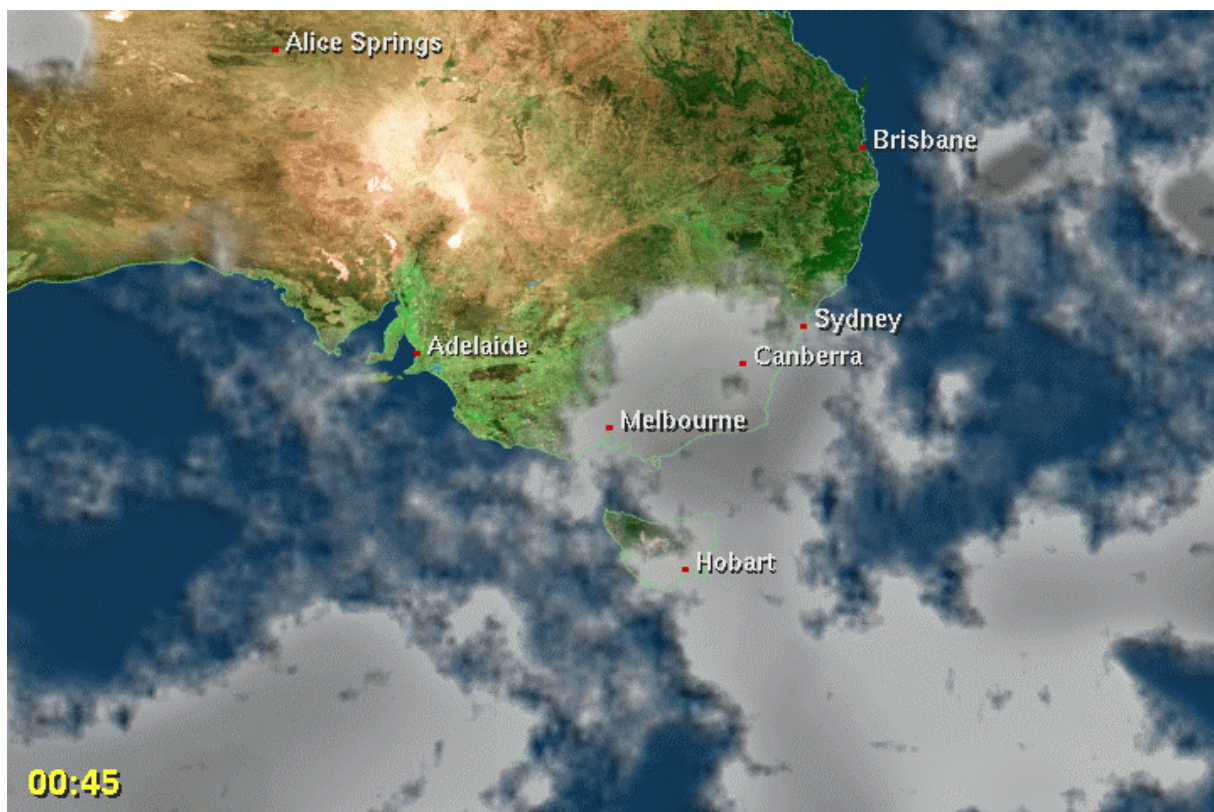
The newest IGS release to produce the Low Level SWC has been used operational since April 1999. A complete new GUI has been introduced. The object oriented Interface provides comfortable working conditions for the Forecaster with a minimum of necessary clicks. The positive response of the meteorologists is the evidence, that the development of the new interface was the right decision.



The meteorological concept of the SWL is to provide a first guess which can be edited by the Forecaster. The Forecaster himself can choose his last forecast as first guess for the next valid time. Because the SWL are issued in 3 hour intervals this concept provides the possibility to maintain the meteorological forecast concept (very short range forecasting problem). A first guess from the model is not used the model forecasts concerning the SWL elements visibility and ceiling have poor verification results. Thus the last subjective forecast taking the last observations into account seems to be the best way to provide a propose which does not need to be corrected so strong by the forecaster.

### **(3) TriVis - The professional Visualisation tool for the media**

TriVis has been developed for the professional visualization of meteorological data for the media (TV stations, Internet). It makes complex output data of forecast models easy to understand. Special visualization algorithms, which have never been used in any other weather presentation system before, are used for the rendering of the weather data in high quality images. One of the outstanding features of TriVis is the application of fractal functions for the realistic visualization of specific cloud data. The system has been used operationally at DWD since 1993 to provide daily products (forecast images, movies) for several TV stations, the Internet and for internal visualizations (MPEG movies in MAP) at DWD. As data input the system accept all data sets available on a regular grid using the simple TriVis data format. The TriVis data format uses an ASCII Header (describing the data and the used grid) followed by the data themselves. The following data can be visualized:



Geographical data for the background images (Digital height data, satellite textures, Line data like borders, rivers ...), meteorological forecast data - the output of numerical weather forecast models of weather services (Scalar data, specific cloud data, spot values... ), Observational data (Satellite images, radar data, synoptical observations.).

The TriVis output is configurable and provides single images including the used geographical background and the meteorological data (2d or 3d views to the data domain are possible), film sequences to visualize the dynamical processes within the meteorological data.

In 1998 the TriVis system has been improved. The work has been focused on the higher flexibility of the system for the customers because TriVis is used outside of the DWD more and more. So the Graphical User Interface (GUI) has been redesigned to provide a convenient, self explaining and easy to use Interface for those users, who hasn't used TriVis before. The so called "story board producer" is developed to provide the possibility of a fast design of new weather shows for TV stations.

The software to generate the specific cloud data has been extended. The output of the numerical weather prediction of the Bureau of Meteorology in Melbourne has been used to provide the possibility of using other data sets beside the GRIB data for the cloud generation. TriVis will be installed in Melbourne by June 1999 to provide the system for the weather forecast during the Olympic games 2000.

**Metod Kozelj: HMIS, Slovenia**

## Recent developments at HMIS





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133 13 96

Weather forecasting department  
Division for OPERational TechnIques and Models - OpTiM

## Recent developments at HMIS

Metod Kozelj, <metod.kozelj@rzs-hm.si>

### 1. Introduction

Graphical support of operational weather forecasting at Hydrometeorological institute of Slovenia (HMIS) is mainly bound to three applications:

- user interface to the visualized products - VISPRO
- non-interactive visualization tools and routines - GROM
- interactive visualization tool - FrontEditor

All the time emerge new demands. We will constantly develop our applications and possibly produce new ones.

### 2. VISPRO

This is HTML and Java-script based frontend to almost every visualized data and product available. It also presents some text data. It has been in use since 1996 and has been under development ever since. This front-end is designed so that it can be used in any Java v1.1 compliant Web browser, such as Netscape Navigator v4.0 or Internet Explorer v4.0 (or later). It was developed for our weather forecasters, but also other departments of HMIS have found it useful.

Recent developments were not conceptual ones but rather some additions to the set of products available. VisPro has been chosen as front-end for the MAP experiment and has been installed in MAP OC in Zurich.

Every page, displayed by Web browser, is dynamically generated by Java-script. The main window is divided to several frames. Leftmost frame contains list of available products (different NWP models, radar and satellite images, observations, ...). When a product is selected, further choices are available. For example: if one chooses to display visualized output from ALADIN/LACE, she can choose model run (00 or 12 UTC), then the visualized product (eg. vertical cross-sections) and the time range (eg. +06 hours). Then she can choose between available cross-sections and between the parameters visualized on one image (eg. relative humidity and temperature).

On the top of right frame there are buttons for navigation through series of images. Usually this is a series of images for different time ranges. One can step through the sequence forwards or backwards either step-by-step, in a loop or by swinging backwards and forwards.

Aggressive image caching is implemented, so the animation can be done very smoothly after all images are stored in RAM.

ECMWF  
ALADIN\_SI  
ALADIN\_LACE  
DWD\_GM  
DWD\_EM  
DWD\_DM  
RADAR  
KOMP OZIT  
SATELIT  
OBSERV  
PRODUCTE

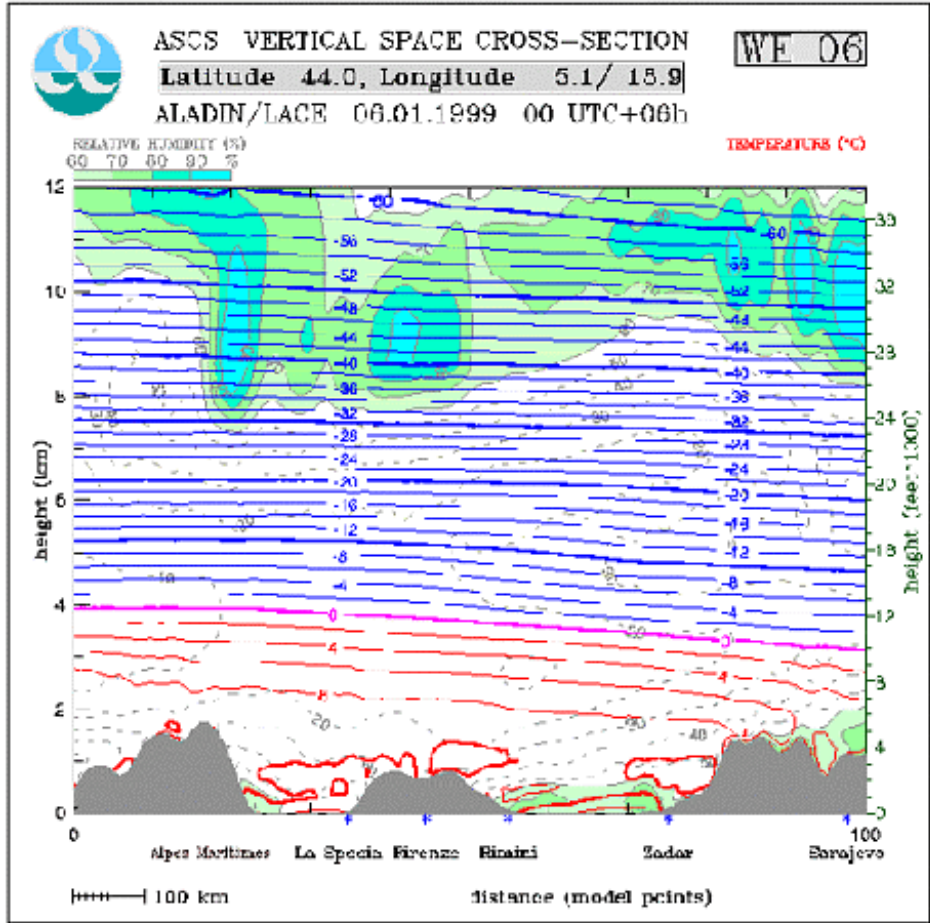
T4Z 300  
T4Z 500  
R-2 700  
P-T+Z 030  
MSL+W 700  
SHW  
SL+PT  
v10m  
TCC+RR  
vMHI  
v600  
v700  
v800  
v850  
v925  
point  
point qr  
sat. for.  
Vert. cross  
HRID th-v  
ITID T-N  
HRID T-th  
HRID v-th-1  
HRID u-th-1  
ITID q-th-1  
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HRID v-N

[ < << STOP >> > ] zanka [ ] hitrast N [ + ]



LACE40  
LACE55  
LACE70  
LACE85  
LACE90  
LACE95  
LACE100  
LACE105  
LACE110  
LACE115  
LACE120

501  
TFW-TH  
W PVD  
UP+UN  
UP+VA



### 3. GROM

Since early 90'ies we were looking for some powerful visualization tool. We were trying to find some tool that would allow off-line as well as interactive visualization. After some consideration we decided to try NCAR graphics package. We were not happy with the results of stock tools, so we started to develop our own routines on top of NCAR's. We developed tools that uniformly visualize data sets and model outputs from different sources. This way the resulting images are easier to compare to each other.

Some features of grom:

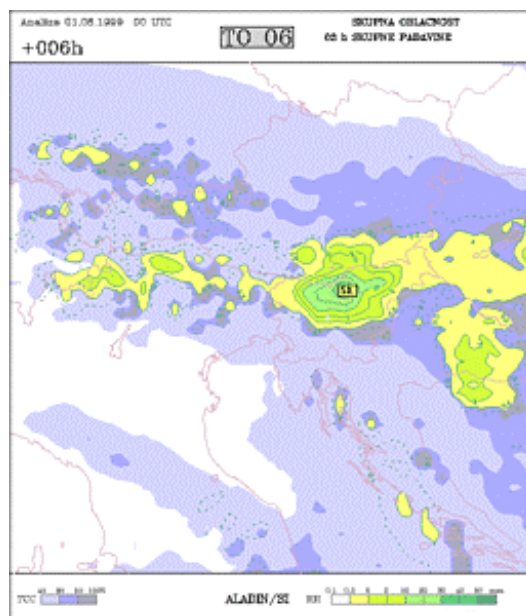
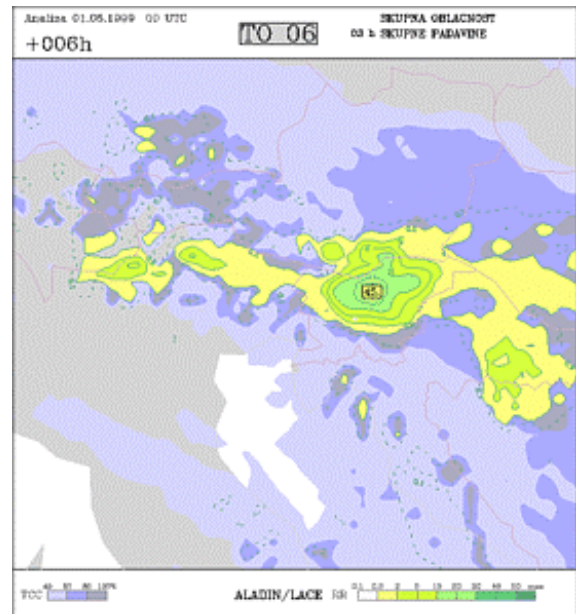
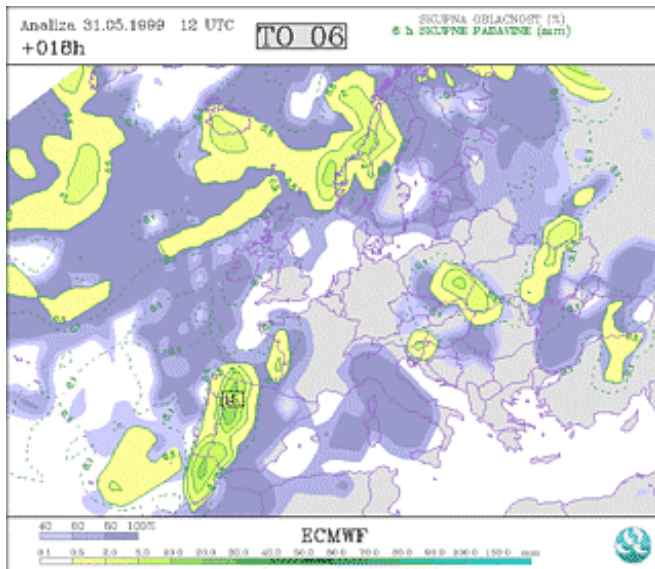
- input data file formats are: GRIB, FA (ALADIN), formatted ASCII, PNM image file format
- plots 2-D fields (model fields, vertical and time cross sections, ...), line charts (isolines, trajectories, ...), discrete data (observations), images from other sources (satellite images, radar images, ...) and various composite images
- plots lines, coloured surfaces, shaded surfaces, raster-filled surfaces, weather symbols, ...
- output in vector formats (PS, CGM), which can be further converted to various raster formats (TIFF, GIF, ...) or printed on any PostScript printer

The GROM suite has been developed to run on any modern UNIX workstation. The requirements are: F90 compiler, NCAR graphics libraries, POSIX compliant shell. To get full functionality, some external programs are required, such as ImageMagick suite (free raster image

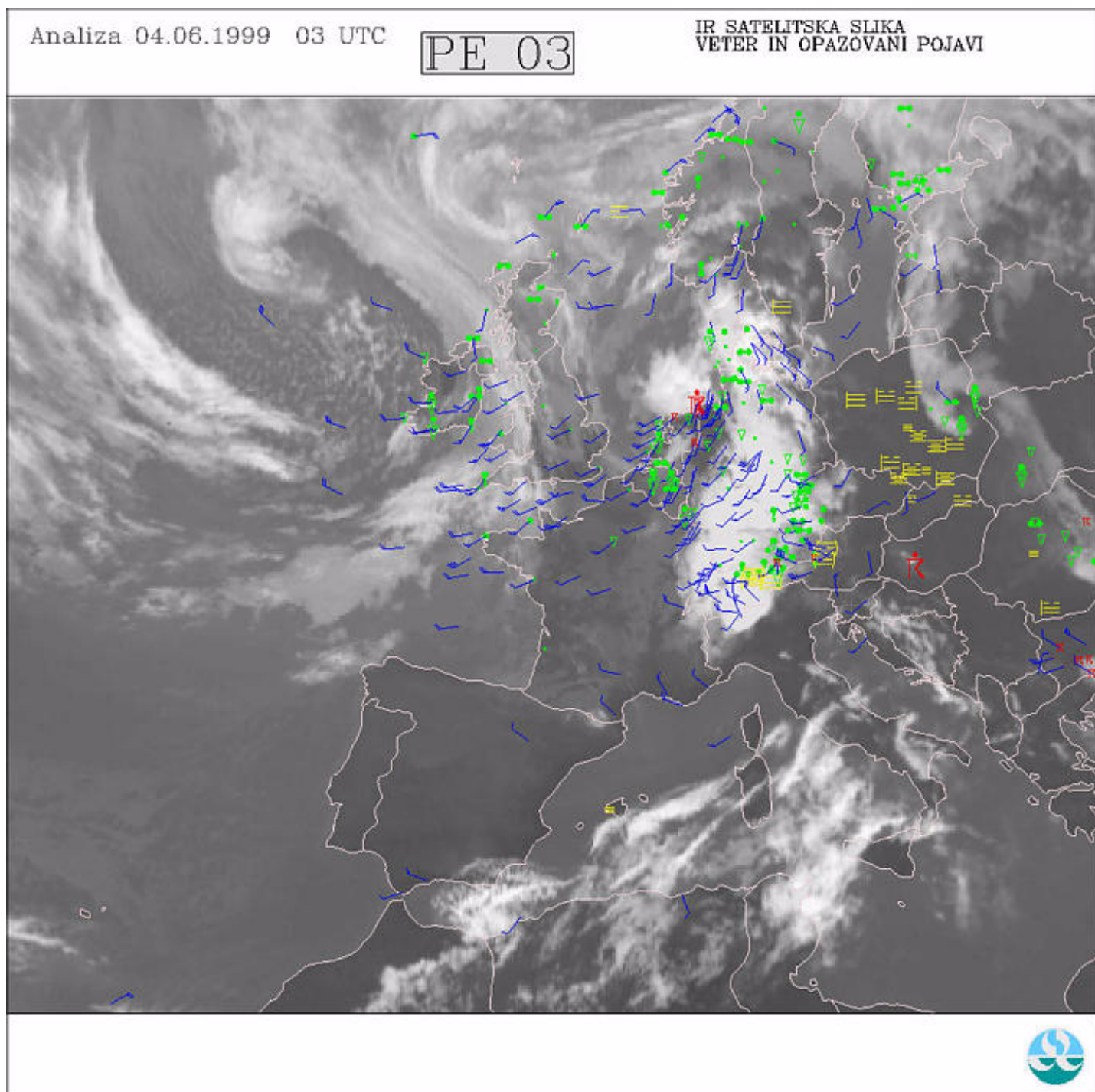
manipulation suite) and GhostScript (free PostScript interpreter).

HMIS is taking part in ALADIN/LACE community. The model was chosen as one of LAMs used in MAP experiment. Our visualization suite was chosen for visualization of ALADIN/LACE model output. The visualization is done in LACE centre in Prague and products (GIF images) are transferred to MAP OC in Zurich twice a day.

The images below represent total cloud cover (TCC) and rainfall rate (RR) for the same time point, as predicted by three different NWP models. Leftmost is ECMWF model output, middle is ALADIN/LACE and rightmost is ALADIN/SI. The RR plotted is accumulation for previous 6 hours (ECMWF) or 3 hours (both ALADINs).



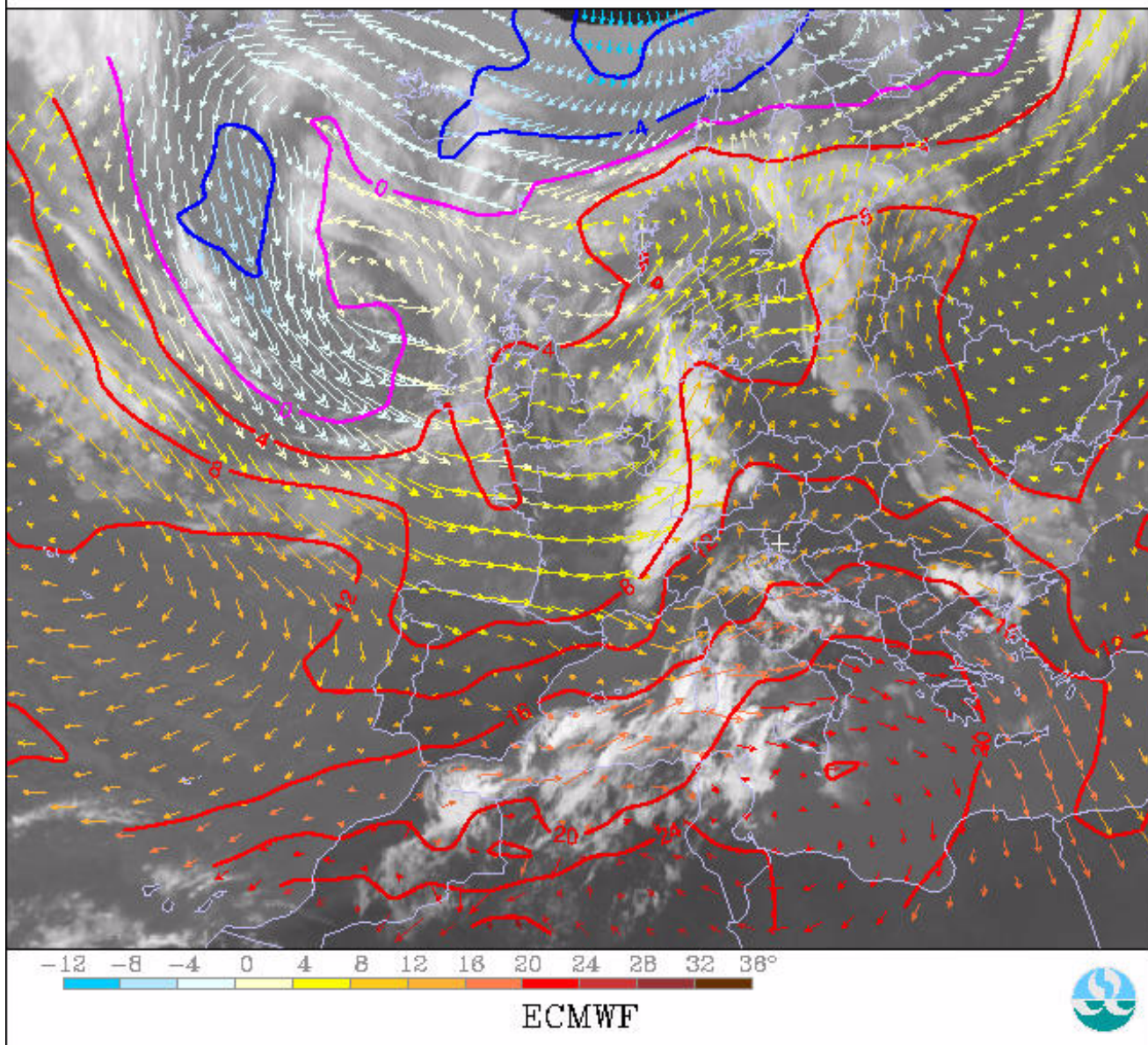
The following images present some composite images. Observation data (wind speed and direction and significant weather phenomena) are plotted over IR satellite image on the first image. Composite of wind field, coloured according to air temperature (both as predicted by ECMWF model on 850hPa level) and satellite image is plotted on the second image. The third image presents composite of predicted total cloud cover (TCC) and satellite image.



Analiza 03.08.1999 00 UTC  
+024h

PE 00

850 hPa IR SATELITSKA SLIKA  
VETER (TEMPERATURA) (°C)  
TEMPERATURA (°C)

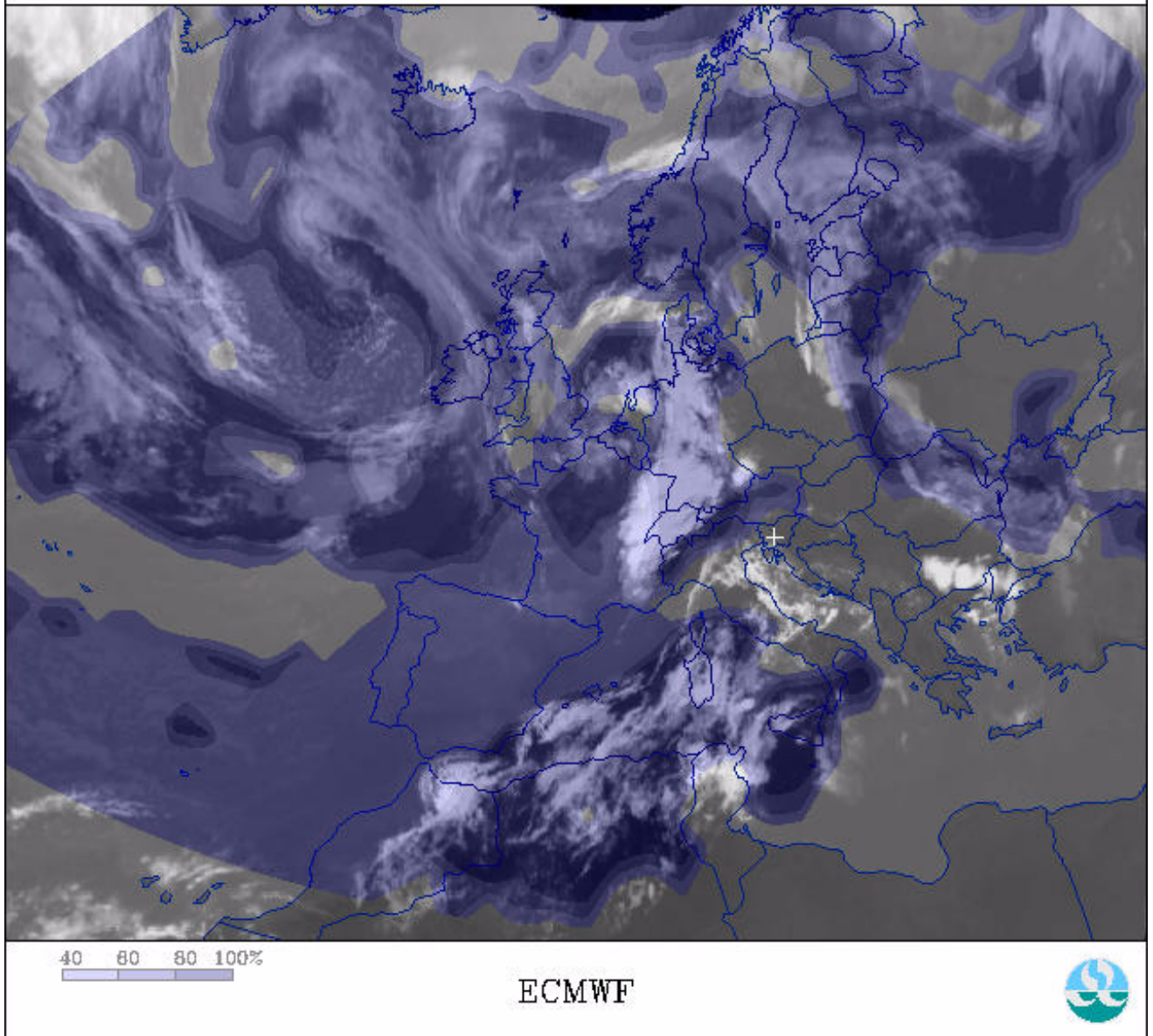


Analiza 03.08.1999 00 UTC  
+024h

PE 00

SKUPNA OBLACNOST (%)

IR SATELITSKA SLIKA



#### 4. FrontEditor

Our forecasters have to produce some forecasted weather maps for various clients. By now these charts were drawn 'by hand'. We decided to produce a simple drawing tool that would allow to do that in a simple and effective way. As the number of slightly different charts with the same contents (map of Europe with fronts and mean sea level (MSL) pressure isolines for example) is considerable, we needed an application that would produce them all from one single template, produced by forecaster.

FrontEditor, the tool we developed, is quite a simple one. It allows editing of all necessary elements of the charts using some pointer device (such as mouse). It is built on top of Tcl/Tk library. It uses some 'backend' software to produce final output images (NCAR graphics based programme for plotting isolines and fronts, ImageMagick based programme or Gimp for final composition of all the elements of the chart into one image, ...).

Different parameters of the chart that can be drawn using FrontEditor are:

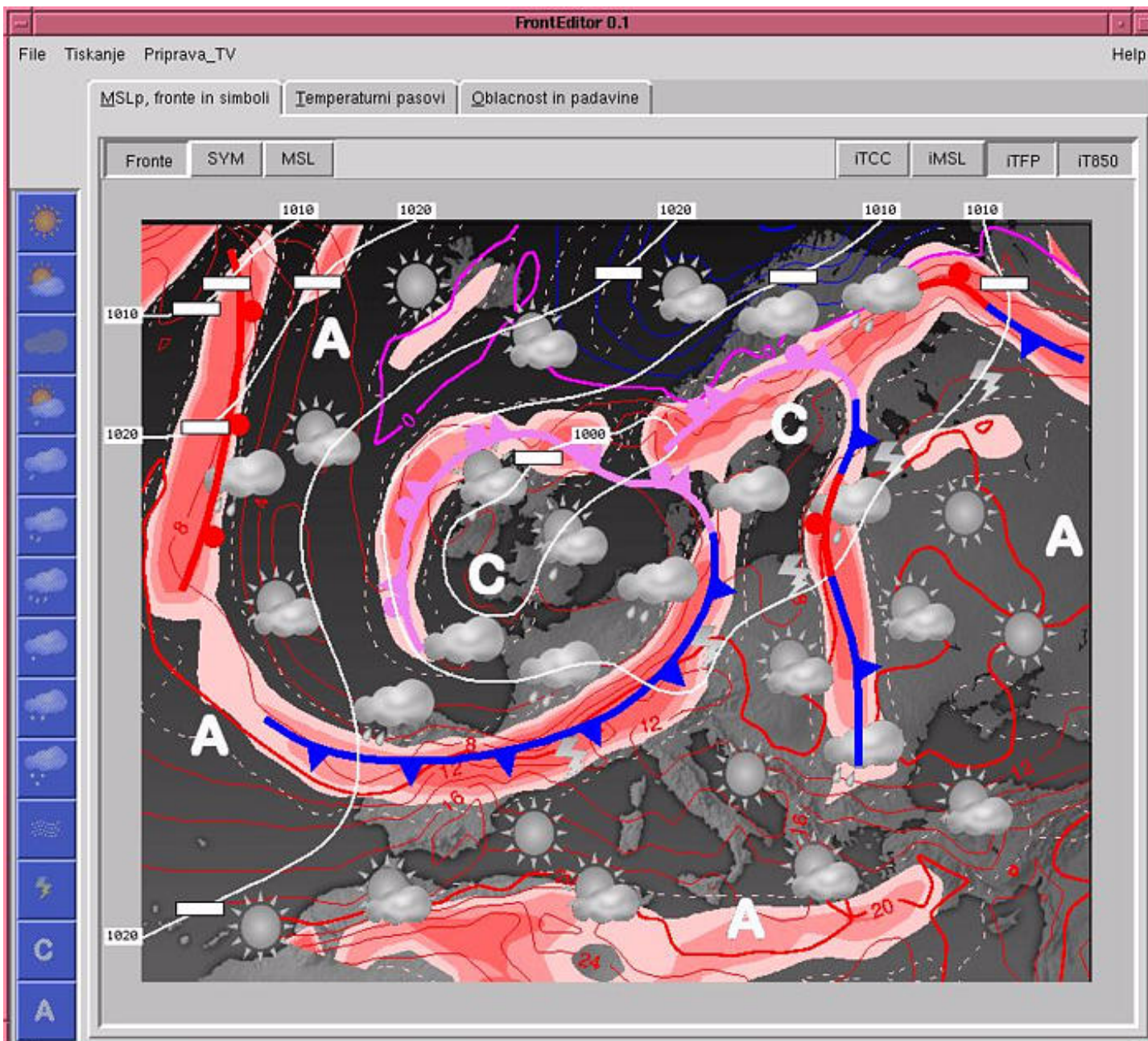
- fronts
- isolines (MSL pressure)
- coloured surfaces (temperature bands, cloudy and rainy regions)
- weather symbols

Different parameters can be combined on a single image. New parameters can be easily added if needed.

Forecaster can use predicted fields for assistance. For example, when plotting fronts, she can use chart of thermic front parameter (TFP) as predicted by some model (eg. ECMWF) for the selected time range. The 'helper chart' can be laid as a background while plotting the parameter and can be removed later. Several 'helper charts' can be used simultaneously.

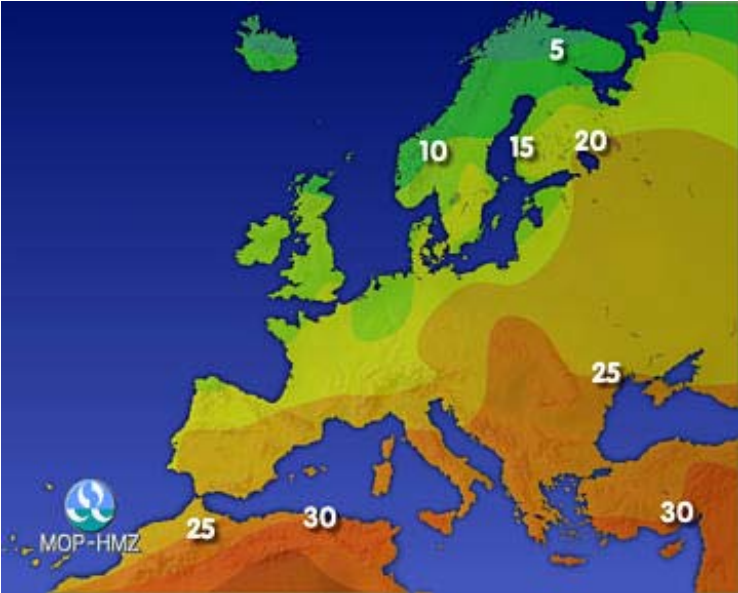
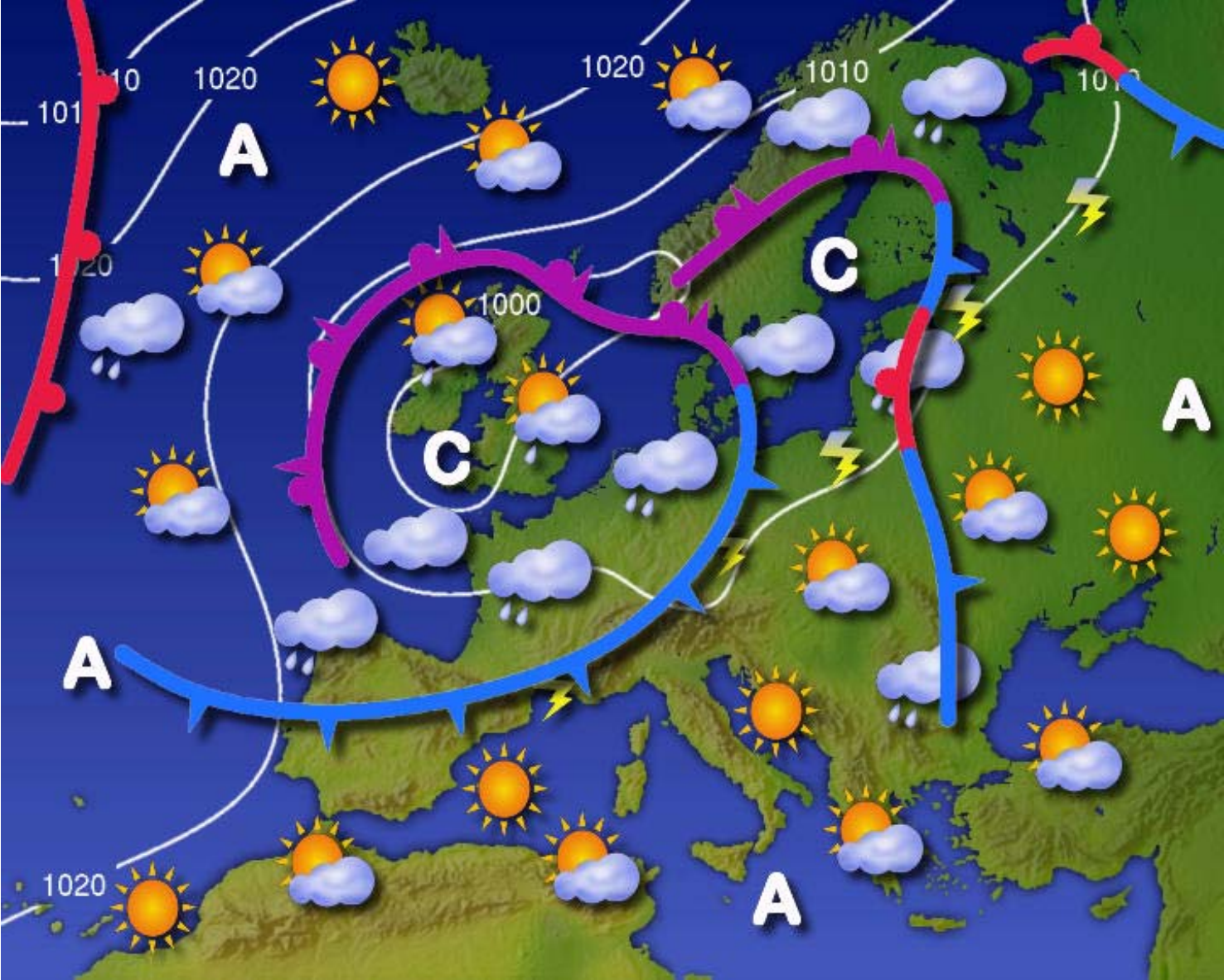
The results can be saved for later use. Previously saved work can be retrieved and the charts can be then changed/enhanced.

FrontEditor is in pre-operational phase at the time being. We expect to put it into operational use in a month or two.



The image above is a screen shot of the FrontEditor application. Fronts and MSL pressure isolines are being plotted. Two 'helper charts' are displayed: TFP chart and temperature isotherms on

850hPa level, both as predicted by ECMWF model. Additional weather symbols are already placed on the image. The image below shows one of final results of the application. Other similar images can be produced. These images are later disseminated to end users via internet.





The two images above present two other possible products of the FrontEditor application: image of temperature bands (left) and image of cloudy and rainy regions (right).

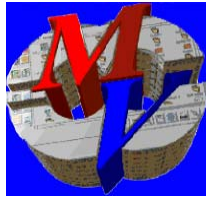
## 5. Future plans

So far we are quite happy with usability of internet technologies, such as HTML and Java script. We intend to use them in the future and deploy their new versions.

We have done some preliminary research on XML format and we obtained some very promising results. It allows interactive work to a certain extent without extensive CPU load on the server. This way the server maintains short response times even if several users are using the data from it. Since XML is emerging standard internet format we will be able to develop new visualization techniques in our usual cost-effective way. Software requirements will be easily met with the new generation web browsers, such as Microsoft Internet Explorer v5 and Netscape Navigator v5.

**Jens Daabeck: ECMWF**

# Recent developments ECMWF



# Recent Developments ECMWF

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**10**  
EGOWS

De Bilt, the Netherlands  
7-10 June 1999

## MAGICS

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- ◆ MAGICS is a software system for plotting contours, satellite images, wind fields, observations, symbols, streamlines, isotachs, axes, graphs, text and legends
- ◆ Developed by ECMWF



## MAGICS 6.0

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- ◆ Available to MS
- ◆ PostScript driver developed by ECMWF
  - MAGICS 6.0 does not assume any underlying proprietary graphics software
- ◆ MAGICS uses
  - ECMWF EMOSLIB
  - CONICON (University of Bath)
- ◆ Y2K ready
- ◆ Revised manuals
- ◆ MAGICS - The ECMWF graphics package
  - ECMWF Newsletter Number 82 - Winter 1998/99



- 
- ◆ MAGICS 6.0 on SGI - the current version
  - ◆ MAGICS 6.0 Manuals
    - PostScript version
    - HTML version (planned)
  - ◆ MAGICS Version tables
  - ◆ PostScript, Previewers and Publishing
    - Some hints on producing MAGICS plots for publishing, rather than plotting
  - ◆ MAGICS 5.4
  - ◆ Some example jobs are available for the workstation platforms



## MAGICS

### Member States web pages (continued)

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- ◆ MAGICS 6.0 Installation Guide
- ◆ MAGICS 6.0 Specifications
- ◆ MAGICS 6.0 has been installed on these ECMWF platforms:
  - SGI                IRIX64 6.2/6.4
  - HP                HP-UX B.10.20 A 9000/811
  - DecAlpha        OSF1 V4.0 464 alpha
  - SUN              SunOS 5.6 sun4u sparc SUNW, Ultra-1
- ◆ **Recent MAGICS updates at ECMWF (planned)**



- 
- ◆ METVIEW is an interactive meteorological application, which enables operational and research meteorologists to access, manipulate and visualise meteorological data on UNIX workstations
  - ◆ Developed by ECMWF and INPE/CPTEC, Brazil with participation from Météo-France



# METVIEW

## Use of METVIEW outside ECMWF

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- ◆ Interactive and batch use
  - METVIEW Macro Language
- ◆ Runs on local workstations
  - access to own data
  - access to ECMWF MARS archive via proxy server
- ◆ Runs on Member State server at ECMWF

- 
- ◆ METVIEW script flags
  - ◆ Link to the original Vis5D documentation
  - ◆ Recent METVIEW updates at ECMWF
  - ◆ Getting and Installing METVIEW in Member States
    - requesting METVIEW
    - supported platforms
    - required software
    - the latest METVIEW release
    - previous METVIEW releases
    - METVIEW manuals: PostScript and HTML versions
    - installation guide (1.8A-export)
    - known usage problems



# METVIEW

## Versions

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- ◆ ECMWF version      METVIEW 2      20 May 1999
- ◆ Current MS version   METVIEW 1.8      13 July 1998
- ◆ Next MS version      METVIEW 2      July 1999
  - Y2K ready
  - interface to Vis5D
  - PlotMod
    - new OpenGL/MAGICS 6 based visualisation module
    - PlotMod currently optional
  - VisMod
    - old GKS/MAGICS 5.4 based visualisation module
    - VisMod will be supported for some time



- 
- ◆ Making Vis5D more usable at ECMWF by integrating it with METVIEW
  - ◆ Rôle of METVIEW
    - start Vis5D from METVIEW User Interface
    - retrieve/access/manipulate/prepare data for Vis5D
    - specify initial Vis5D visualisation
    - drag and drop icons from METVIEW to Vis5D
  - ◆ Rôle of Vis5D
    - 3D visualisation
    - Vis5D User Interface fully functional



## METVIEW 2

### Interface to Vis5D (continued)

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- ◆ Data source
  - MARS Retrieval
  - Data Read from File
  - output from METVIEW Formula
    - similar facilities in Vis5D
  - output from METVIEW Macros
  - etc.
- ◆ GRIB scalar and vector fields for upper air and surface
- ◆ *METVIEW controls Vis5D by sending TCL script files to Vis5D via a pipe file*



- 
- ◆ Combines the facilities for batch and interactive visualisation
  - ◆ Allowing the user to view the same data simultaneously in different ways
  - ◆ OpenGL based
  - ◆ Uses ECMWF MAGICS 6 graphics package
    - PostScript driver
    - OpenGL/METVIEW drivers





## METVIEW 2

### OpenGL and GLU

---

- ◆ METVIEW 2/PlotMod require OpenGL 1.1 and GLU 1.2
- ◆ GLU is an OpenGL Utility Library and is used by MAGICS 6/OpenGL for contour shading
- ◆ SGI, Compaq, HP, SUN, IBM support \*
  - OpenGL 1.1 and GLU 1.2
- ◆ Mesa supports
  - OpenGL 1.2 and GLU 1.1

\* based on information from the web



- 
- ◆ Installation procedure with/without
    - VisMod/MAGICS 5.4/S-GKS (as version 1.8)
    - PlotMod/MAGICS 6/OpenGL
  - ◆ Porting to HP, DEC Alpha and SUN platforms



## METVIEW 2

### In progress

---

- ◆ PlotMod User Guide
- ◆ Revised Main User Interface
- ◆ New Graphics Page Layout Control
- ◆ New Show Contents
- ◆ New Animation Control
- ◆ Advanced titles and legends
- ◆ Automatic conversion of VisMod macros



- 
- ◆ Shows the EPS control and members forecast distribution for a model run
  - ◆ Only available at ECMWF



## Future development

---

- ◆ Further develop MAGICS and METVIEW to cope with new user demands
  - new data types
  - new METVIEW applications
- ◆ Desktop strategy considerations



- 
- ◆ MAGICS 6 available to MS
  - ◆ METVIEW 1.8 available to MS
  - ◆ METVIEW 2 planned availability July 1999
    - Y2K ready
    - interface to Vis5D
    - new visualisation module added (requires OpenGL)



**Philip Dominy: MetOffice, UK**

Forecast Product Creation on Horace

Recent Developments in Horace

Product Creation using On-Screen Analysis

# Forecast Product Creation on Horace

Many products are now automatically produced on Horace.

Products include :- fax, graphics for the Web, text and gridded data.

96-885 2

## Benefits

- **Allows the forecaster more time for 'meteorology'**
- **Less support staff needed**
- **Less time per product required**

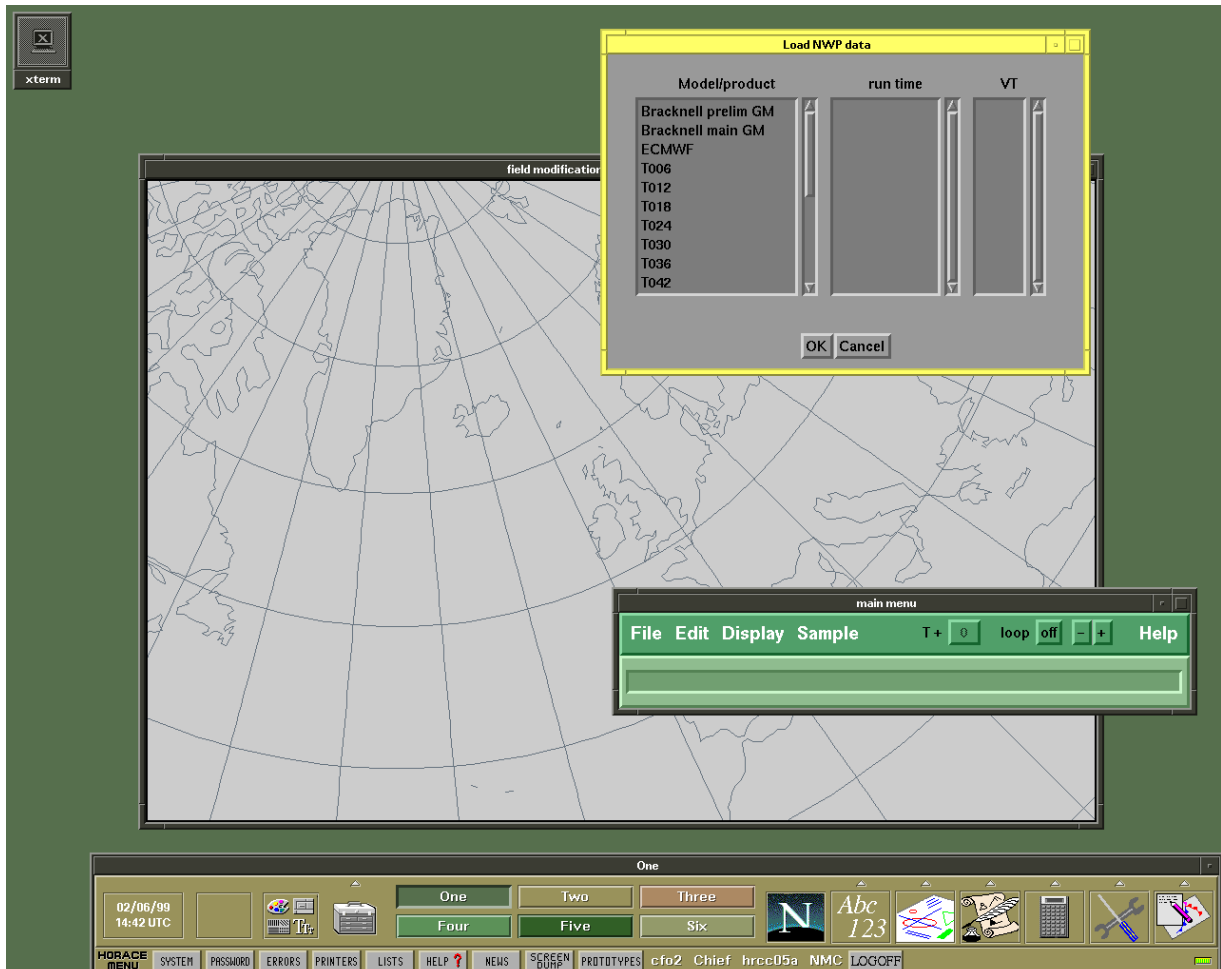
96-885 3

# Stages in Product Creation

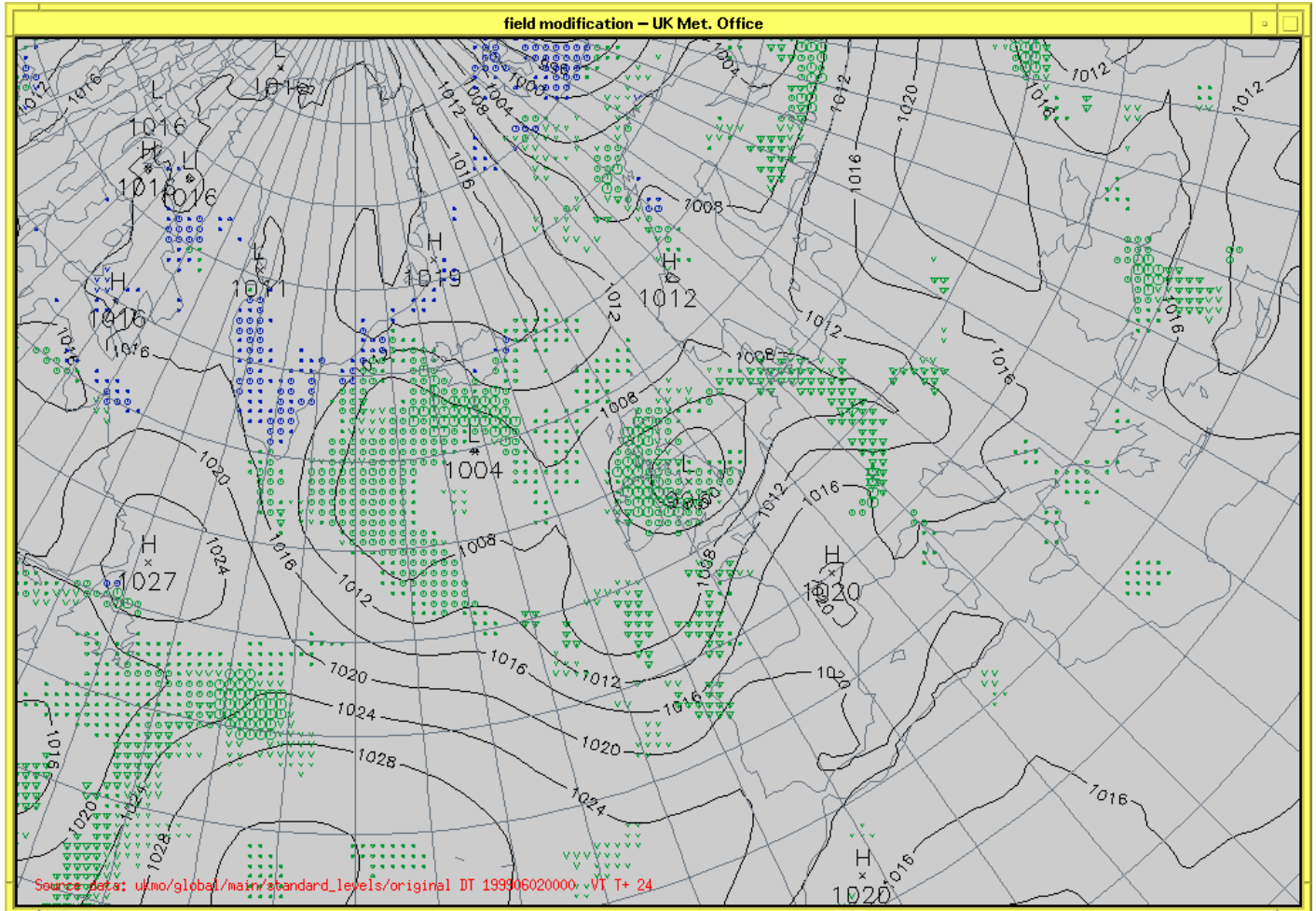
- Amend the forecast data using On-Screen Field Modification (OSFM) program
- Save the data back into the central database (4-dimensional fields)
- Create all products using this amended data

96-885 4

## Amending the Data



# Identify the Feature to Modify



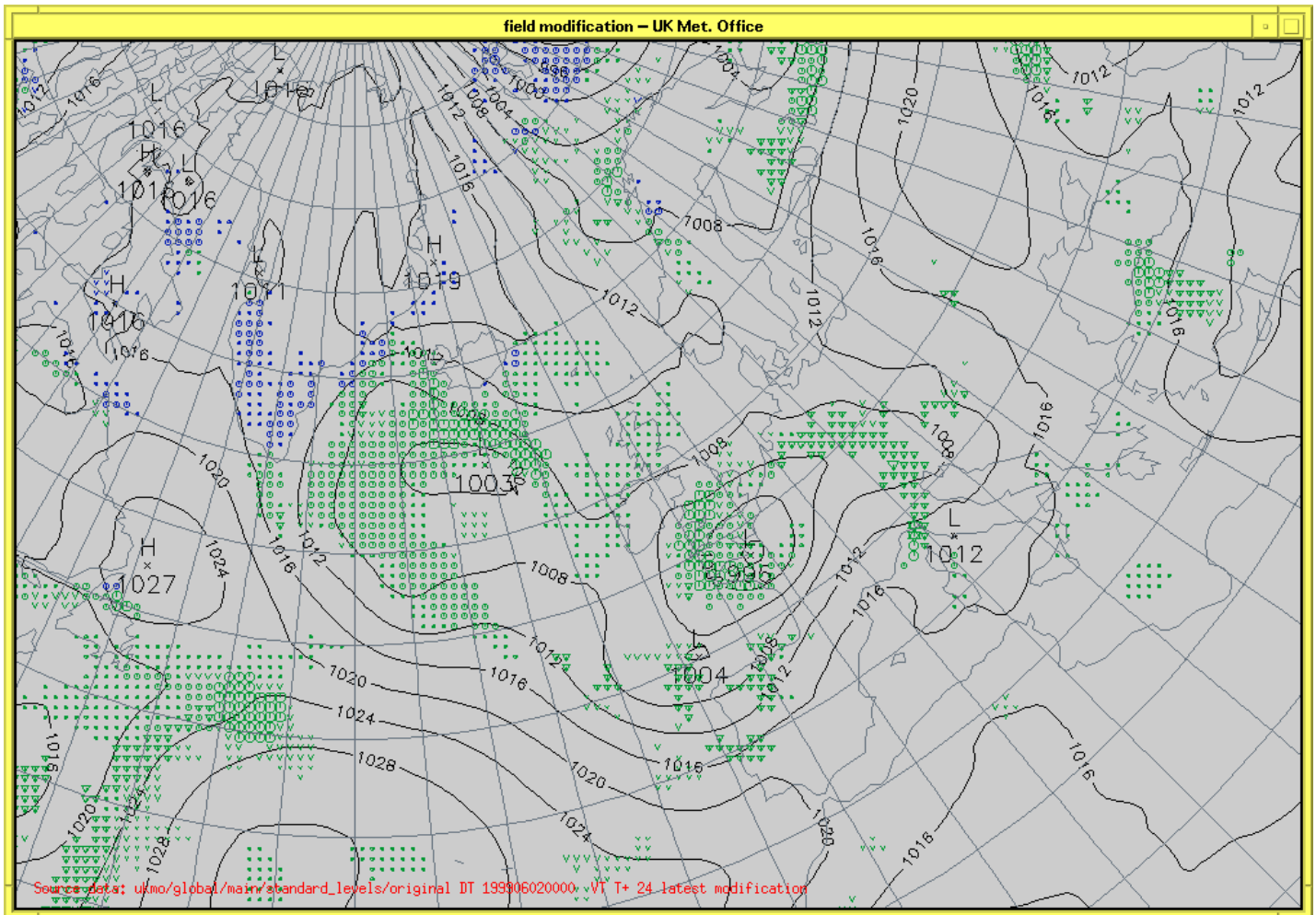
# Adjust Position and/or Depth

This screenshot shows the same meteorological map as above, but with several software interface elements overlaid. At the top, a "main menu" bar is visible with options: "File", "Edit", "Display", "Sample", "T + 24", "loop off", and "Help". Below the menu, a status bar shows "Cancelled.....". On the right side, a "Change dynamical fields" dialog box is open, containing the following settings:

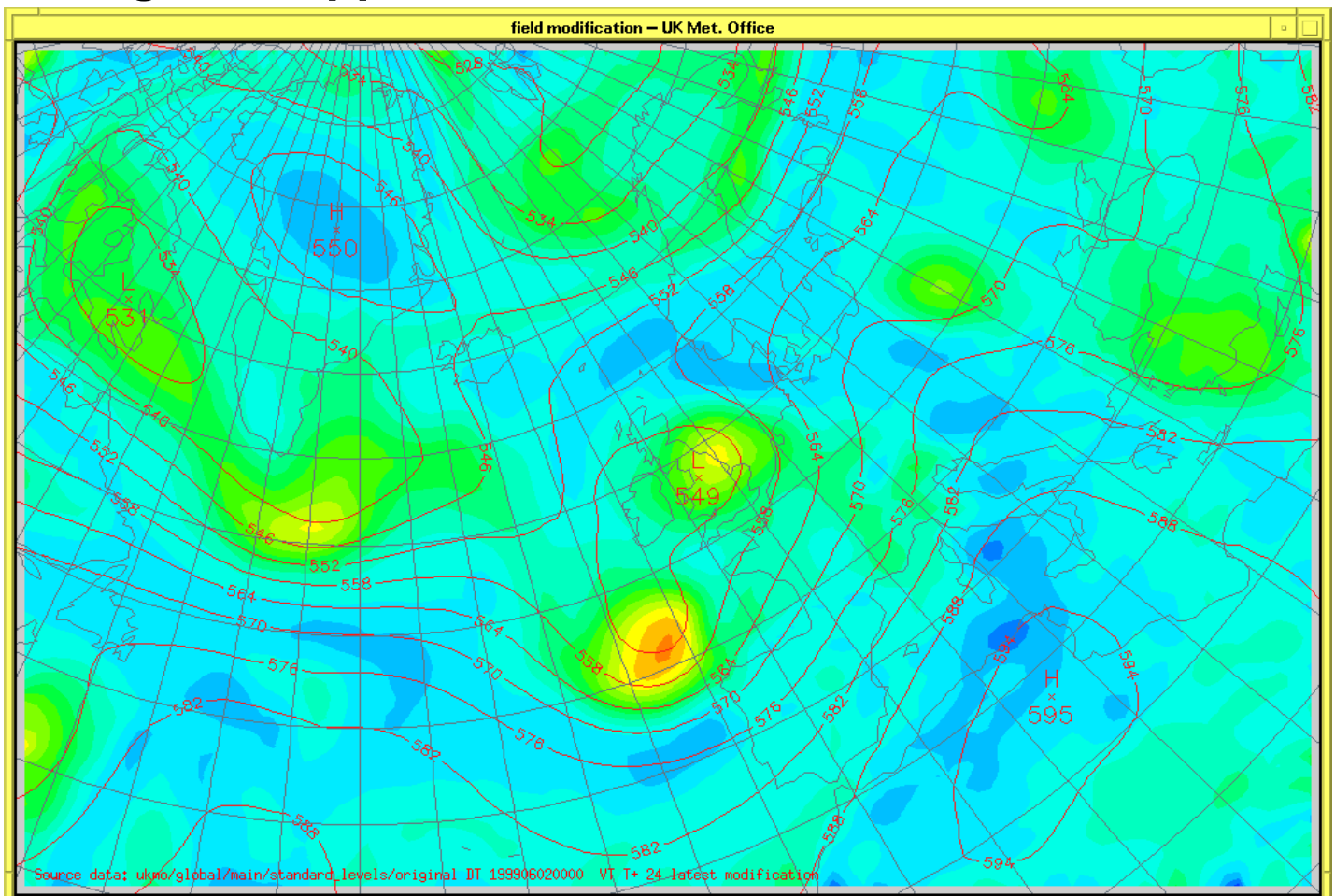
- Parameter: PV
- Transformation: point
- Level: Surface
- Vertical influence: Equal at all levels

At the bottom of the dialog are "start" and "dismiss" buttons. The map itself shows the same pressure contours and data points, but the green data points are now more sparsely distributed, indicating they have been modified or adjusted. The source data reference at the bottom left remains the same: "Source data: ukmo/global/main/standard\_levels/original DT 199906020000 VT T+ 24".

# Changes are applied to many fields

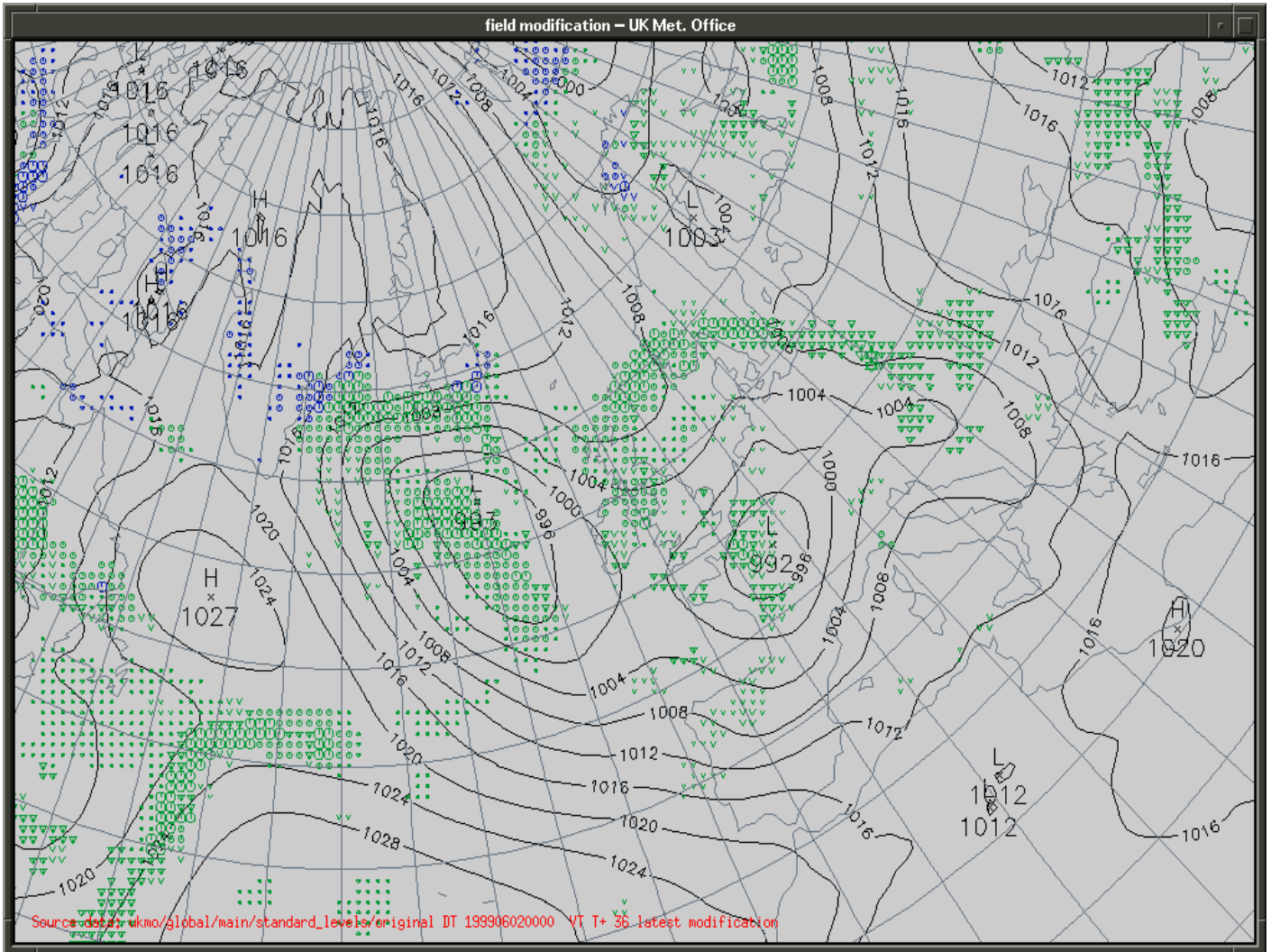


# Changes to Upper-Air Data

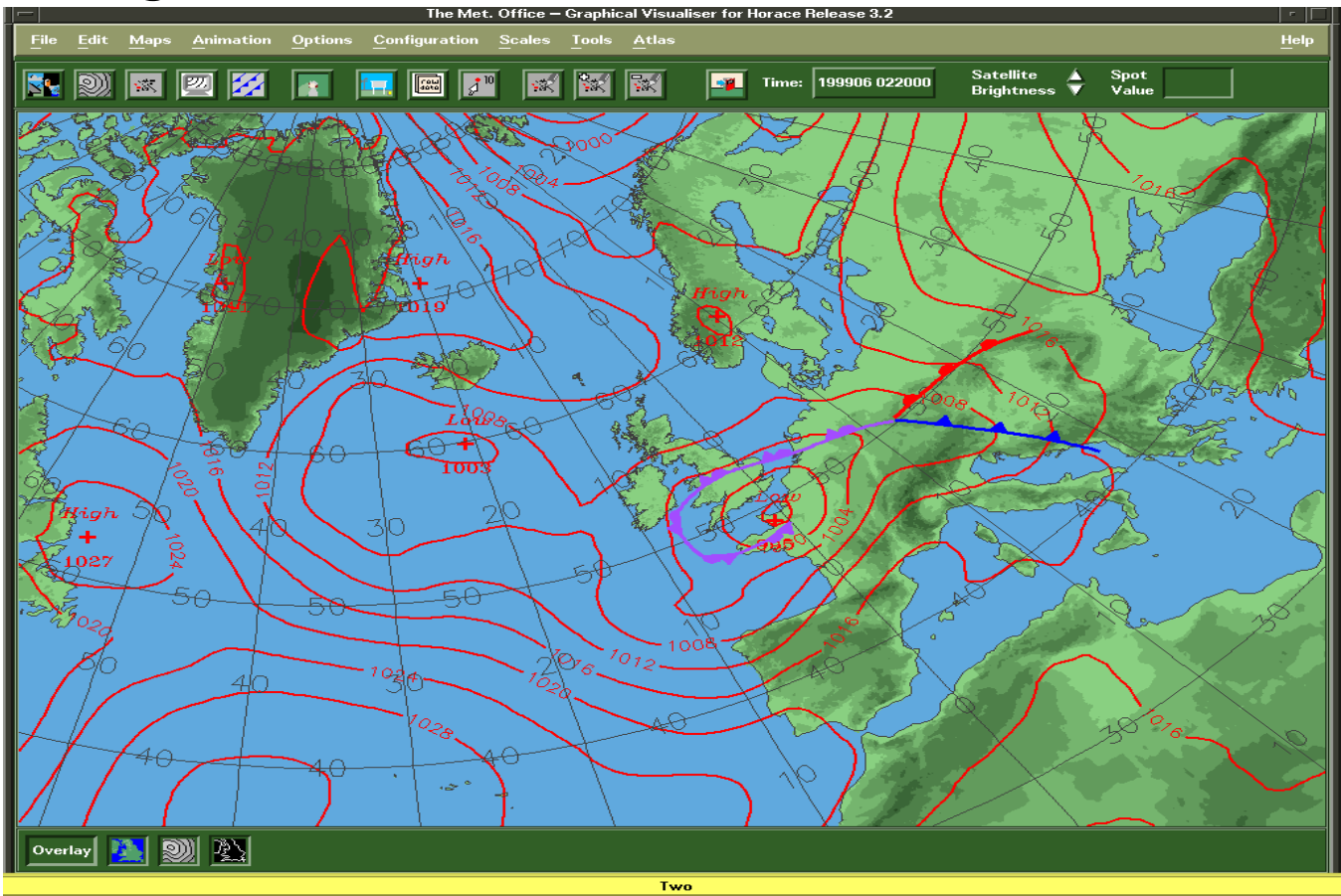




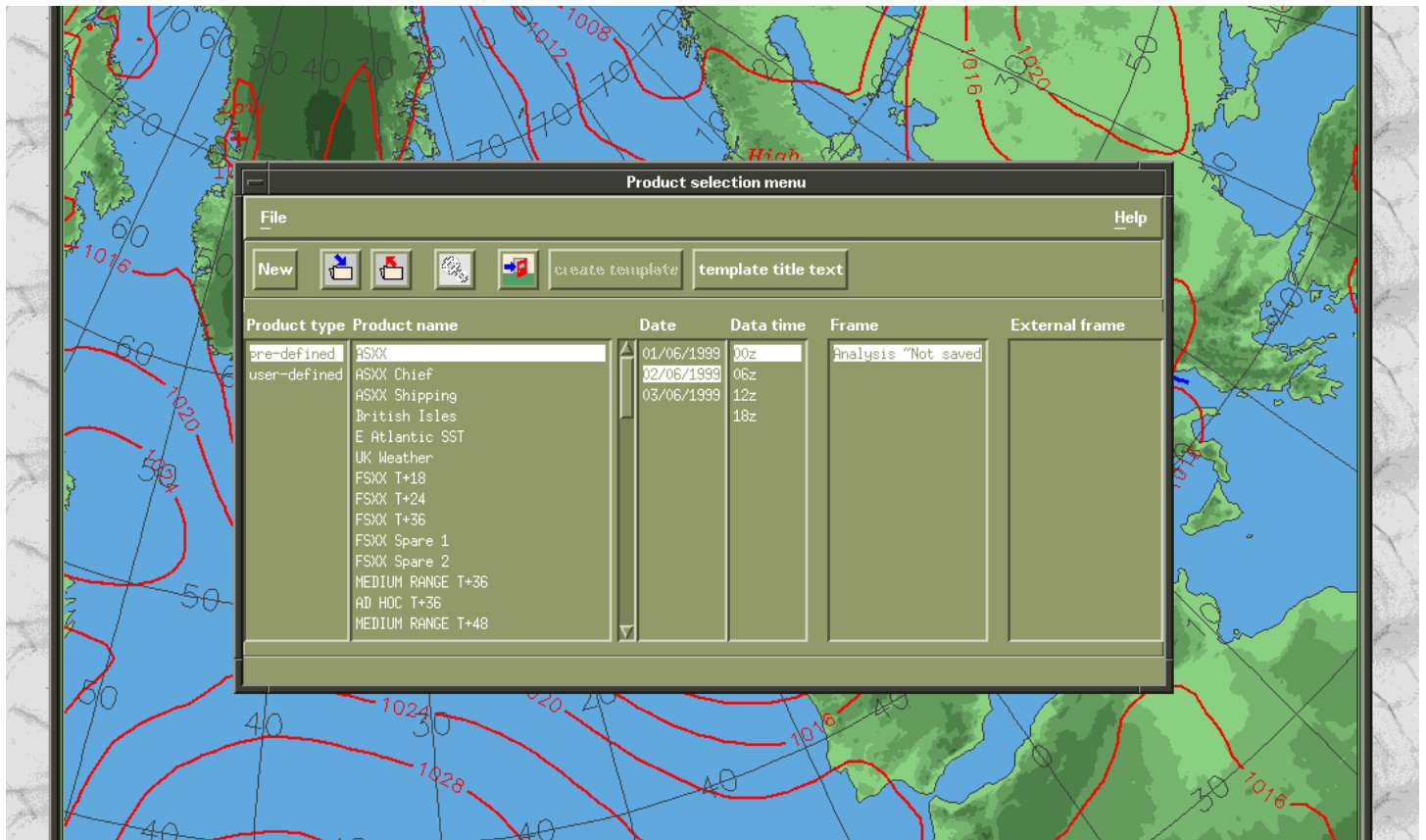
# Time-Link Modifications



## Using Amended Data to Create a Product

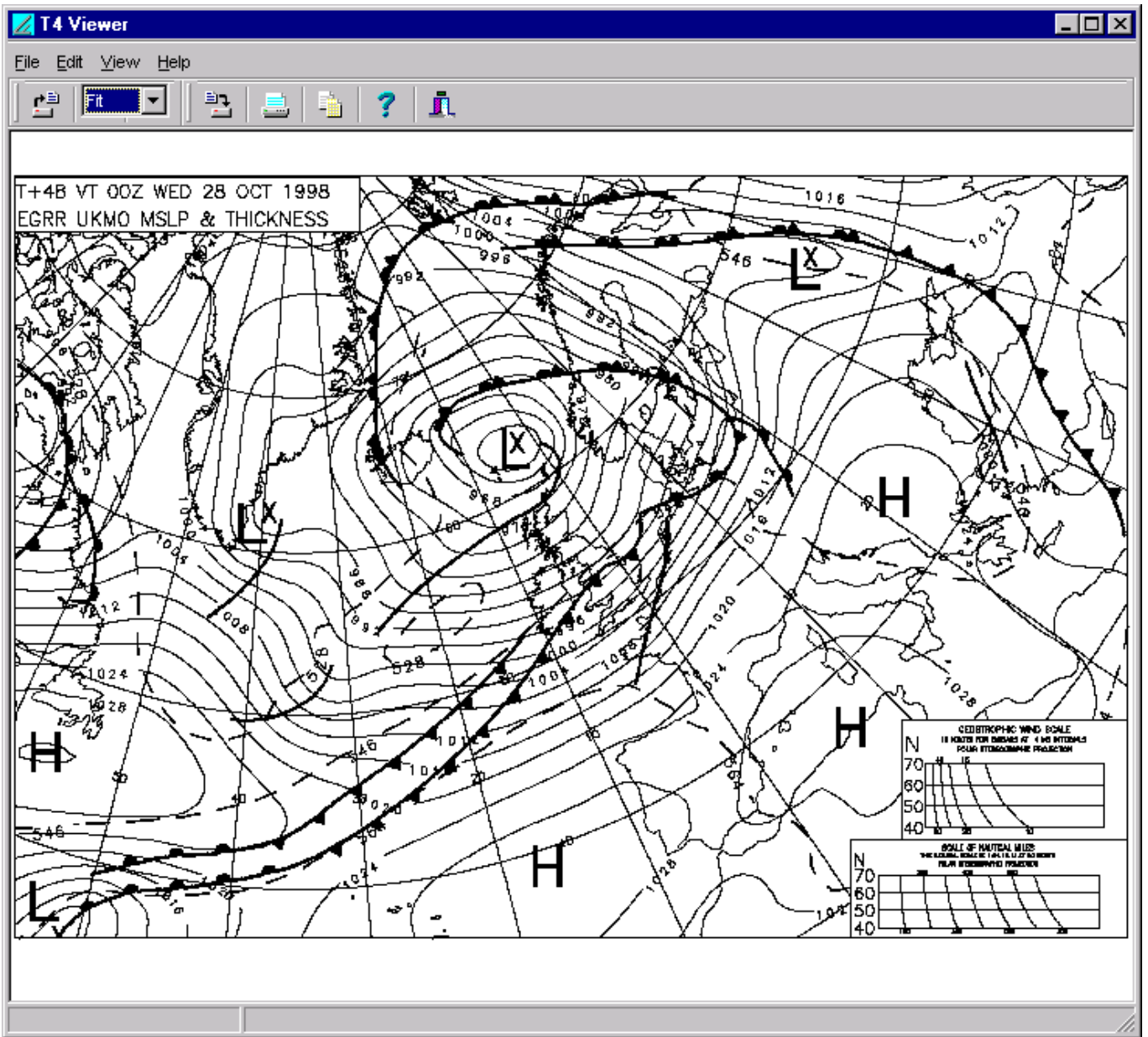


# Product Selection Menu

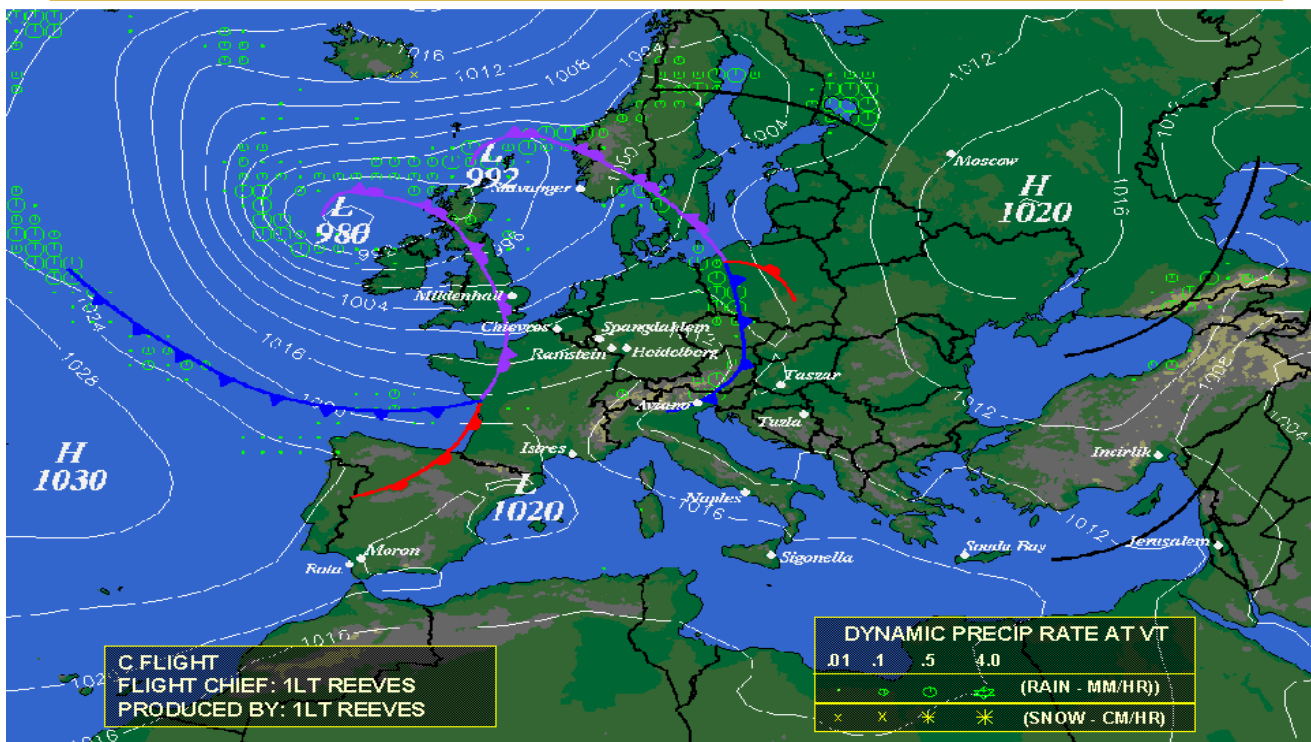


## Example Products

- T4 Fax - NMC Bracknell
- USAFE T+24 MSLP Forecast
- USAFE Thunderstorm Forecast

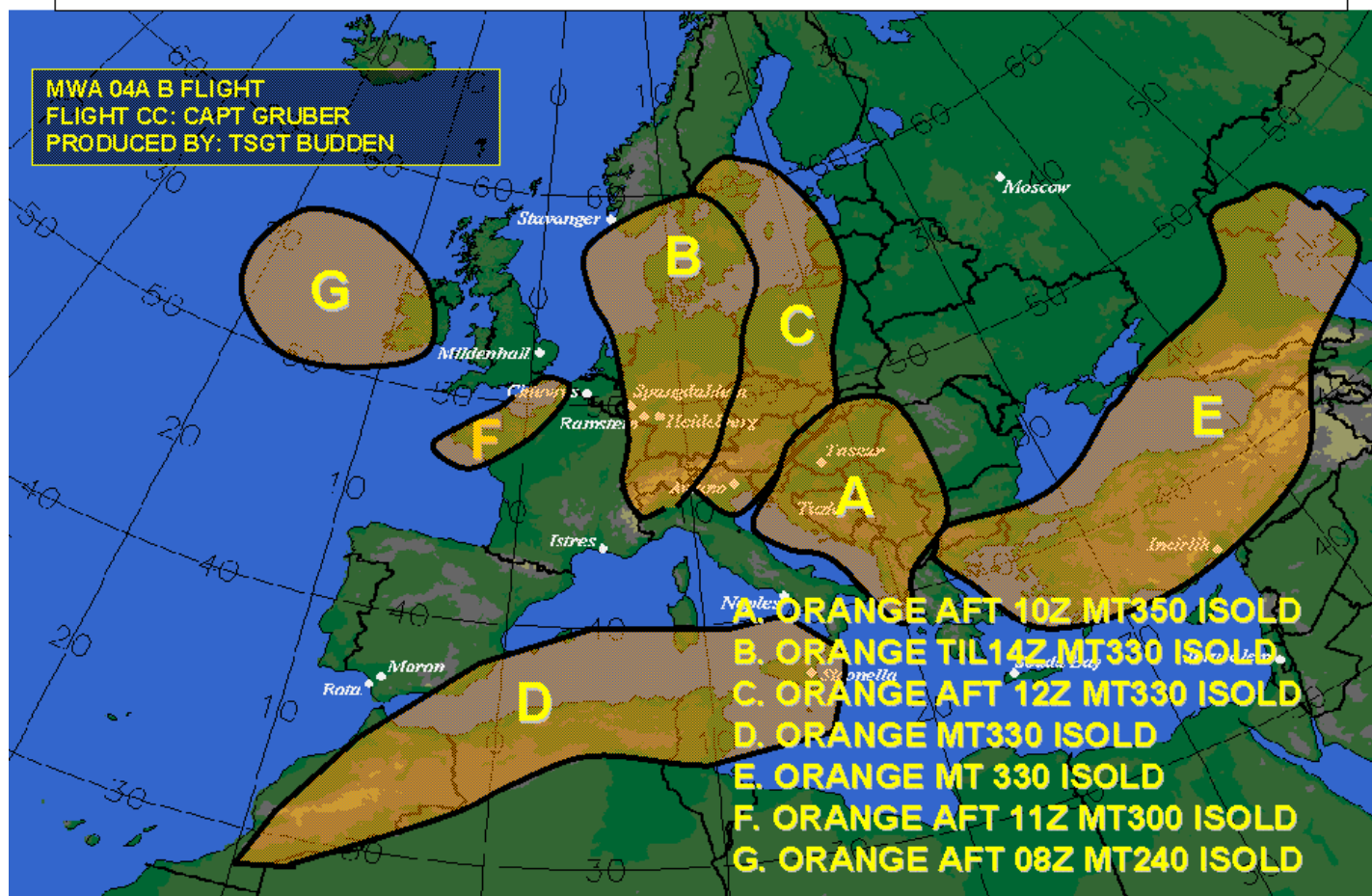


## 24 HR SFC PROG VT 04/12Z



# TSTM CHART VT 04/03Z - 04/15Z

MWA 04A B FLIGHT  
FLIGHT CC: CAPT GRUBER  
PRODUCED BY: TSGT BUDDEN



## Recent Developments in Horace

- Updates to Atmospheric Field Modification System (e.g. Time linking)
- New Oceanographic Field Modification
- On-Screen Analysis Fully Operational
- Y2K Compliance
- Oceanographic Cross Sections
- Vertical Profiles for the Ocean (BATHYs)
- Trajectory Display
- User-Definable Product Creation
- Improved Attention-Getter System
- Ship Routing System (Trax)

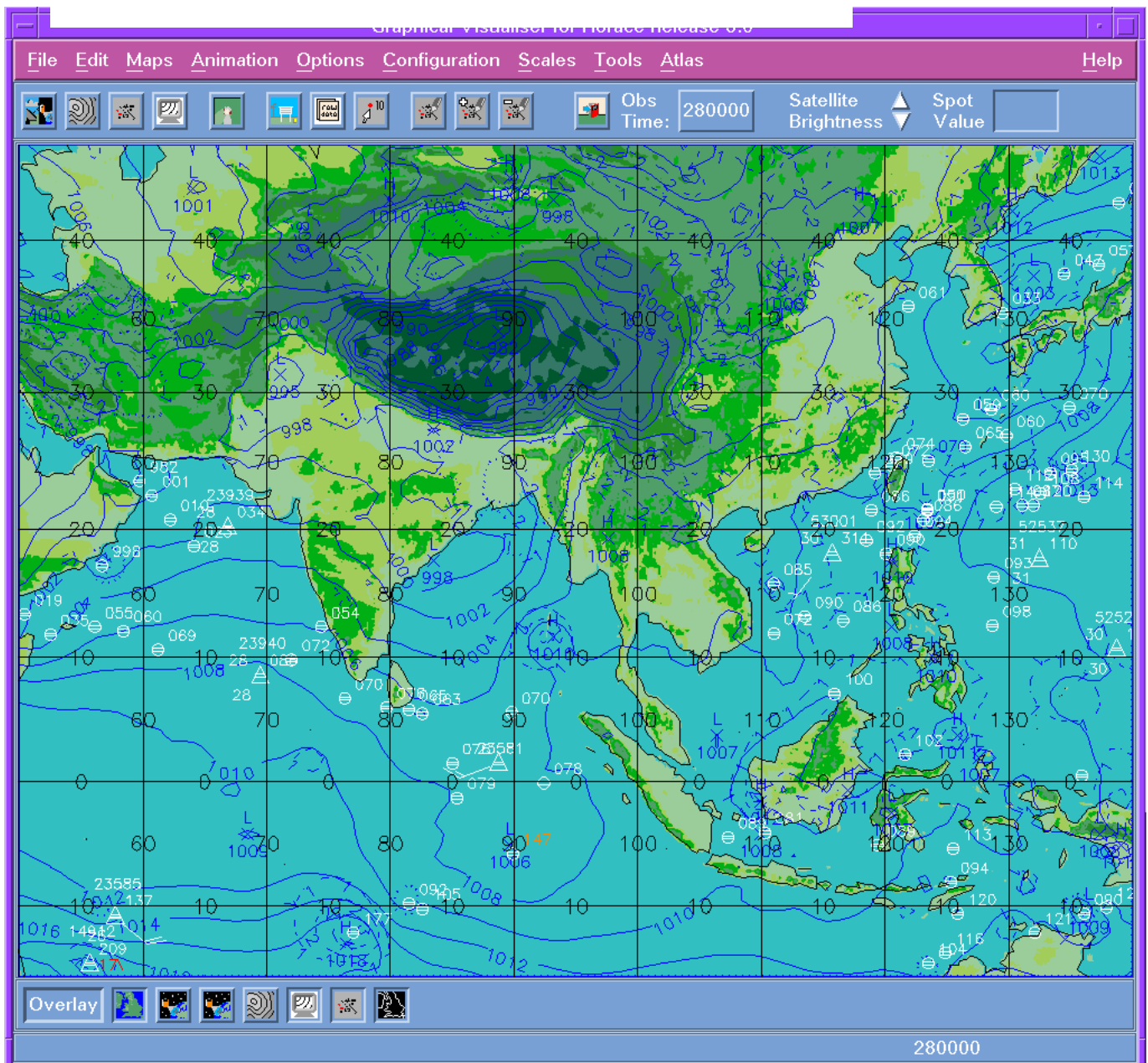
## Forthcoming Developments in Horace

- Semi-Automated TAFs (AUTOTAF)
- Macro Options for User
- Semi-Automated Shipping Forecast
  - (Using Automatic Text Generation)
- etc...

## The Process of On-Screen Analysis

- 1) The field of Raw Observations is contoured by the computer, using either:
  - univariate analysis, no model
  - univariate analysis, model-merge
  - trivariate analysis, no model
  - trivariate analysis, model-merge

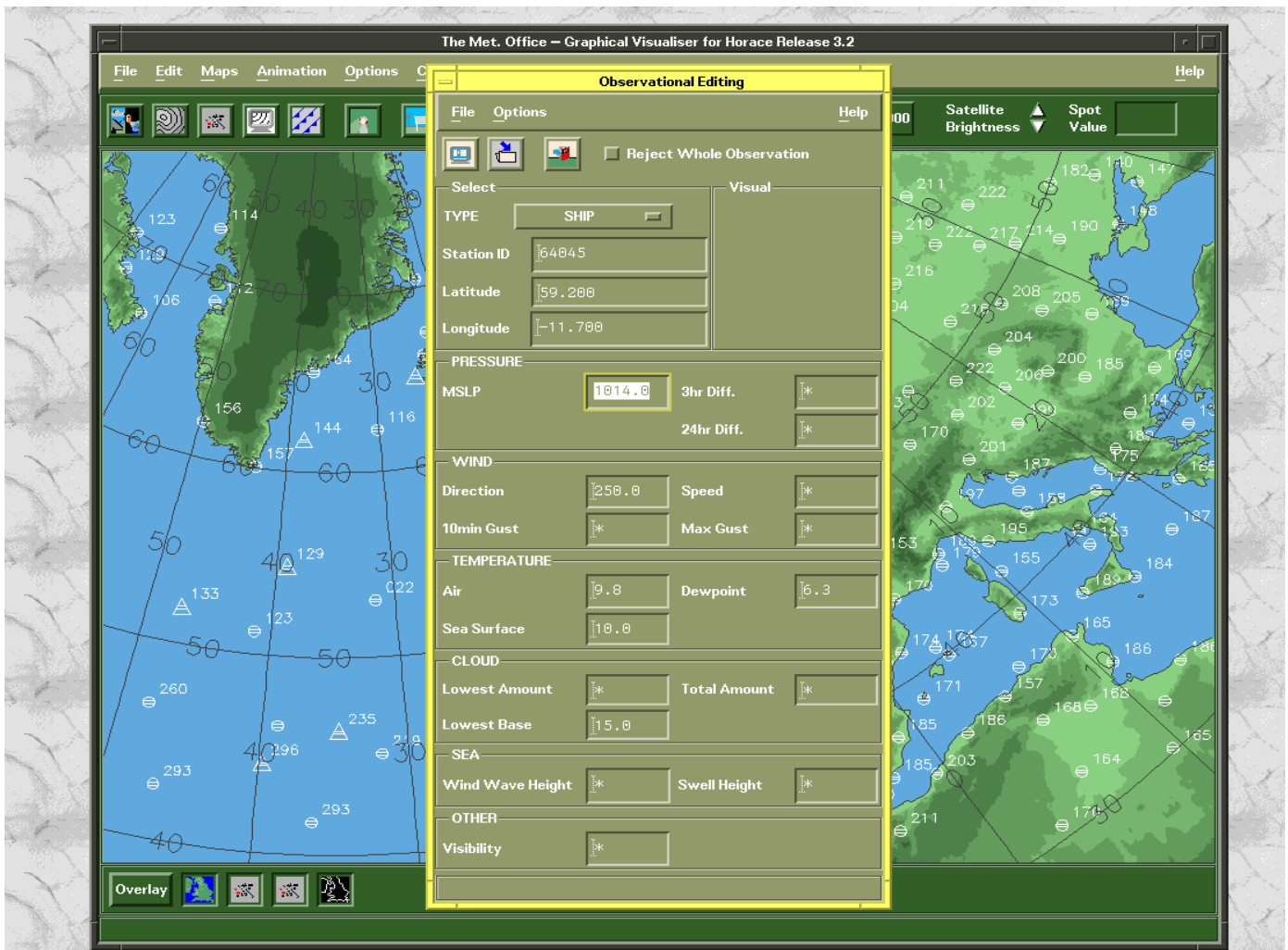
### OSA MSLP - 'Raw' Observations



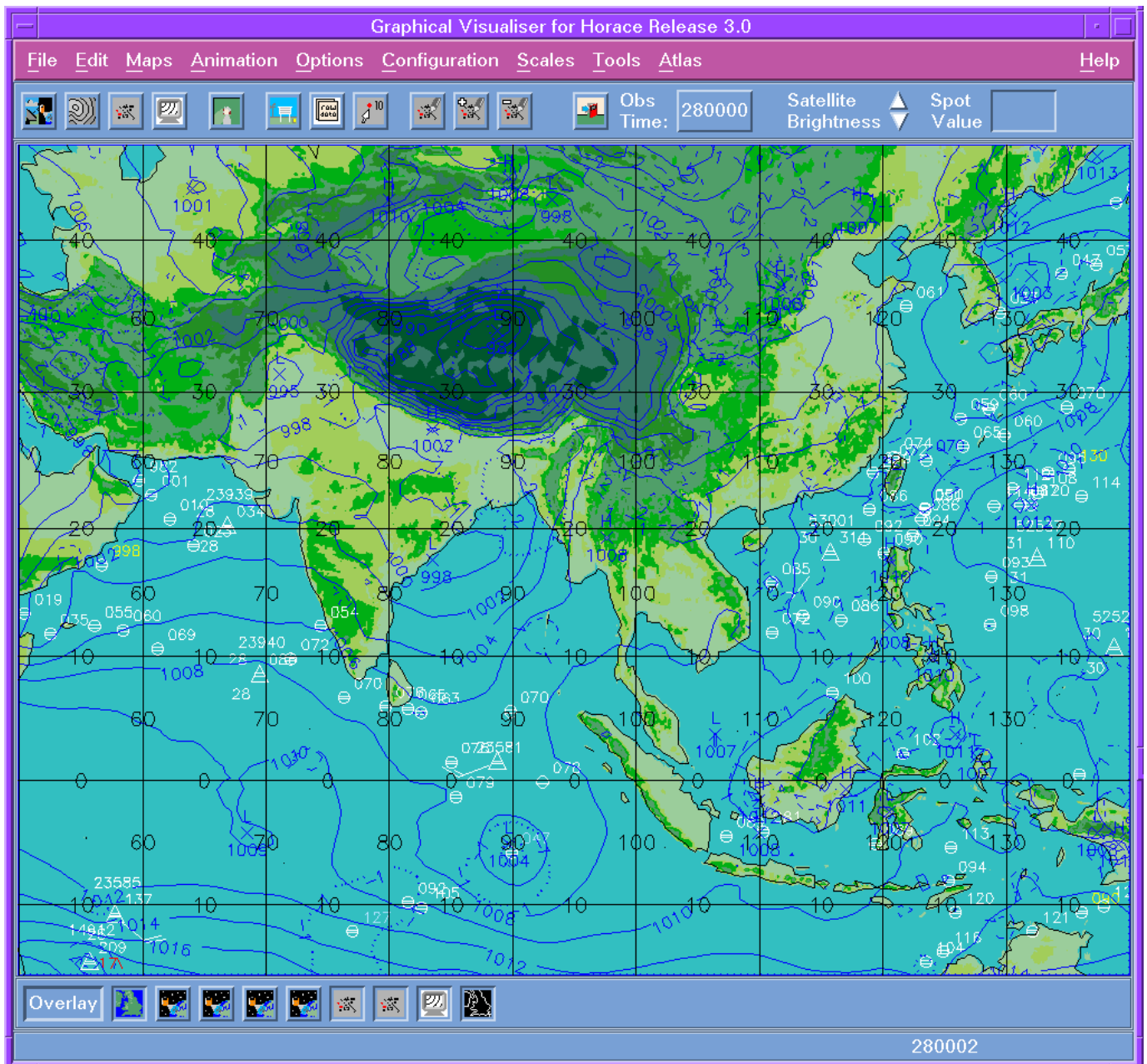
## The Process of On-Screen Analysis

- 2) Quality Control :
  - 'Automatic' - by the computer
    - Permanent Rejections/Corrections
    - Filter against NWP background
    - 'Buddy Check' against nearest neighbour
    - MSLP: Metar QNH converted to QFF
  - 'Manual' - by the forecaster
    - Correction/Rejection of a *single* element
    - Rejection of the *whole* observation

### OSA Editing GUI



# OSA MSLP - 'Q/C' Observations



## The Process of On-Screen Analysis

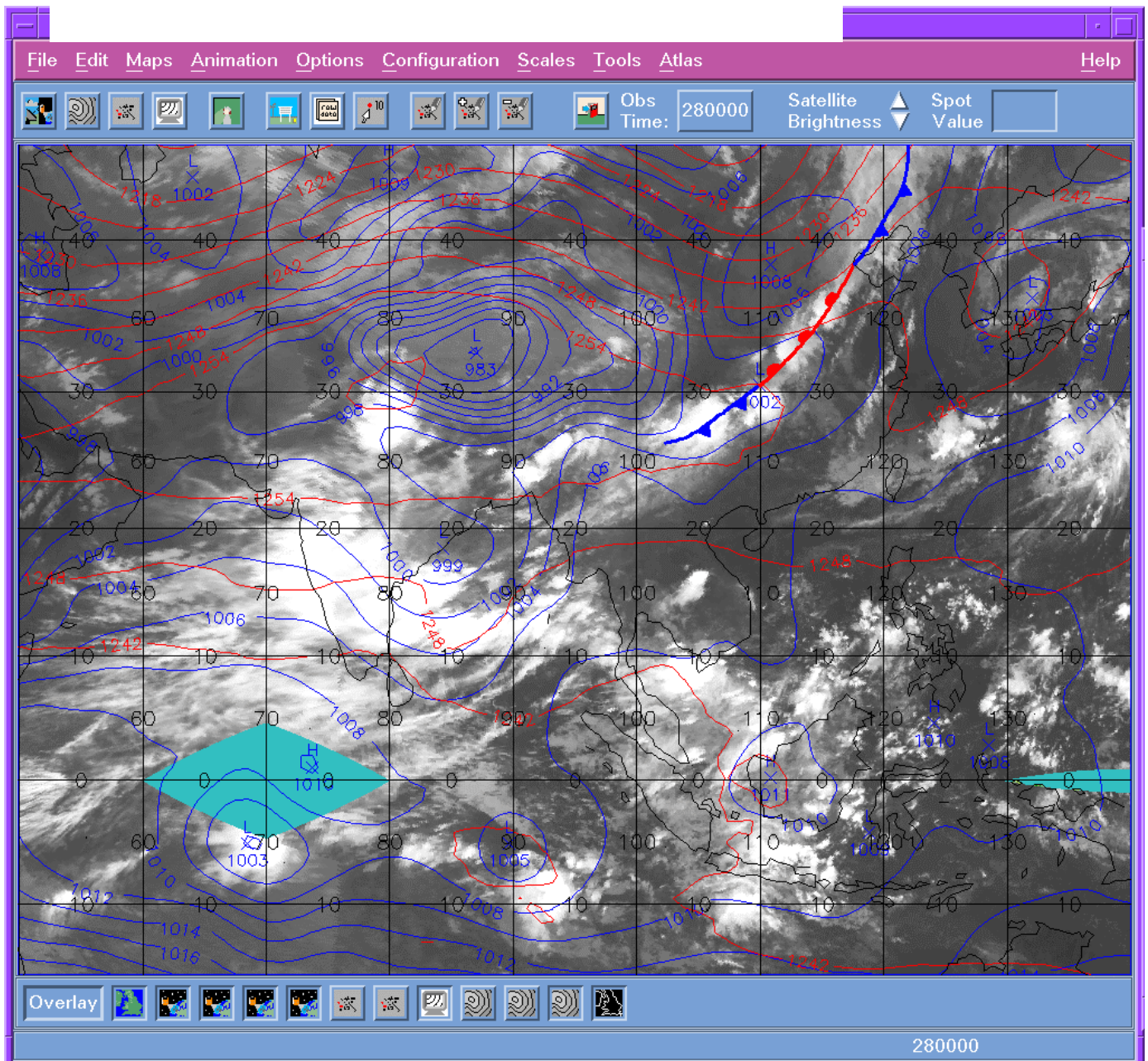
- 3) Bogussing - by the forecaster
  - In data-sparse areas
  - Using Satellite Imagery
  - Using Tropical Cyclone Advisories
  - Using data types not included in OSA
    - e.g. Scatterometer winds, AIREPs, etc.



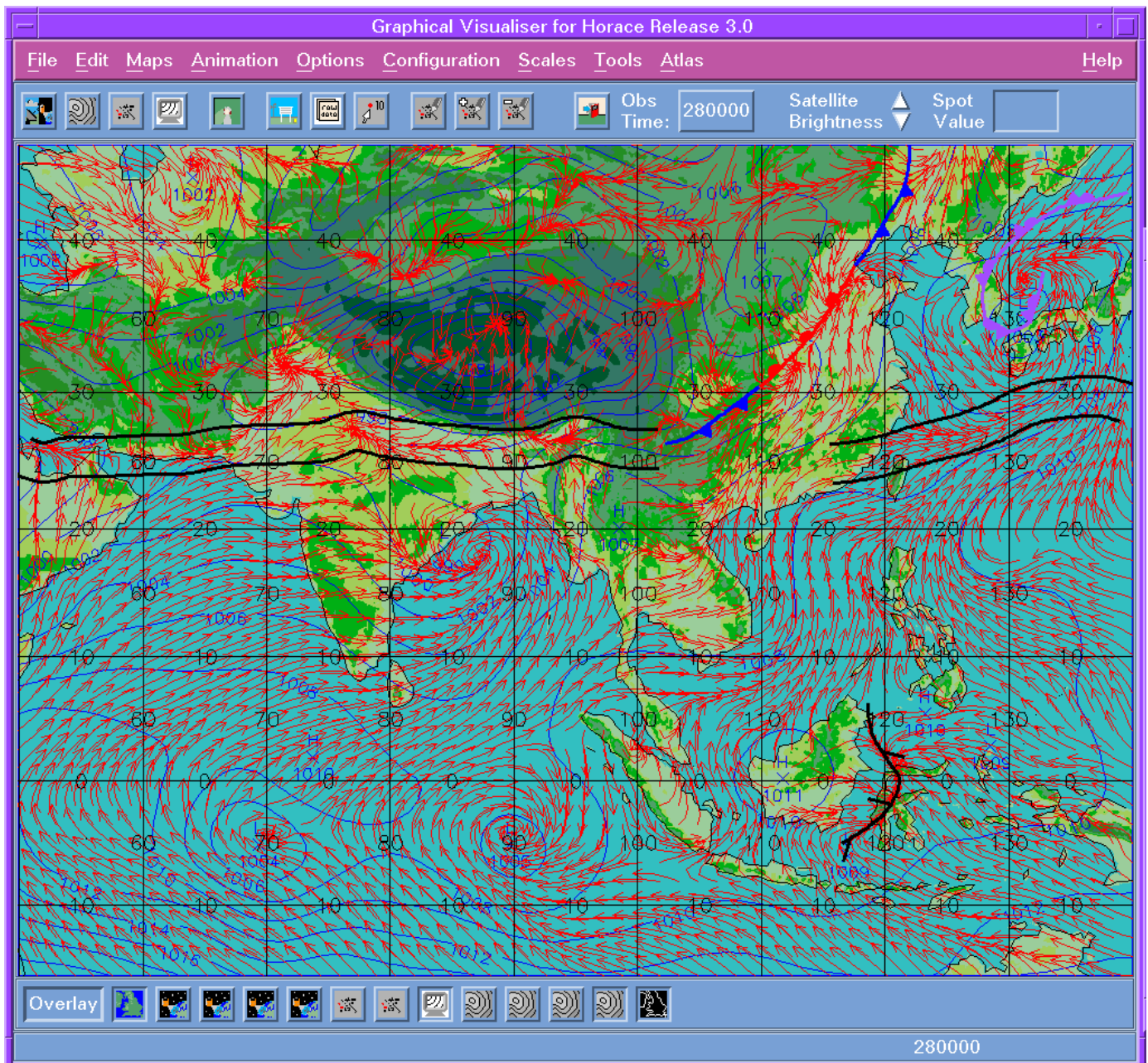
## The Process of On-Screen Analysis

- 4) Fronts, Troughs, & CZs - by the forecaster
  - Using Satellite Imagery
  - Using 850hPa Wet Bulb Potential Temperature
    - (or 1000-500hPa thickness)
  - Troughs using Upper Air Geopotential Height
  - Convergence Zones using Streamlines

### OSA MSLP - Add Fronts



# OSA MSLP - Add ITCZ & CZs

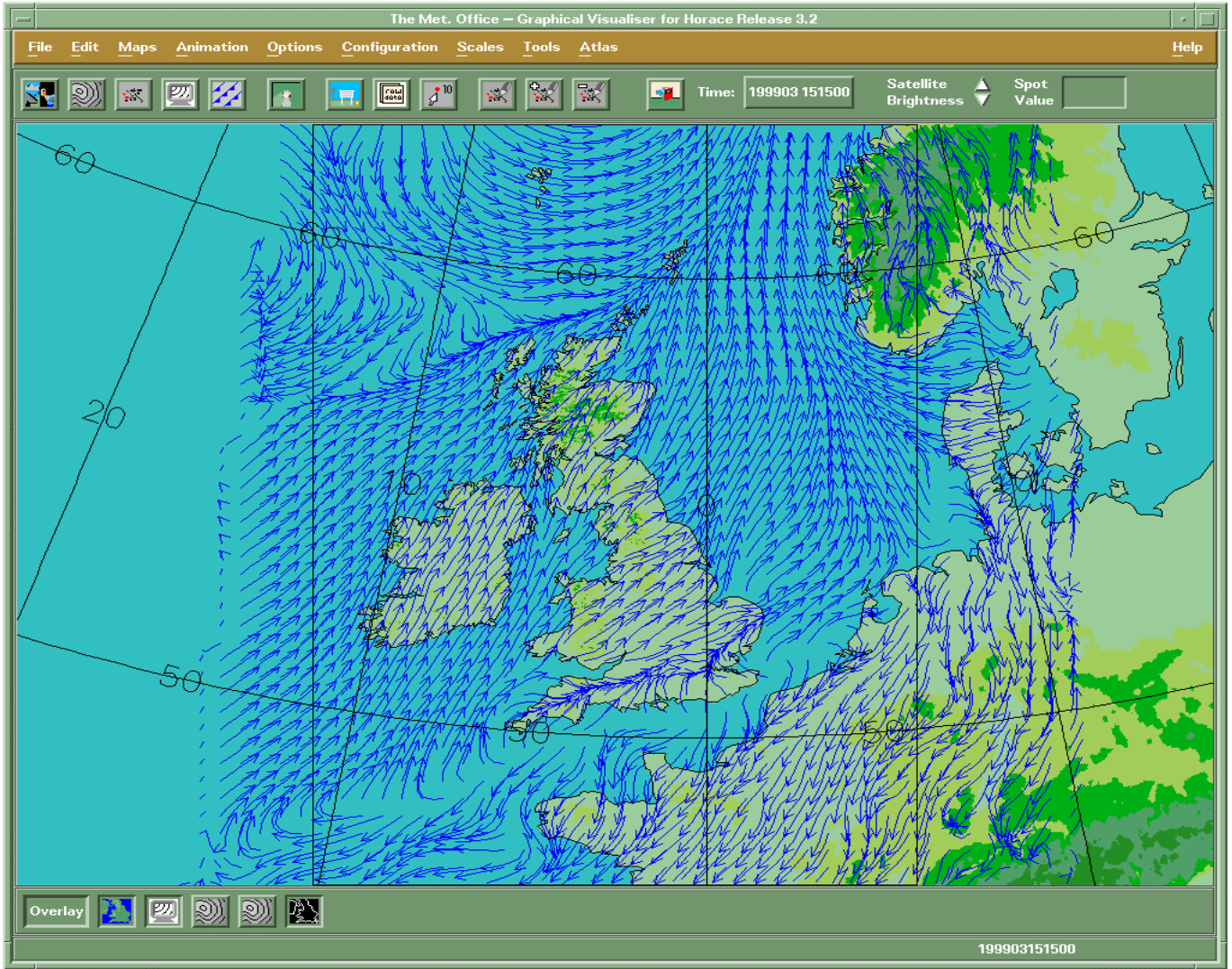


## The Process of On-Screen Analysis

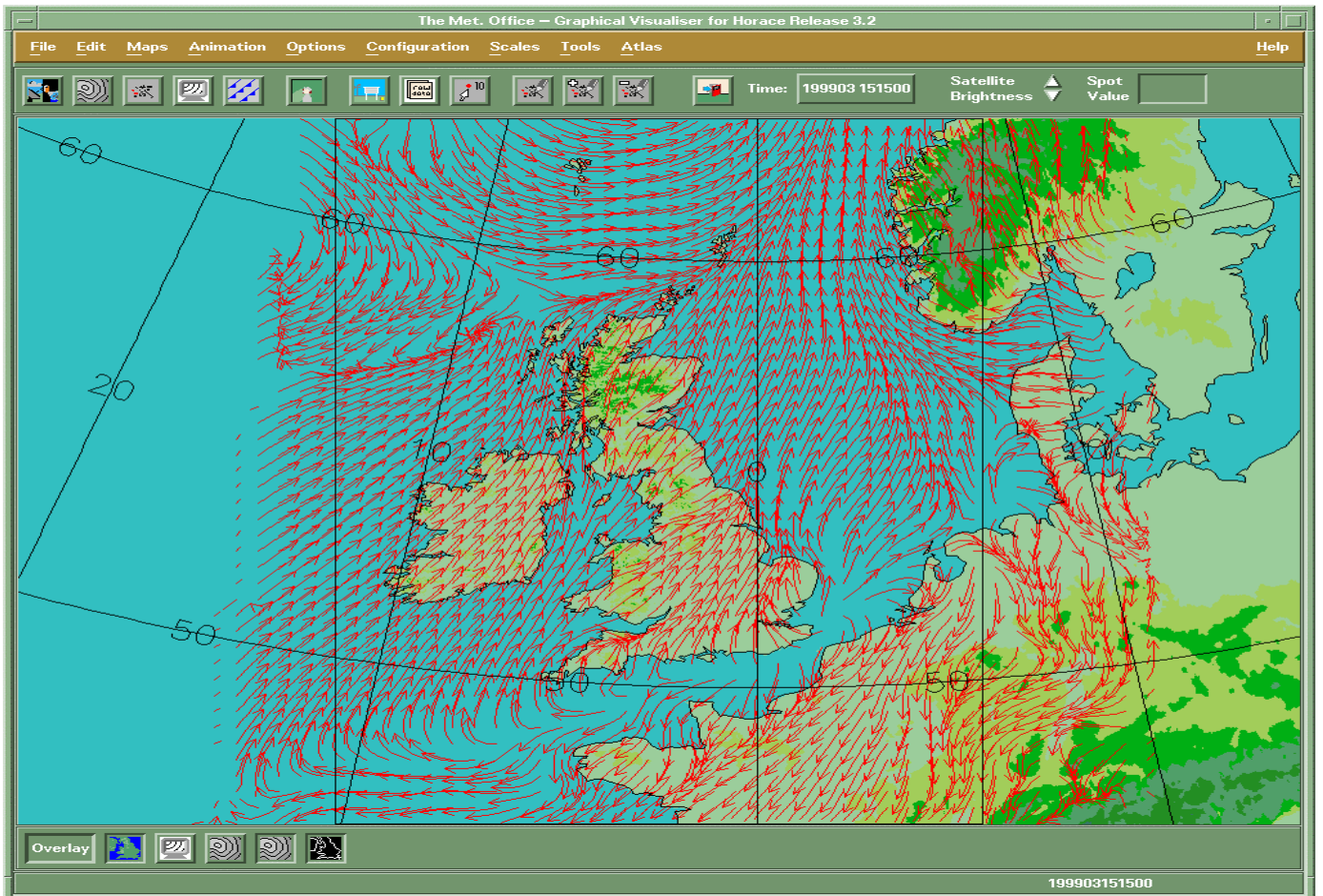
- 5) Desk-Top Publishing - by the forecaster/assistant
  - Names/Labels of Highs, Lows, & Fronts



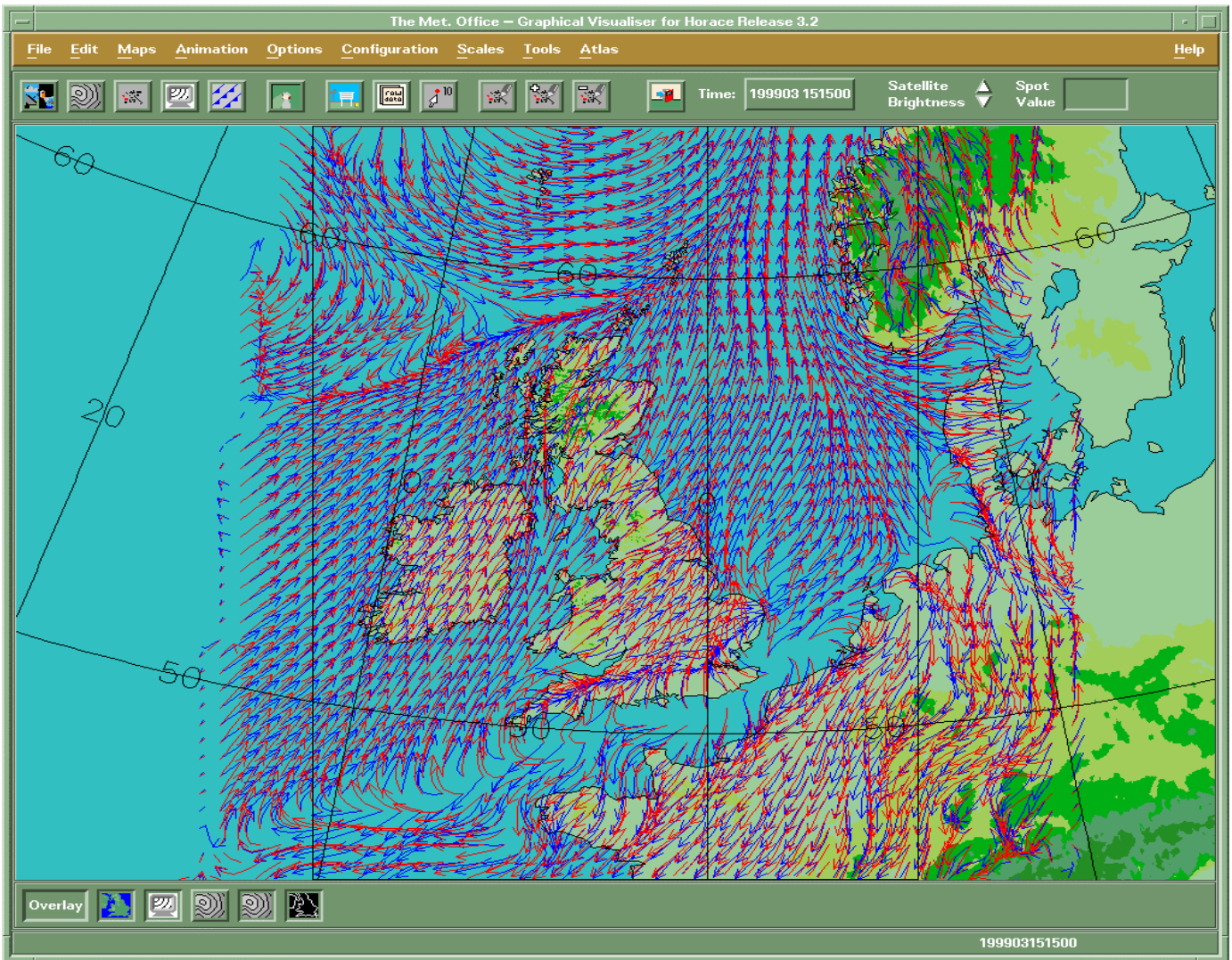
# On-Screen Analysis Streamlines



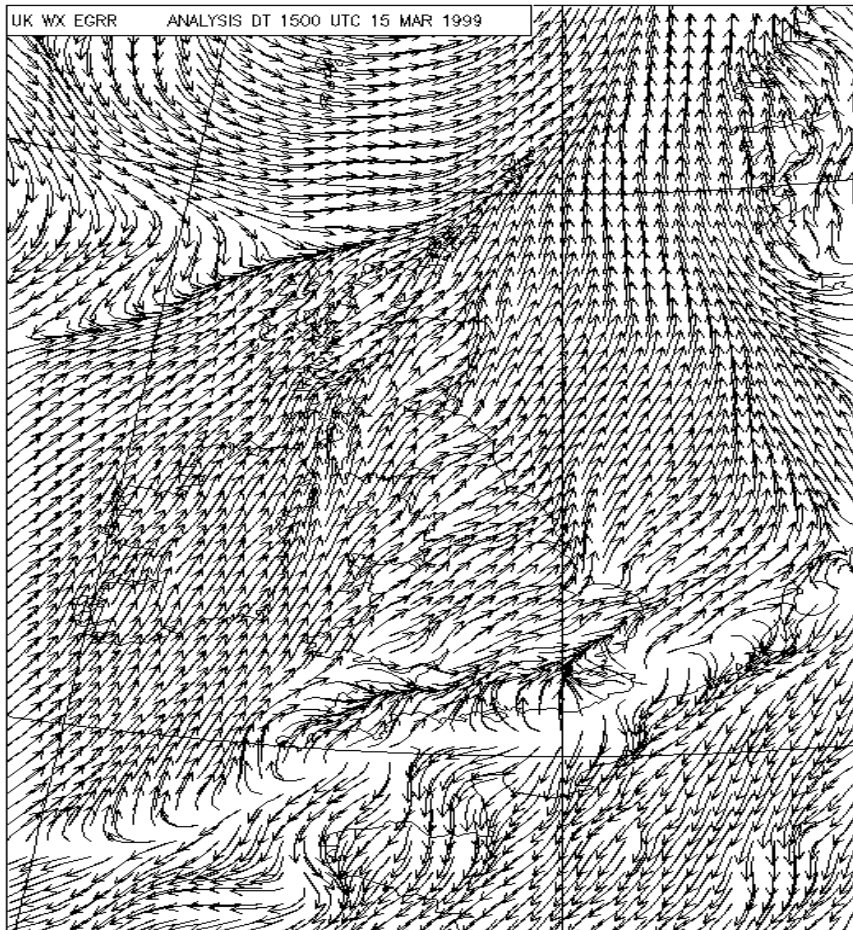
# NWP Streamlines



# OSA & NWP Streamlines



## Streamline Product



**Dick Blaauboer: KNMI, Netherlands**

## Recent developments at KNMI

....

## **1998-1999 developments MWS**

**hardware replacement finalized 1998 (DEC Alpha DPW 600a)**

**finalized software developments**

**alert-function on observations (extendable to models)**

**configurable detailed background maps**

**integration of lightning data**

**combined Station-Contour source**

**advanced crosssection features**

....

....

## **1998-1999 developments MWS, con'd**

**integration of windprofiler data**

**integration of AMDAR profiles (aircraft measurements)**

**overlays of vertical profiles**

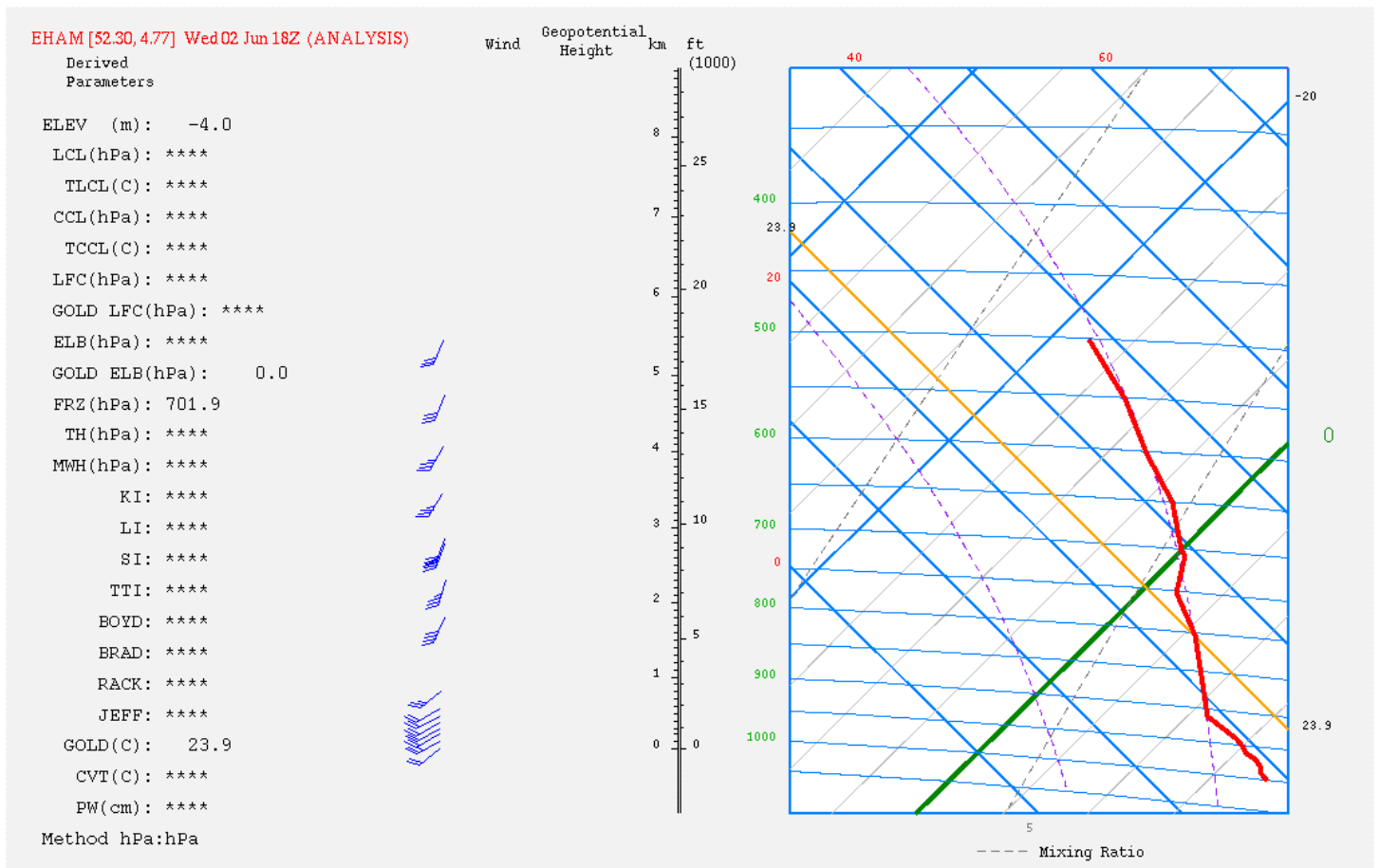
**some smaller enhancements**

....

## Profiler network in Europe

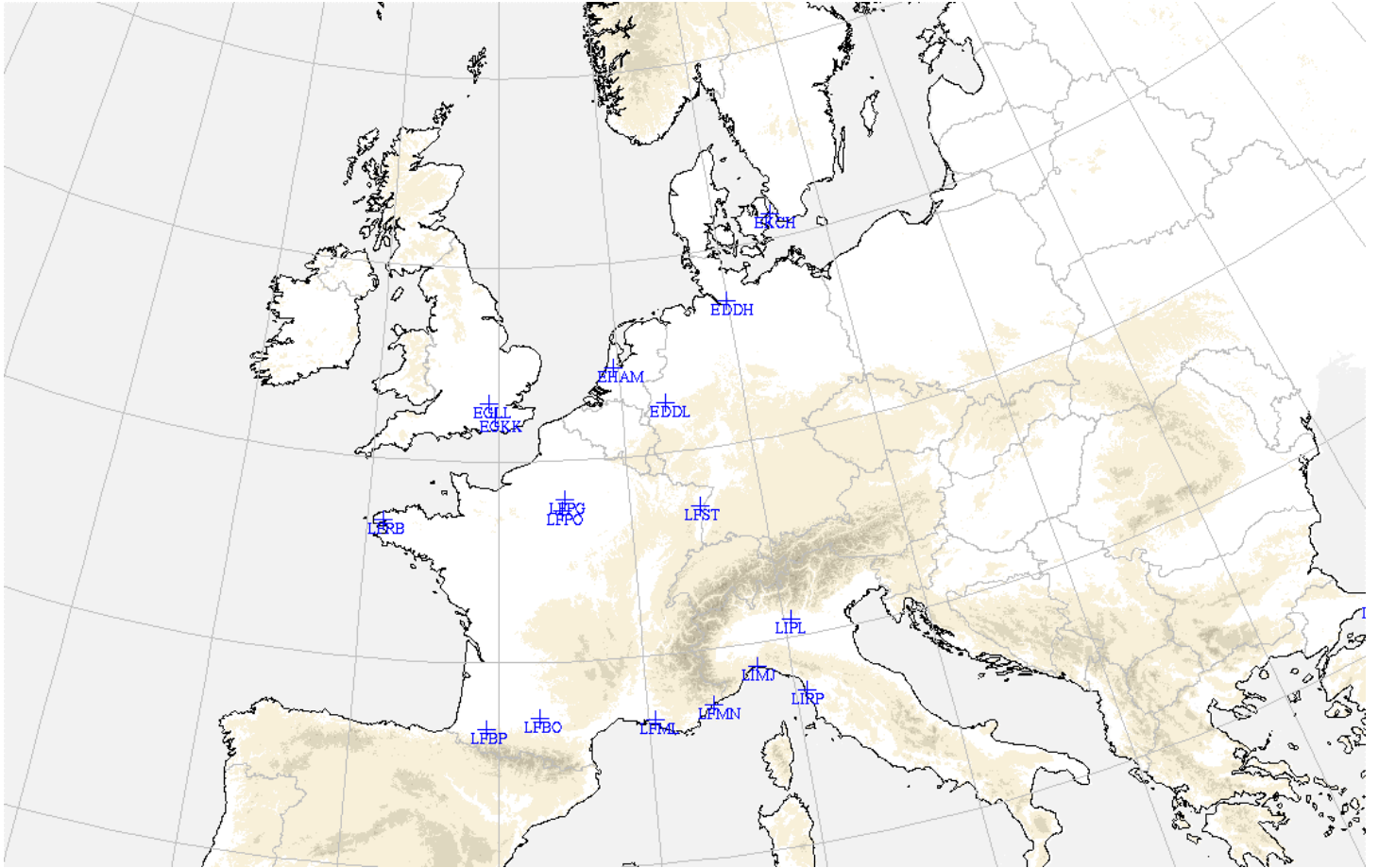


## Amdar profile

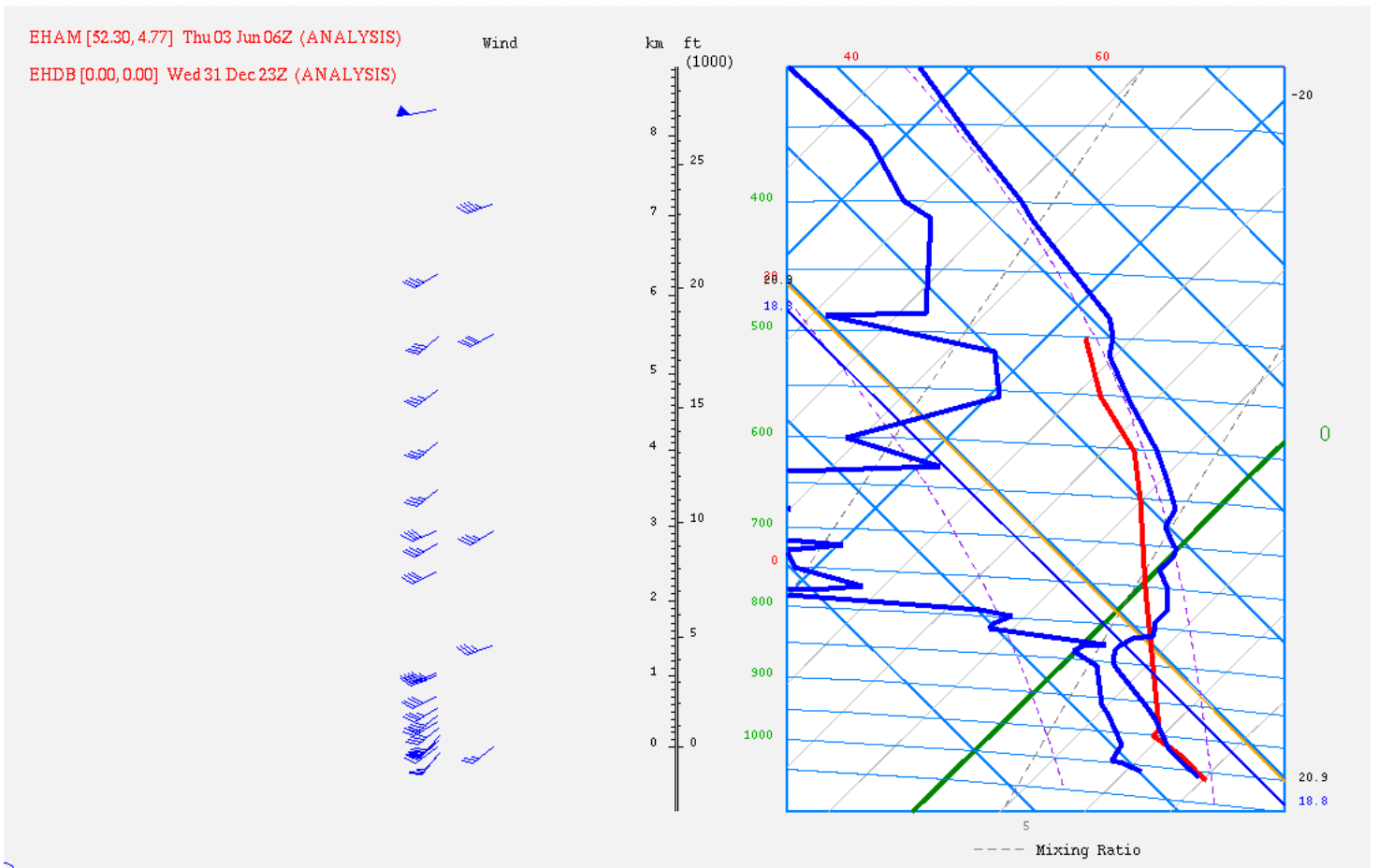




Amdar airports



Profile overlay



....

## **1999-2000 developments**

**Object Oriented redesign (C++):**  
**Multi-windowing with mouse-mirroring**  
**Smart Windows (demo)**  
**Graphical Interaction tools**  
**Interface to GIS applications: shapefile**  
**(ArcView)**

....

....

## **Project GI: HOPWA**

**start: December 1998**  
**end: August 2000**  
**goal: operational implementation of general**  
**tool for interaction on model output of all**  
**operationally used parameters**  
**emphasis on but not restricted to very short**  
**range**  
**design phase until summer 1999**  
**running under UNIX, interface with MWS**

....

....

## **Three levels of GI**

**interaction with analysis: research project  
adjustment PV using WV-imagery  
synoptic scale: meteorological consistency  
OSFM-tool UK MetOffice  
short range: delta-techniques**

....

....

## **Synoptic scale GI**

**OSFM-tool evaluated (april 1999)  
Technical discussion on possibility to integrate  
almost finalized  
Integration of functionality required  
Decision by KNMI (late June)  
Implementation autumn 1999 (if yes)**

....

**Juha Kilpinen: FMI, Finland**

## The latest developments of meteorological workstations and production tools at FMI

# THE LATEST DEVELOPMENTS OF METEOROLOGICAL WORKSTATIONS AND PRODUCTION TOOLS AT FMI

Juha Kilpinen\*, Kari Niemelä, Annakaisa Sarkanen and Laura Thölix  
Finnish Meteorological Institute (FMI)  
Helsinki, Finland

## 1. INTRODUCTION

A new meteorological information and visualization system is under development at Finnish Meteorological Institute (FMI). The database has been the most important part during the past but during the past few years most effort has been given to the workstation part. The aviation workstation was introduced few years ago and it has been used operationally since that (Kilpinen & Pietarinen, 1998). Some new features have been implemented to the system this year. The automatic product generation has also been an important part of development work.

Since the last EGOWS meeting most effort has been given to development of an editor for grid data. The methods were tested in a prototype editor and since last November the first operational editor has been developed. At the moment it is in test use at FMI.

FMI has used Short Message System (SMS) of mobile phones as a media for transmission of text forecasts to customers for several years. A totally new system for this service has been developed and it is also ready for present and future WAP (Wireless Application Protocol) services.

## 2. THE GRID EDITOR

The forecasters are able to edit the grid data with the new editor. The prototype of the editor was introduced last year (Kilpinen, 1998; Kilpinen & Kukkonen, 1998). The prototype editor had features for graphical editor but in the present version these features are excluded. The user can get model data or previously edited data for editing. After editing is finished the data can be stored locally or to the database. Once the data has been stored to database it is available for those application that are connected to database. At the moment HIRLAM (High Resolution Limited Area Model) and ECMWF data can be used operationally. The editing area has at the moment about 2100 grid points with 1 hour time step up +48h with 15 parameters.

---

\* Corresponding author address: Juha Kilpinen, Finnish Meteorological Institute, Product Development Division, Vuorikatu 24, P.O.BOX 503, FIN-00101 Helsinki, FINLAND, email: Juha.Kilpinen@fmi.fi

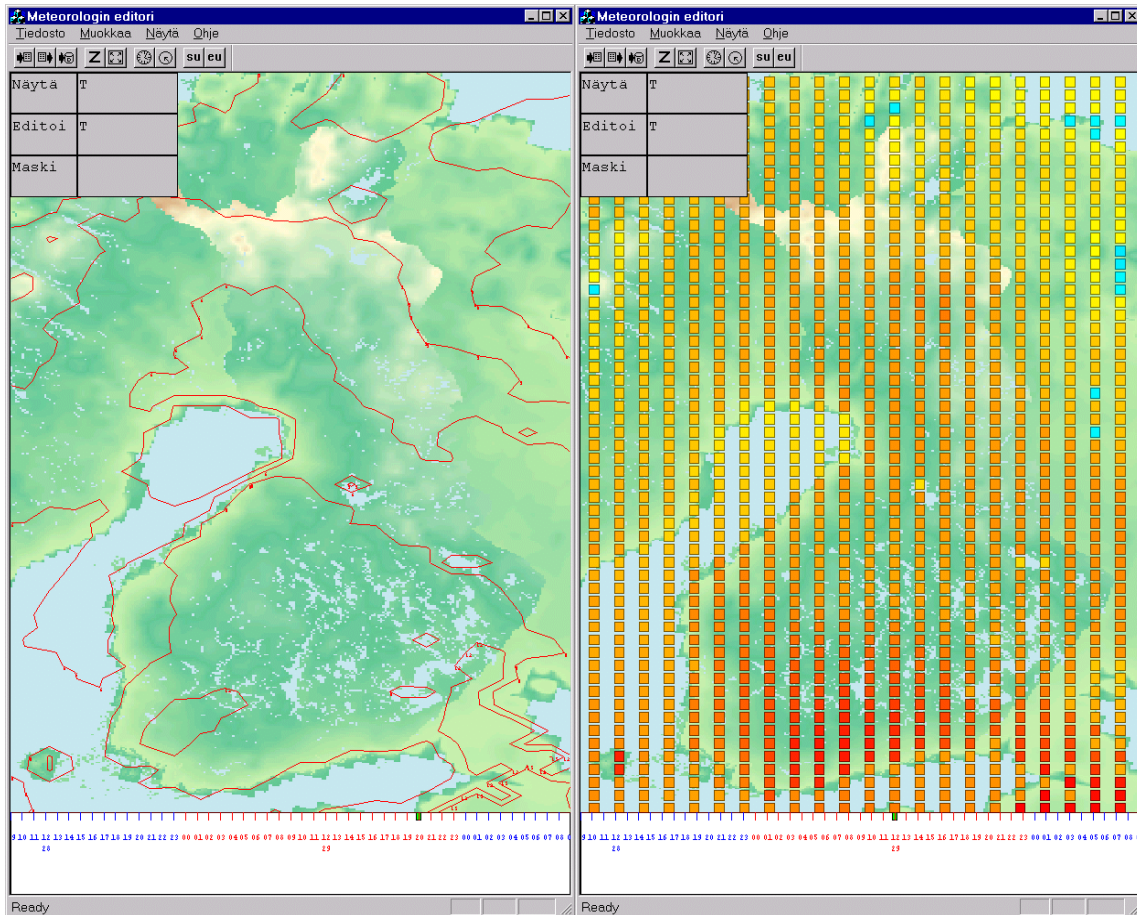


Figure 1. Map display of the editor with isoline and text/symbol representations.

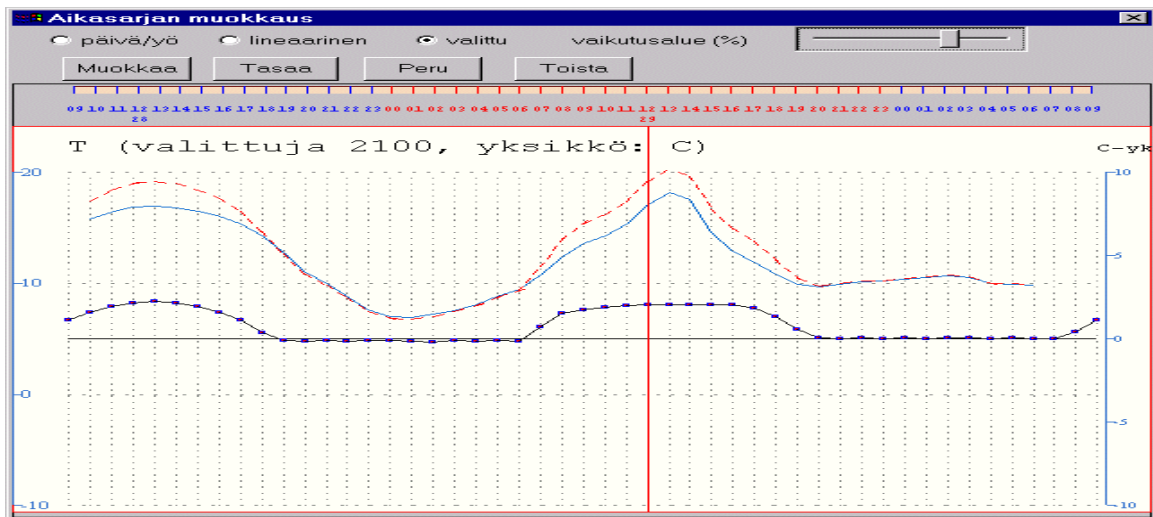


Figure 2. The time-series editing window of the grid editor is presented in this figure. The continuous line represents the original temperature, the thick line with dots represents the magnitude of change and the dashed line shows the corrected temperature.

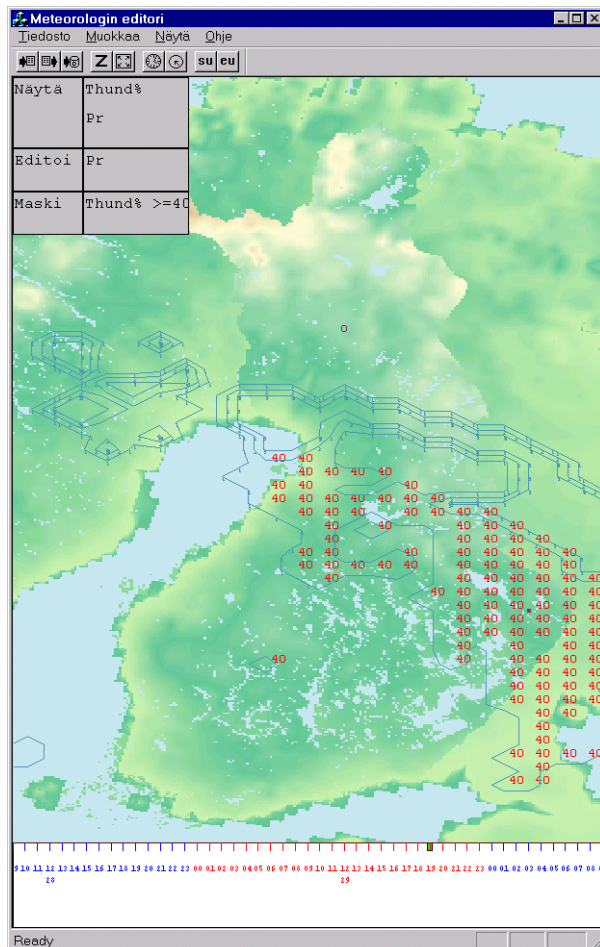


Figure 3. Display of intensity of precipitation and probability of thunderstorm.

The user can see the data on text format (as symbols or number values) or as isolines (Figure 1.). The editing is only possible in the time-series window (Figure 2.). The presentation outlook can be chosen from a large variety of options.

At the moment the data is edited only using time-series editing tools (see Figure 2.). Different masks are used to make the editing fast and to keep the meteorological consistency between the edited parameters (e.g. temperature vs. cloudiness and cloudiness vs. rain).

The masks can be used in several ways. For instance one can first increase the amount of cloudiness on the daytime and chosen area and keep it unchanged the rest of the time. Then one can decrease the temperature within the mask area and time by some amount. With these few changes of parameters the forecaster can change data in hundreds of grid points and tenths of time steps while the consistency will also be sustained. New mask for different purposes or for different phenomena can be created.

### 3. OTHER APPLICATIONS

The aviation workstation has been developed slightly further. The model data has been added to time/vertical cross-section display. An example of these new features is presented in Figure 4.

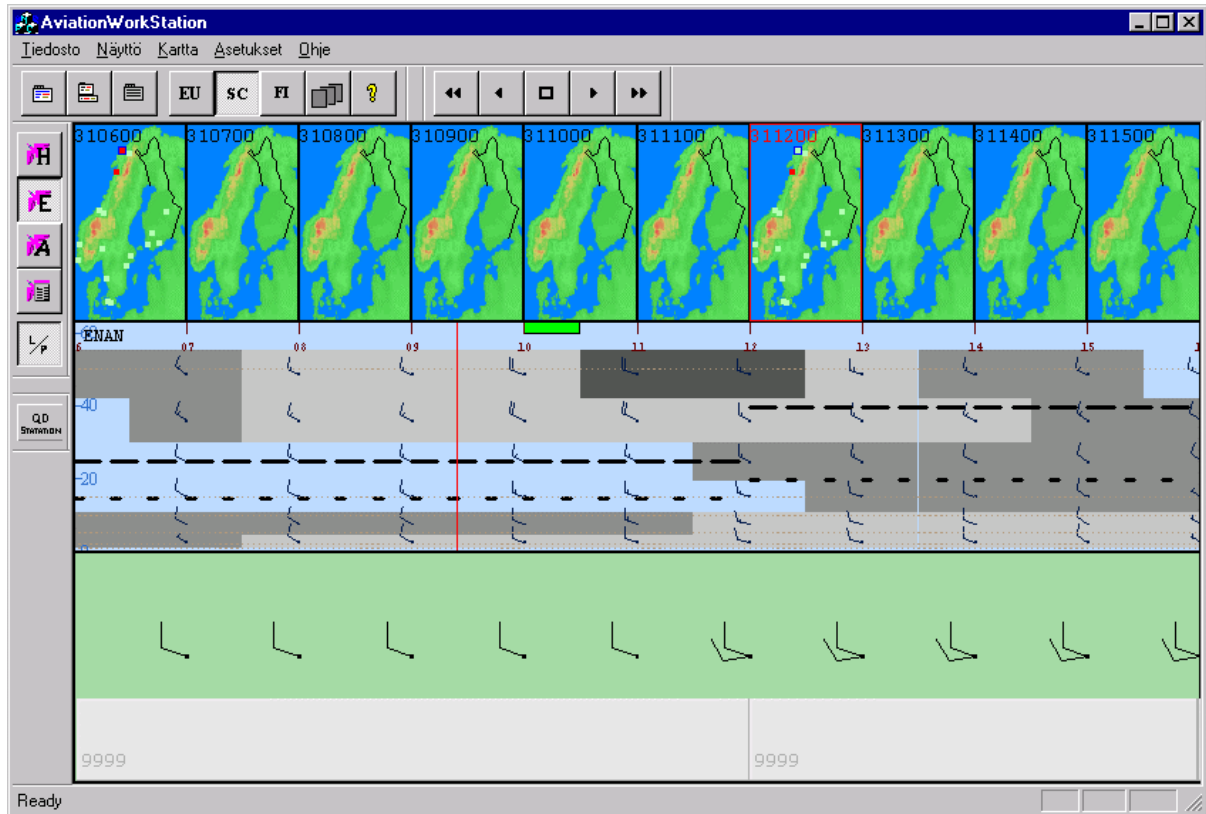


Figure 4. The new time/vertical cross-section of model data in aviation workstation.

The SMS (Short Message System) of mobile phones (GSM standard) is a very convenient way to transmit forecasts and warnings to different customers. A new system has been developed to serve customers. A customer can send a short message e.g. "weather 1day Amsterdam" to a certain service number. After few seconds a text forecast is sent back by the system which is developed together with FMI, mobile phone operators and some other software companies (see Figure 5.). The text forecast is generated in real time for the particular place, language and forecast length. Also observations are available in the system.

The message is like:

Amsterdam  
Thu 10-Fri 10  
Moderate southeasterly  
wind, partly clear.  
Temperature in the daytime  
25 in the night 15 C



At the moment the languages supported by the system are Finnish, Swedish, English and Savo (a Finnish local dialect). Under construction are Saame-language (spoken in Lapland) and German. The system produces equivalent products to WAP -phones (which are not yet available commercially). The FMI weather on WAP -phones was introduced at CeBit99 exhibition (Hannover) this year.

### FMI's automated production for text messages (+ WAP)

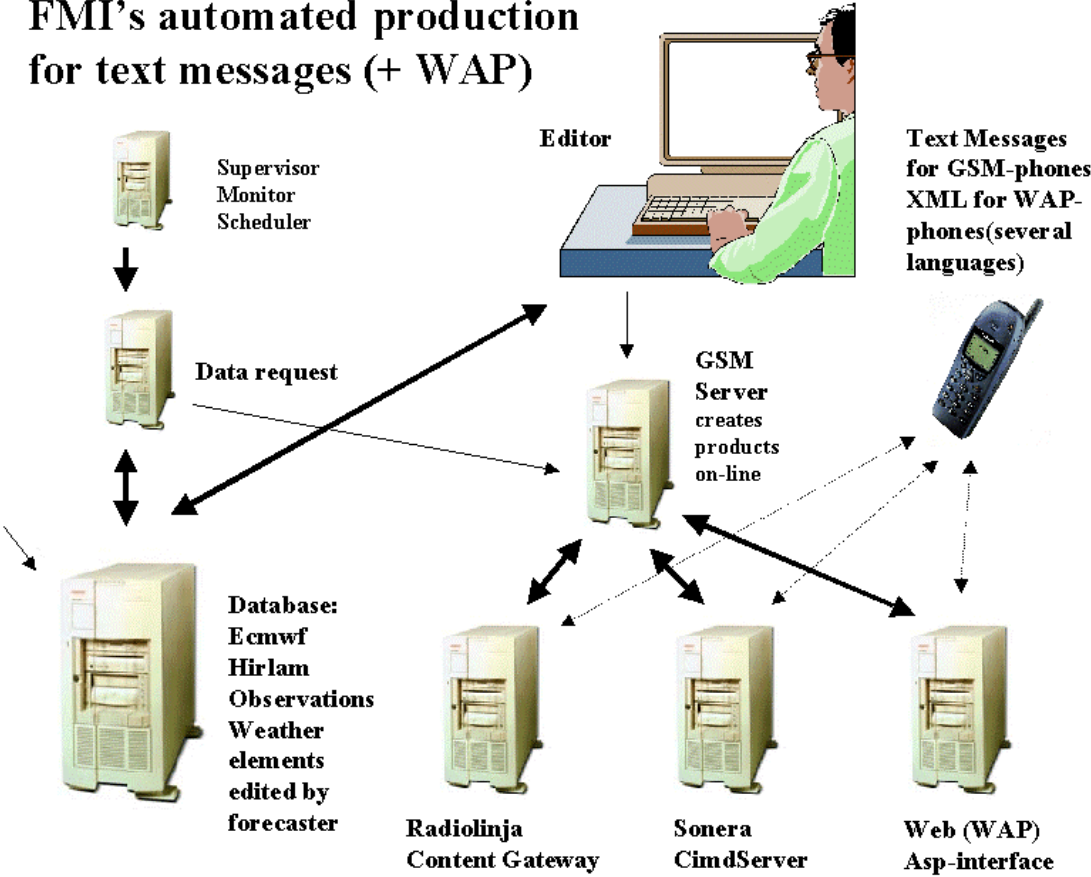


Figure 5. FMI's automated production chain for short message system (SMS) of mobile phones (GSM standard and WAP (Wireless Application Protocol) standard).

In Figure 5. Radiolinja and Sonera are Finnish mobile phone operators and Content Gateway and CimdServer are the software that they use in short message systems. Supervisor Monitor Scheduler is developed by ECMWF and ASP (Active Server Page) is a feature in Microsoft Web server (Internet Information Server) which makes dynamic response very fast between the client and server.

Several applications producing end product for customers are already using the real time database described earlier. Among these products are graphics for newspapers, transportation and industry.

## 5. REFERENCES

- Kilpinen Juha and Pertti Kukkonen, 1998: The latest developments of meteorological workstations at FMI, Report of the 9<sup>th</sup> EGOWS Meeting held at SMHI, Norrköping, Sweden 8-11 June 1998.
- Kilpinen J., and M. Pietarinen, 1998: The New Workstation Software for Aviation Forecaster. 14th International Conference on Interactive Information and Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology, 11-16 January, 1998, Phoenix, Arizona, pp. 445-446.
- Kilpinen Juha, 1998: Current strategies and developments in GI with gridded fields. Proceedings of the International Workshop on Graphical Interaction with Gridded Fields, 10-12 December 1998, Helsinki, Finland/Cost-78, pp. 11-13.

**Anders Larsson: SMHI, Sweden**

Short status report on the project:  
Rationalisation in the Production Process  
RiPP

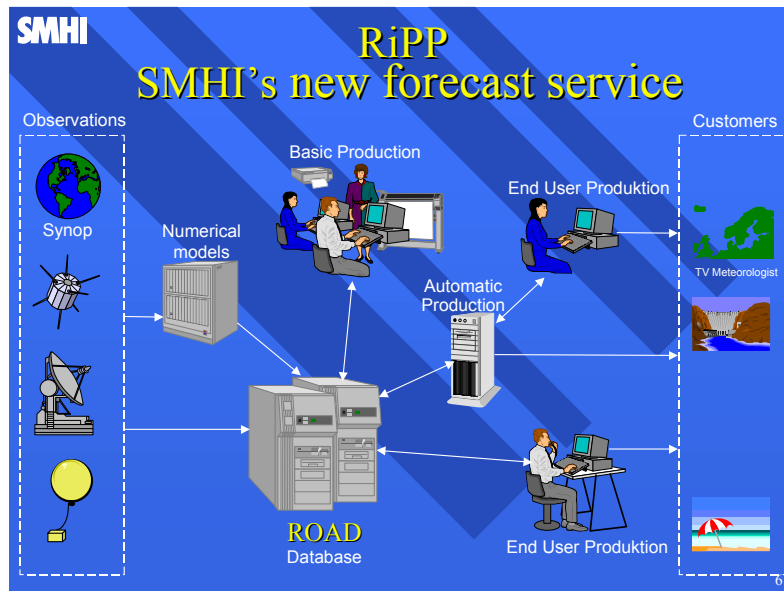
## 1. Status of the RiPP project

The RiPP project has been going on for some years now, and it was already started when I began working at SMHI for about 18 month ago.

The project is now in the "pre-release" state, meaning that the meteorologists have had the opportunity to test the complete system, from the so-called ForecastControl tool (used in the basic production), via the ProductAssembly tool to the ProductEdit tool (used in the end user production).

The only tool that hasn't yet been tested together with the other tools in RiPP, is the ForecastEdit tool. This is a tool for graphical interaction, which will be used to edit data fields of the parameters available in the ForecastControl tool. It is not an independent tool, but should be seen as a part of the ForecastControl tool.

The ForecastControl and ForecastEdit tools are used in the basic production (see picture below)



Overview of the RiPP system

## 2. Developing the tools in the RiPP project

### 2.1 *The client server interface*

All the tools in the RiPP project are client/server systems where the servers are written in the C++ programming language, and the clients in Java. The communication between the clients and servers is handled by CORBA, which stands for Common Object Request Broker Architecture. The language used in CORBA is called IDL (Interface Definition Language) which is a definition language defined by OMG (Object Management Group). It is not possible to write any executable code in IDL, but it is only used for describing what you will send via "the software bus". In IDL all the simple data types (int, float, etc) are defined, and of course array of these. There are also more complex data types, such as structures (the same as in C, C++) and sequences. Sequences you can see as dynamic arrays. It is also possible to "combine" the different types in IDL to optimise the on how data is transmitted.

### 2.2 *Working with the users*

In the two subprojects that I've been involved in, these are the ForecastContol and the ForecastEdit projects, we have been working in a close collaboration with the meteorologists that will be the users of the tools that we've developed.

It is my opinion that it has been essential for the result of the work. It has been very useful both for the system developers to know what is important for the users, and for the users to understand what is easy to accomplish, and what is not.

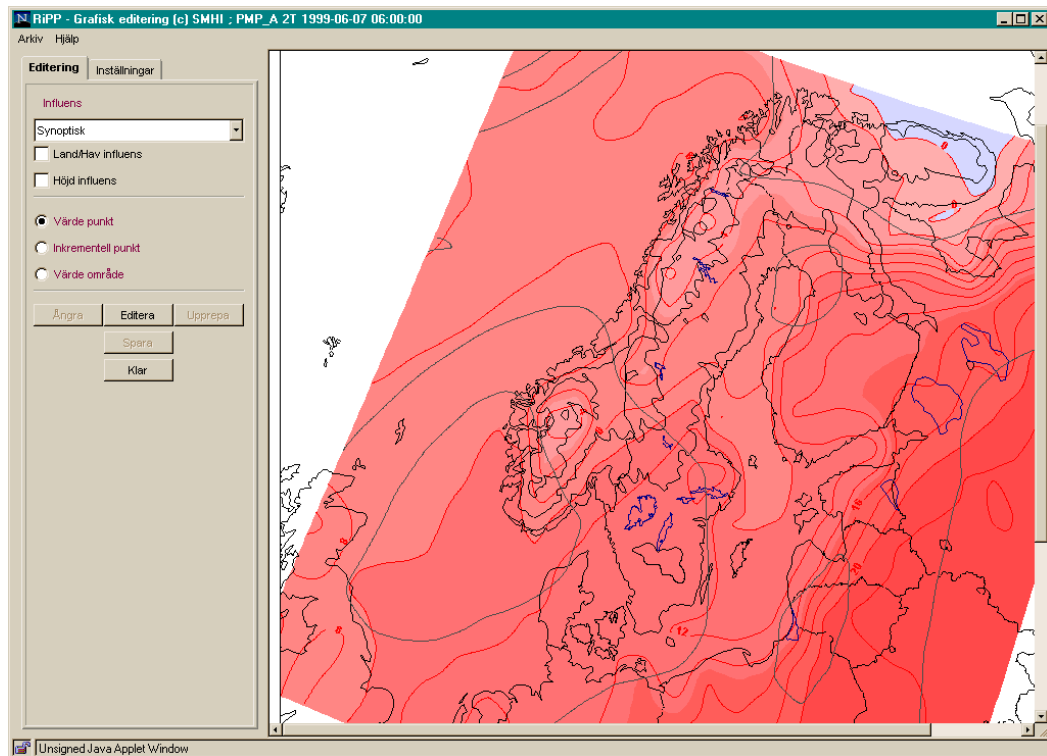
It would also have been very hard for the system developers to know what functionality there must be, and also to make a good graphical interface for these of systems.

At the start of the ForecastControl project the meteorologists involved in the project and the system developers made sketches, with paper and pencil, of what the client interface should look like, and what services the tool should provide.

With the result from these meetings as a basis, the developing process then continued. The users have "been with us" all the way to where we are today, and have participated in testing etc.

In the ForecastEdit project we had a prototype made by Lars Häggmark at the scientific department in SMHI as a starting point. Together with the users we have made a few design changes regarding the GUI and the users have been involved in testing and tuning the tool.

I think we have had a very open and free dialog all along the way, while working in these projects.



The GUI for graphical interaction

### 3. What will happen now?

We are now in the testing phase of the RiPP projects, and we have during the first part of this year ran some "test production" session. The results from these tests have then been the basis for the discussion to continue the work with the RiPP project.

This will result in a version 1.0 of the project later this year.

It is for the moment not decided what will be included in this version, but decisions will be taken on this in a very short time.

**Bernhard Niedermoser: ZAMG, Austria**

# Recent developments in visualisation and production

# ZAMG Austria

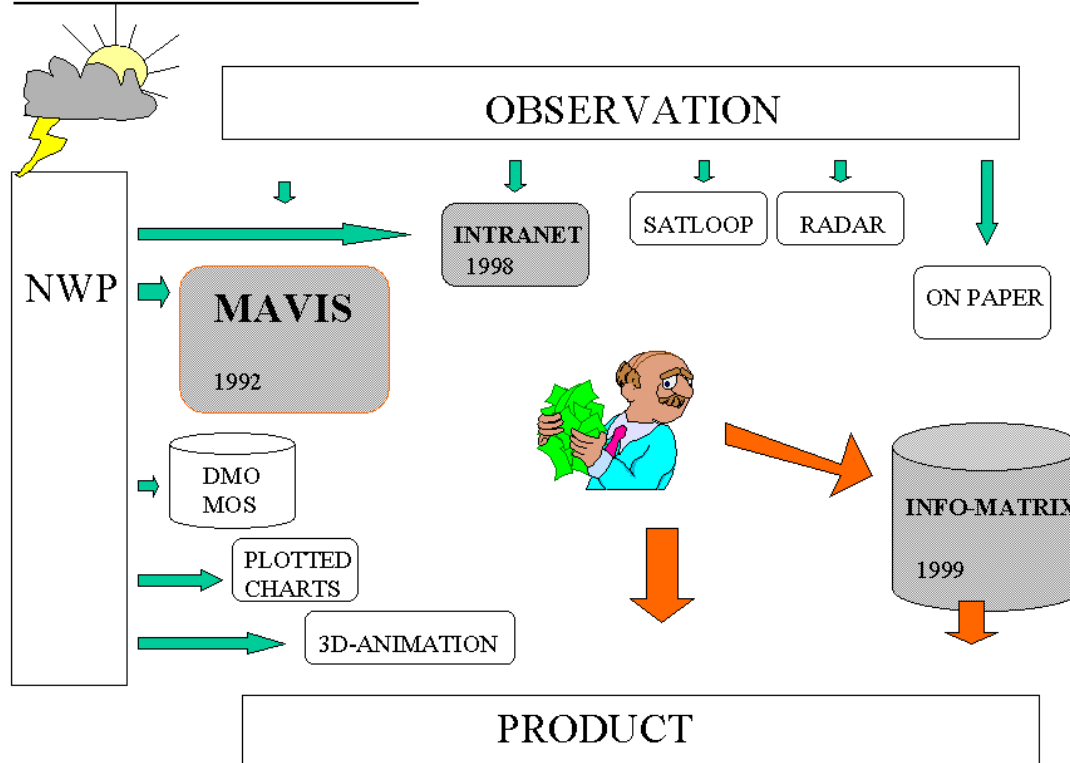
Central Institute for Meteorology and Geophysics

Bernhard Niedermoser, Forecaster  
Salzburg

## RECENT DEVELOPMENTS

## IN VISUALISATION AND PRODUCTION

## Introduction / Overview





# MAVIS MetAustria Visualisation

- \* interactive application
- \* to access and visualise meteorological data
- \* since 1992
- \* „self-made“
- \* ~ 30 Installation Locations

- NEW**
- \* Increased performance
  - \* NOAA
  - \* New symbols for stations

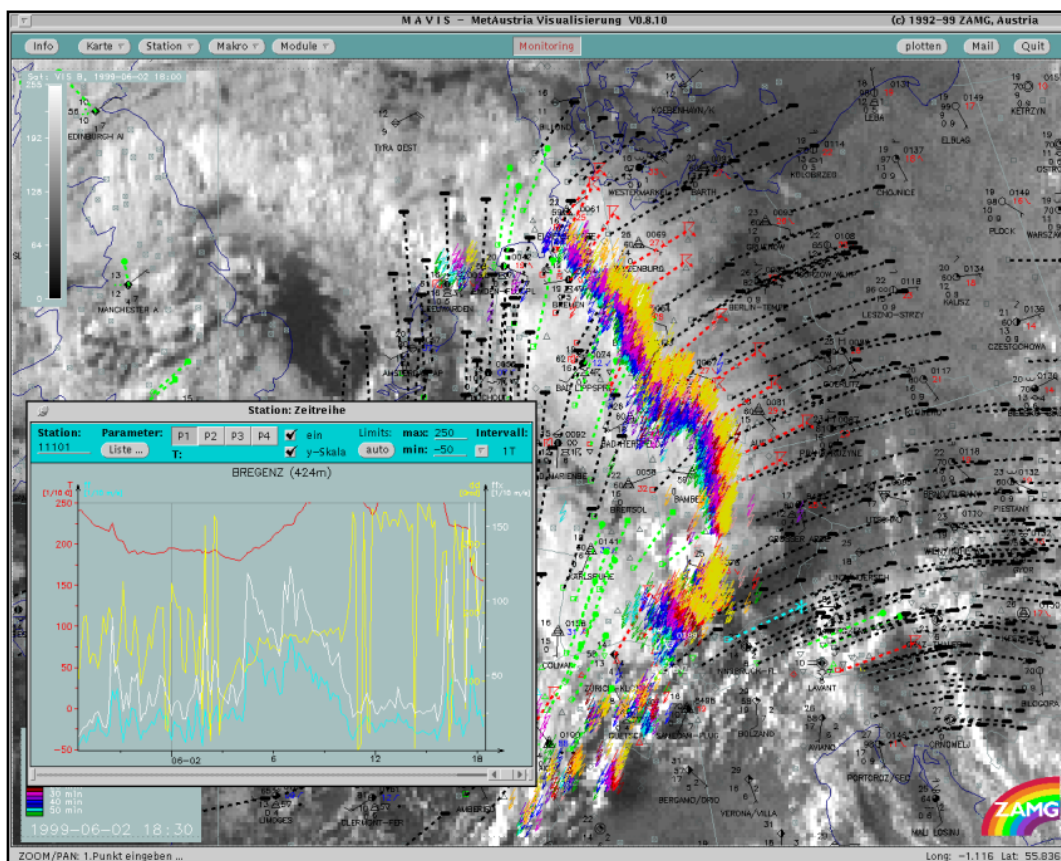
- PLANED**
- \* RADAR
  - \* Animation
  - \* Batchplotting

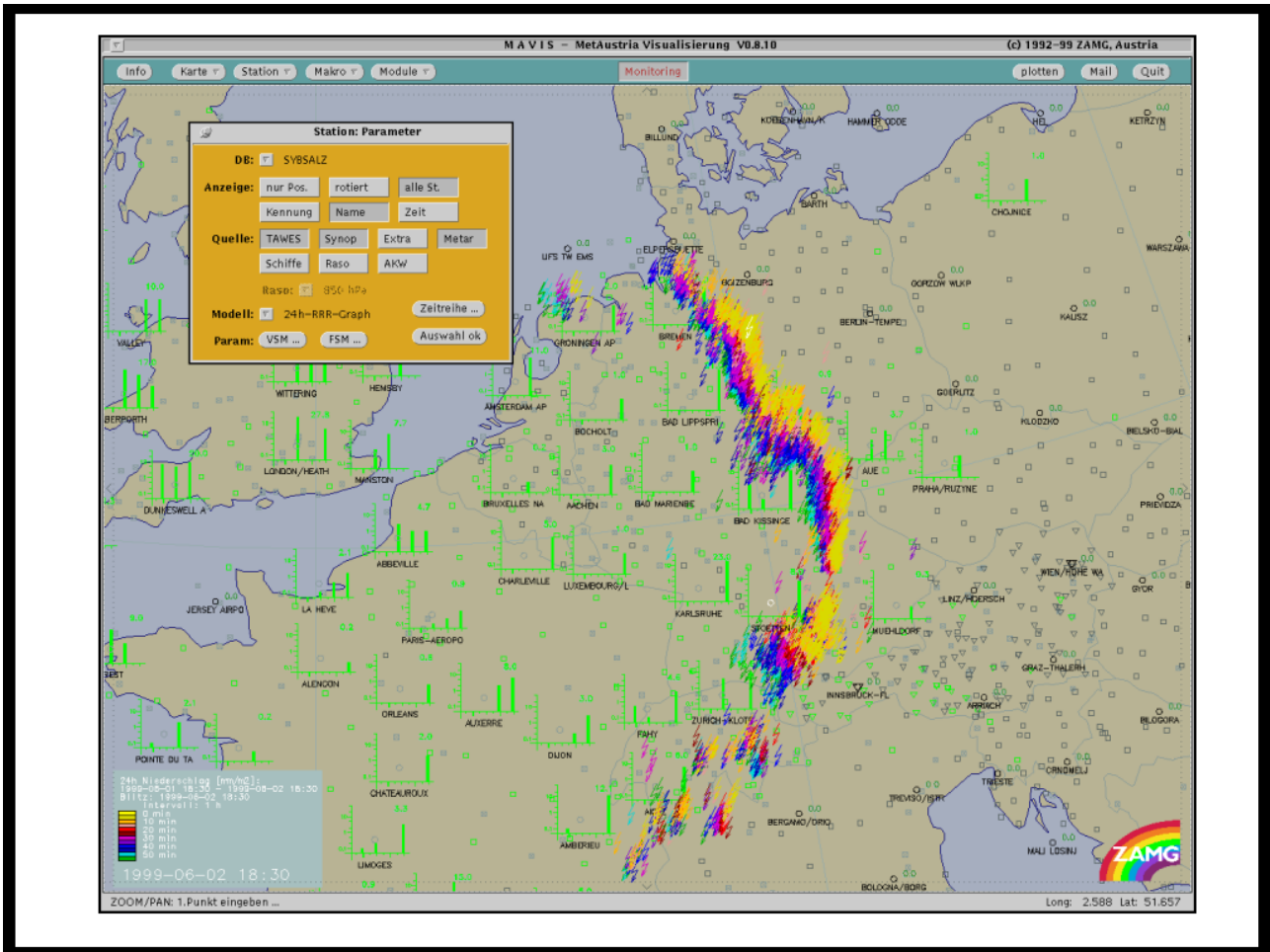
- METEOROLOGICAL INFORMATION**
- \* OBSERVATIONS    Synop, Metar , Automatic Stations, etc.  
Lightnings  
Satellite (Meteosat, NOAA)
  - \* NWP-DATA            Charts (ECMWF, ALADIN-LAM)  
Trajectories
  - \* OTHER                Vertical cross section  
Nowcasting tools  
SafRep  
Objects of classic weather chart

EGOWS/De Bilt 1999

B. Niedermoser / ZAMG-Austria

3





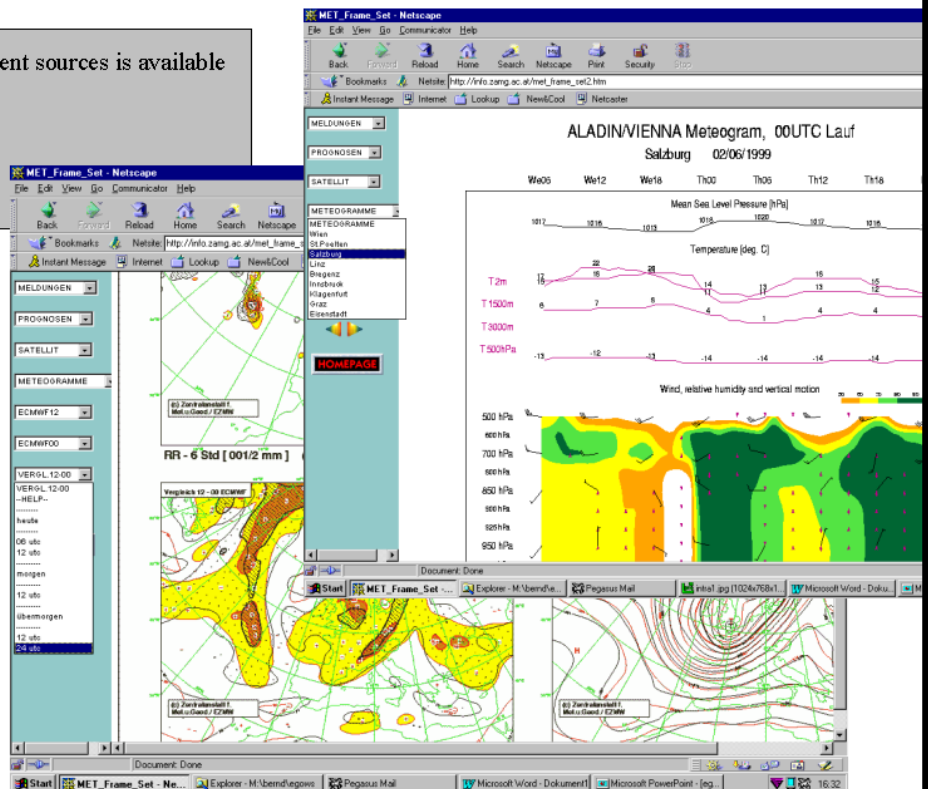
## INTRANET

- \* Information from different sources is available
- \* easy to use
- \* quick access to the information

## OTHER SOURCES

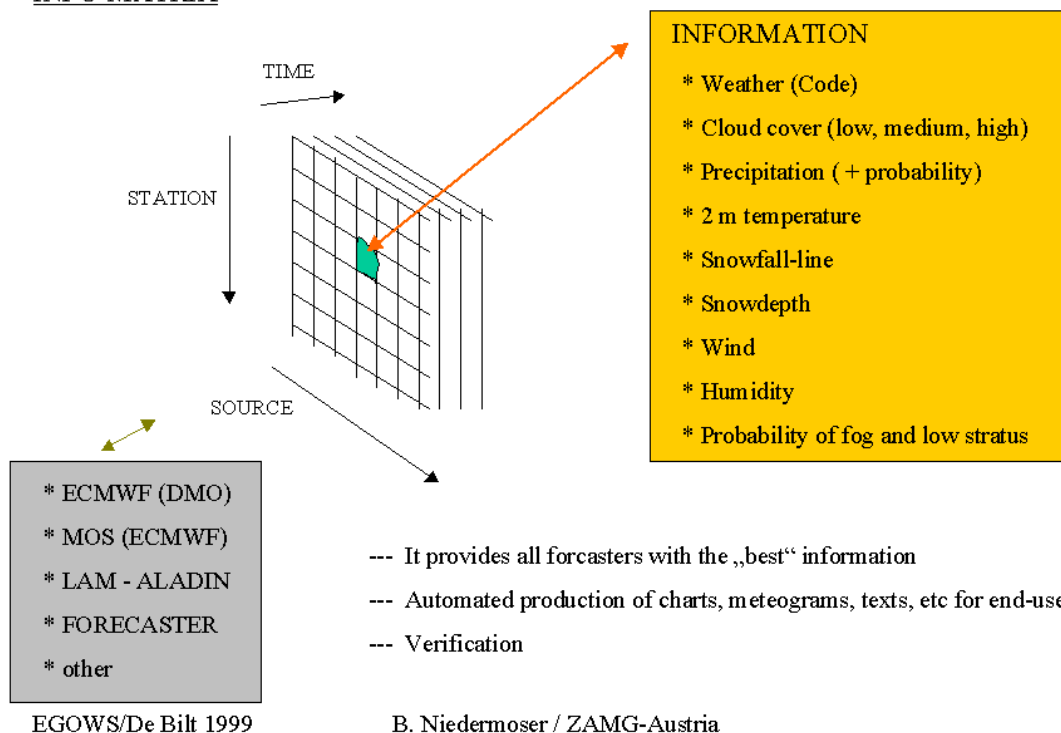
- \* SatLoop
- \* Radar
- \* 3-D-Animation (Vis5D)
- \* plotted weather charts

EGOWS/De Bilt 1999



## PRODUCTION

### \* INFO-MATRIX



5

## PROJECT

### \* Application that is based on the information of the INFO-MATRIX

- \* to generate charts with weather information for the end user
- \* based on GIS system (ArcView)
- \* it uses also local values from the INFO MATRIX
  - \* Weather symbols      derived by INFO-Matrix
  - \* Temperature fields    derived by INFO-Matrix
  - \* RR fields                initialised by LAM
  - \* Wind                      initialised by Wind model
- \* tools for graphical interaction with the fields of the boundary layer would be very useful
- \* first results should be available this year

**Malcolm Field: MetOffice, UK**

The Year 2000 Problem – Strategy adopted  
by the UK Met. Office for the Horace project

The Year 2000 Problem – Strategy adopted by the UK Met. Office for the Horace project  
Malcolm Field  
UK Met. Office

1. What's the problem?

The year 2000 problem has received much coverage in the media but what exactly is the problem and how serious is it?

If software has been written with the need to minimise storage requirements in mind, then the calendar year may be held in short form as a 2-digit variable, YY. Arithmetic calculations can then give unwanted results, especially,

$99 + 1 = 100$  (100 = year 2000 ?)  
 $00 - 1 = -1$  (-1 = year 1999 ?)

The 1<sup>st</sup> Jan 2000 falls on a Saturday. In the UK most employees return to work on the following Tuesday and the previous day is a public holiday. Furthermore many businesses close between Christmas and the New Year. With staff being absent during this extended period, any software problems that emerge may not receive attention until three days after the 1 Jan. Meteorological software which utilises forecast fields several ahead may fail earlier, over the Christmas period.

Regarding the seriousness of the problem, predictions are hard to make in such cases where there is no precedent. It is worth pointing out that if technical problems were to arise, the damage to customer confidence may have long term negative repercussions, even if such problems were minor.

2. The Met. Office approach (projects, stages and risks)

The Met. Office approach has been to identify its key systems and to assign a Y2K project to each. Such projects include Admin systems, the internal communications backbone, the supercomputer, radiosonde upper air systems and production systems such as Horace.

Each project is broken down into 4 stages as follows.

Stage 1 is the production of a Project Initiation Document and the generation of inventories of hardware and software.

Stage 2 is the work required to ensure Internal Y2K compliance, to carry out tests and to generate a Clean Management Plan and Risk Management Plan

Stage 3 involves End to End tests with connected systems, ongoing Clean Management and Risk Management. Recovery and Contingency plans are also drawn up.

In the final stage, risks are managed and clean management is ensured.

The definition and management of risk is a key feature of the Met Office's approach. Against each risk both the impact and probability of occurrence are assessed. Risk registers are held for each project. In addition a central register of common risks is also maintained.

3. The Horace project

Detailed Hardware and Software inventories were drawn up several months ago. The code has been scanned for key terms such as "99", "year", "date", "YY". Manual scrutiny of any files in which potential Y2K problems may exist followed this activity. In many cases no code changes were needed but where there was any doubt the software was modified.

Attribute flags were set against all source code files indicating whether the file was "Clear" (i.e. no changes necessary) or "Compliant" (code changed to ensure compliance). In this way progress could be monitored.

A Recovery Plan has been drawn up to ensure a good mechanism for restoring the system is in place. Contingency Plans for each site will also be produced for all key operational systems, including Horace. This will ensure that alternate ways of generating key products and maintaining key services have been devised.

As yet, no Y2K problems as such have been found. However the effort has ensured that confidence in Y2K compliance can be high. Users can and have been assured that problems are very unlikely to occur. The risk of a problem remaining can never reach zero but can and has fallen to acceptable levels.

**Paul Davies: MetOffice, UK**

# A First guess temperature and rainfall forecast using EPS data

## **A First guess temperature and rainfall forecast using EPS data.**

P A Davies  
UKMO

Introduction.  
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Currently, the medium-range forecaster in the National Meteorological office (NMC) is responsible for providing guidance to local forecast offices within the UKMO. This guidance takes the form of a deterministic forecast showing the positions of fronts, isobars and contours of 1000-500 hPa thickness for days 2 to 5 (see figure 1), a description of the overall weather expected and likely synoptic developments and a table showing the temperature and rainfall forecast for a selection of UK stations.

The 2 to 5 day deterministic forecast is based on the UKMO global model and output from several other forecast centres. The forecaster may choose to follow one of the other models rather than the UKMO model, or choose a solution which is a compromise between the various model solutions available (the more likely scenario).

However, if there is a large spread of possible model solutions it may not be possible to provide a deterministic forecast. In this eventuality it may be more desirable to provide the forecast in terms of probabilities. To achieve this the forecaster uses ensembles produced from the ECMWF Ensemble Prediction System (EPS). These ensembles are being used to suggest modifications to a deterministic solution, but are also being used to produce forecast temperature and rainfall probabilities. It is this latter use which this paper will try and address, concentrating on the methods used to produce a temperature and rainfall forecast.

The ECMWF Ensemble Prediction System (EPS)  
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The basic idea of using an ensemble technique is to run not just one deterministic forecast but to run a model many times with slightly different initial conditions. The EPS system consists of 50 perturbed forecasts and one control forecast (see figure 2).

The control run is from the unperturbed analysis, and the remaining members are produced by integrating forward, using the same numerical model and resolution, starting from analyses which are slightly 'perturbed' from that used by the control run. The initial perturbations are not chosen randomly but are carefully chosen by a mathematical technique to try and select those perturbations which will grow most rapidly and hence give realistically a large spread of solutions.

The EPS system is run daily using 12Z analyses. At 12-hour intervals from T+12 to T+240, a set of 51 values of each forecast parameter is produced. The parameters of interest in the production of a temperature and rainfall forecast are spot screen (2M) temperature values at 00Z and 12Z and 12-hour precipitation accumulations.



## Using the EPS system to produce a Temperature and Rainfall forecast

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Since there is a large amount of information available from the EPS package there is a need to extract temperature and rainfall information from the ensembles and present it to the forecaster in a readily accessible form. Data is transferred to Bracknell and pre-processed using FORTRAN and PV-WAVE. The most favoured options to display temperature and rainfall forecasts is in terms of probabilities. This is done by treating each ensemble member as equally probable and then deriving a probability forecast using all members. A brief description of the three most widely used methods for predicting medium range temperatures and rainfall amounts will be discussed below. All products are displayed on the internal UKMO web using HTML.

### Probability Density Functions

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A probability density function (PDF) is used to show the distribution of forecast values of an ensemble, in terms of the likelihood of the value falling within each unit interval of the range of values. At present temperature, rainfall and wind speed PDF's are displayed for each forecast time, at twelve-hour intervals, up to T+240.

Temperature and rainfall PDF's are displayed graphically. (see figure 3). The x-axis is scaled to cover the whole range of values forecast by the ensemble members. The values on the y-axis represent probabilities of the value lying within each unit interval (unit intervals are 1 degree Celsius for temperature and 1mm for precipitation). For example, the value plotted against 18C on a temperature graph represents the probability of the temperature being between 17.5 and 18.5C.

### Event Probabilities

.....

The maps shown in figure 4 are the probability of a stated event occurring. This example shows the probability of the difference in temperature (between the Forecast 2 M temperature and the climatological value) lying in the four categories. Thus the forecaster can see at a glance the probability that the temperature will be, for example, at least 2C above the seasonal average at 12Z on 31st May 1999. Probabilities of rainfall exceeding each of a series of threshold values may also be displayed.

### 'Horace' Tables

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An example of a 'Horace' temperature and rainfall forecast is shown in figure 5. It shows values derived from the temperature probability distribution for 00Z and 12Z. For each forecast time there are three parameters: lowest [LB], highest [UB] and most likely values [MP]. The lowest and highest points are the values below and above which there is a probability of occurrence of 2.5%. The mode of the distribution is the most probable [MP] temperature. The second section shows the probability of

rainfall amounts (PPN) exceeding certain thresholds. The precipitation amount is a 24-hour total over the period from 00Z to 00Z.

PROBABILITY FORECASTS FOR: MON 31ST MAY 1999

```

-----
:      :          TEMPERATURE          :    %AGE PROBS   :
:STN:      MIN      :      MAX      :      PPN(MM)    :
:      : LB : MP : UB : LB : MP : UB : 0.4: 4.9: 11.9:
-----
:026: 04  08  11 : 09  13  16 : 50  20  00 :
:091: 05  08  11 : 11  14  17 : 50  20  00 :
:136: 06  09  12 : 12  15  22 : 70  30  10 :
:257: 05  09  12 : 12  17  23 : 50  20  00 :
:334: 06  10  15 : 15  18  25 : 60  30  10 :
:534: 05  09  15 : 14  18  25 : 50  20  00 :
:590: 07  10  15 : 14  18  22 : 30  10  00 :
:717: 06  09  15 : 15  18  24 : 50  20  00 :
:772: 07  10  16 : 17  19  26 : 30  10  00 :
:917: 07  10  14 : 13  17  21 : 60  30  10 :
-----

```

Figure 5 Temperature and Rainfall Horace table.

However, it was realised that forecasters find minimum and maximum temperatures more useful than the 00Z/12Z values currently given by the EPS package. To satisfy this need, the minimum temperature is calculated by adding the difference between the most probable midnight temperature and model climatology to the station's average minimum temperature. The same method is also applied when calculating maximum temperatures.

At present the local forecast offices within the UKMO receive medium range temperature and rainfall forecasts from the NMC in this format. This clearly has an advantage over the other two methods as the output is in the format that forecasters have requested and this also avoids the rather tedious method of studying PDF's and/or tables for each station and each forecast time.

#### Conclusions

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As computing power increases and ensembles become larger, and as the development of ensemble forecasting techniques develop further so the prospect of a significant improvement in forecast skill for the medium and long range (6 to 10 day) becomes real. This will inevitably lead to better guidance from the NMC, but may also provide a service to customers whose work is sensitive to temperature and rainfall.

Fig 1

xv 3.10a: /tmp/MD374CFE4F0714134.gif <unregistered>

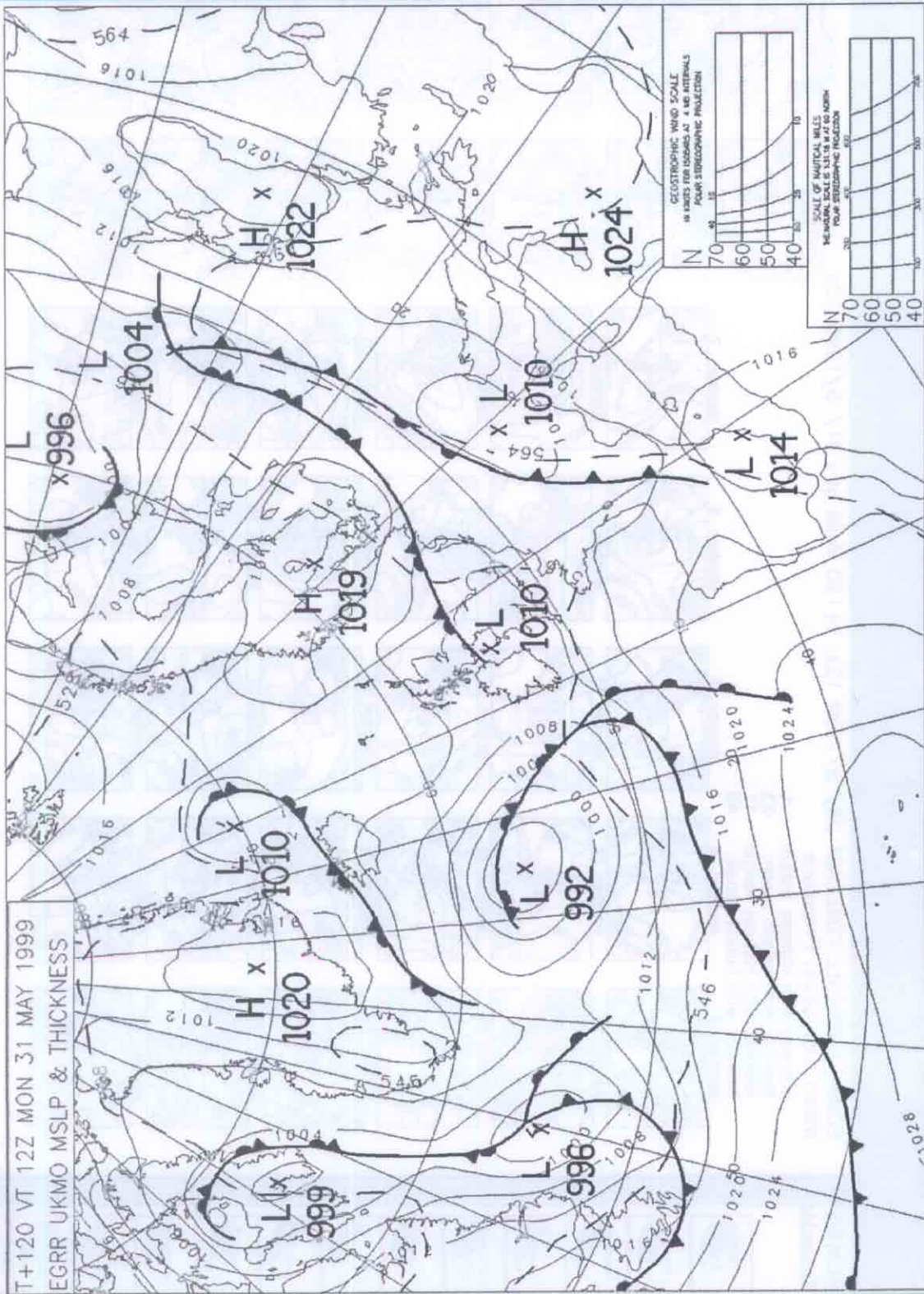


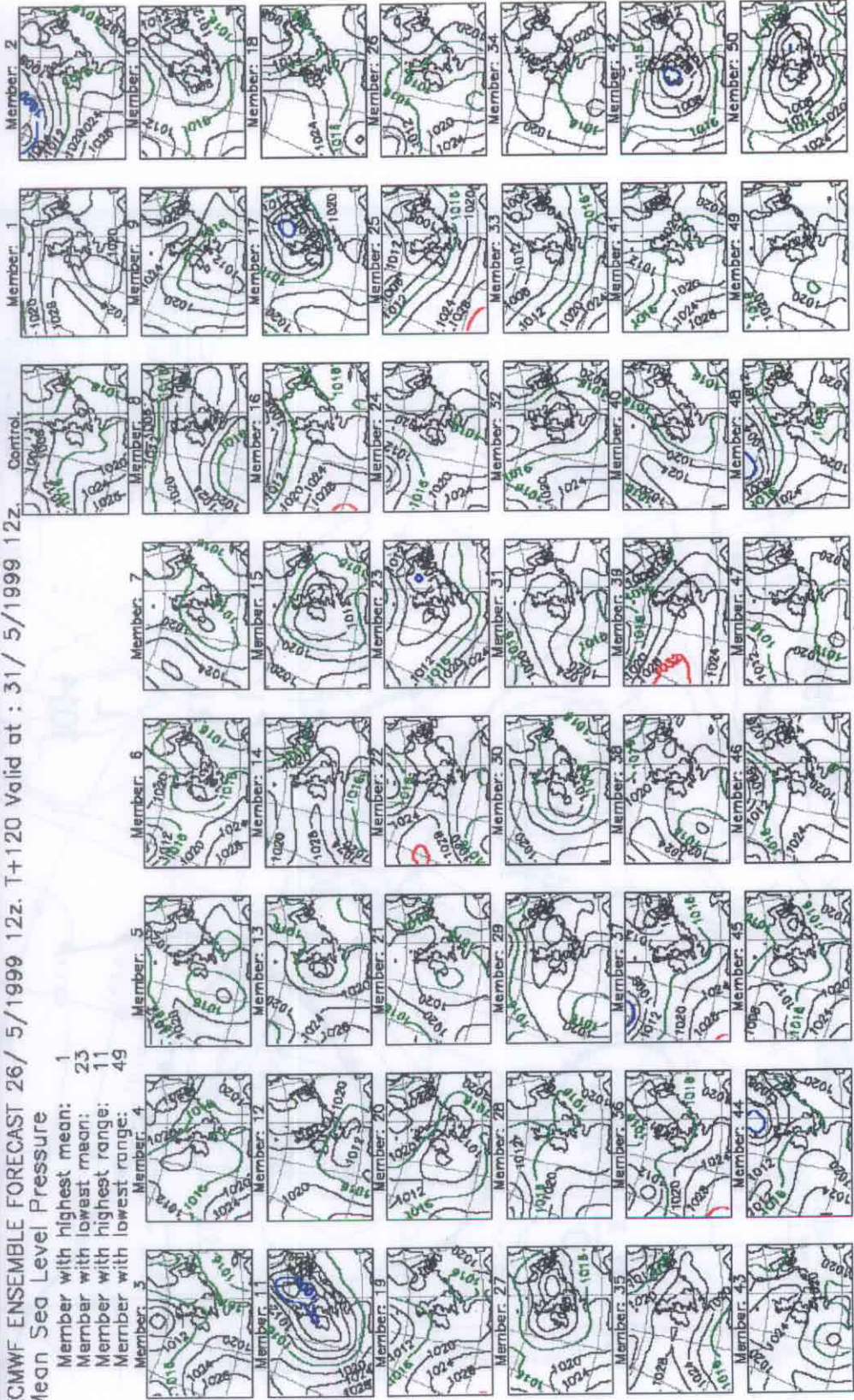
fig 2

ECMWF Ensemble

ECMWF ENSEMBLE FORECAST 26/ 5/1999 12z. T+120 Valid at : 31/ 5/1999 12z.

Mean Sea Level Pressure

- Member with highest mean: 1
- Member with lowest mean: 23
- Member with highest range: 11
- Member with lowest range: 49

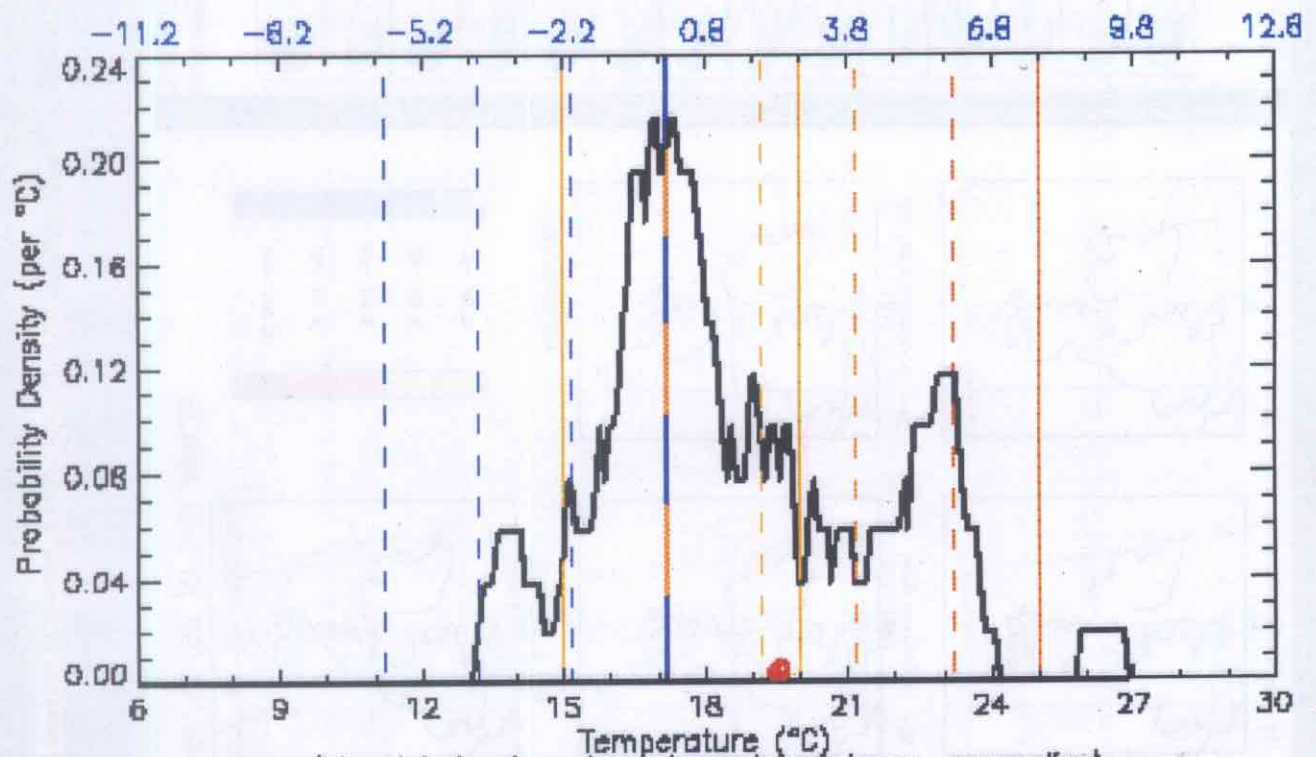


Navigation menu with buttons: FRONT PAGE, Station Map, Probability Maps, TIME SEQUENCES, CYCLONE TRACKING, CHARTS, Tubes, Curvans, TABLE TEXT, ANEMOMETER, OBS TRACKING OTHER DATA, OTHER ENSEMBLES.

Forecast Time: T+144

Verifying Time: 12Z on 31 May 1999

Probability density function for TEMPERATURE and T\_anom



(blue labels along top of graph are temp. anomalies)  
Probabilities per degree interval

T319 Operational—Forecast values are shown as red circles for comparison.  
Coloured vertical lines — colours correspond to threshold values in probability table (right); the dashed lines are for temperature anomalies. Dual-coloured dashed lines represent seasonal normals of temp. and 12-hour precip.

Probability density function for RAINFALL

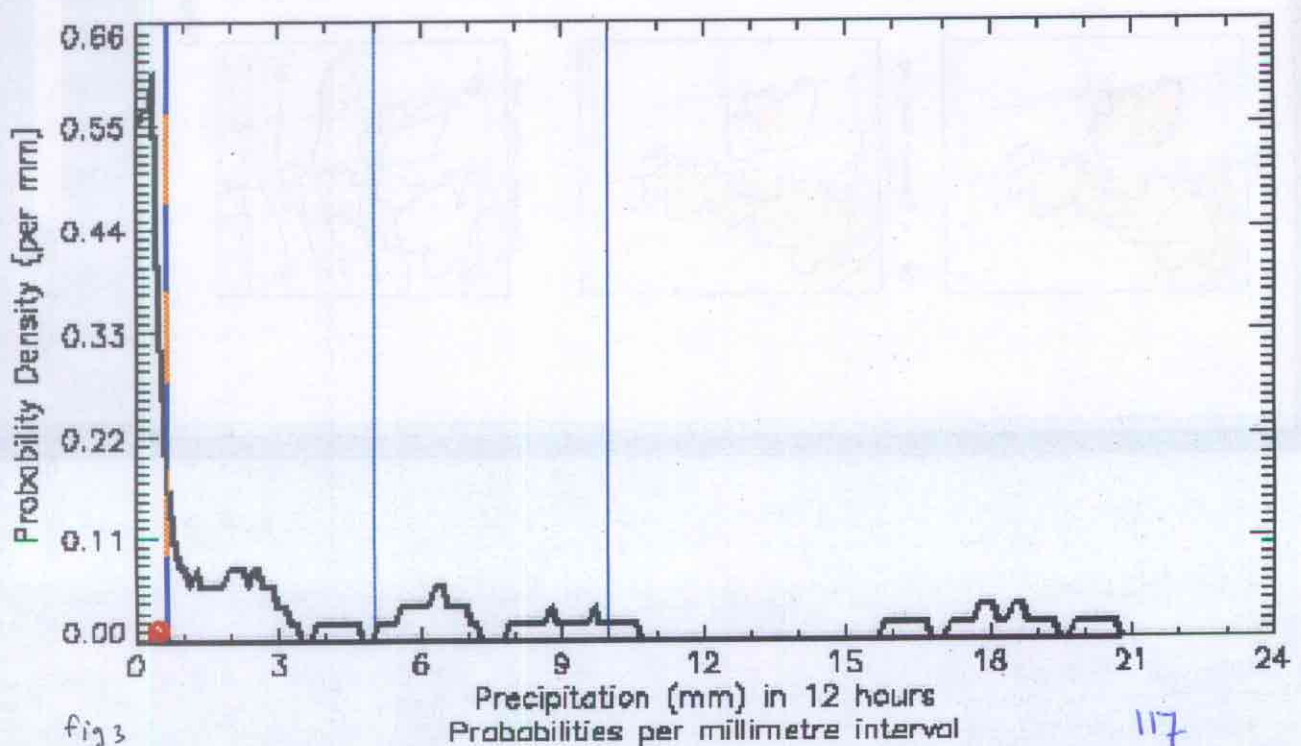


fig 3

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figs

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Backmarks Location: [http://ukmet/OPER\\_PRODUCTS/ensembles/ensembles.html](http://ukmet/OPER_PRODUCTS/ensembles/ensembles.html)

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Help

What's Related

ECMWF Ensemble

ECMWF EPS DT 26/05/1999 D+ 5 VT : 31/05/1999

FROST  
 FROST PALETTE  
 STATION MAP  
 PROBABILITY MAP  
 TIME SCHEDULE  
 EXCLUDE TRACKING  
 CHARTS  
 TIDES  
 CLUSTERS  
 TABLES  
 TABLES / LEGEND  
 ANNOTATION  
 OBS  
 FROST ON DEMAND  
 DISTURBANCE  
 ?  
 HELP

PROBABILITY

90-100 %	Blue
70-90 %	Dark Blue
50-70 %	Light Blue
30-50 %	Yellow
10-30 %	Orange

2m Temp anomaly < -4C

2m Temp anomaly < -2C

2m Temp anomaly > 2C

2m Temp anomaly > 4C

2m Temp anomaly < -4C

2m Temp anomaly < -2C

2m Temp anomaly > 2C

2m Temp anomaly > 4C

ens mean: 970h (contours 2 mb)

ens mean: 500 gph (contours 2 mb)

ens mean: 850 wppt

For best

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**Markus Haerri: SMA, Switzerland**

Combination between visualization and  
products of climatic data

## Combination between visualization and products of climatic data

One of the major demands from our customers is to transfer the visualization of climatic data into the production part. At the moment, the forecast production software is already in use and the development of a climate information system is in progress. A link between the production part and visualization of climatic data will be presented and discussed.

### *The Forecast Production Editor (FPE):*

Once the forecasting step is done, the same forecast can be used for several products. Every product is based on a template that is generated once and converted to a product which is used as often as necessary. The templates (and therefore the products) contain all the texts, images and drawings that are used every time from new. Therefore, a lot of repetitive work can be bypassed. This saved time can be spent for the increasing number of products that have to be done or for research to increase the forecast quality.

### *The Climate Information System (CIS):*

The visualization of climatic data is based on three selection parts: 1) parameters, 2) stations and 3) time intervalls or time periods. There are three types of data visualizations: table presentations, charts or static maps.

### *The link between FPE and CIS:*

The climate information system will have to be linked to the production part as there is the need to substitute some old, year 2000 critical, climatological products. Both, the visualization of climatic data (CIS) and the forecast production editor (FPE) are developed in JAVA and run under UNIX (Sun Solaris). Hence, the adaptation between visualization and production consists in modifying and expanding the existing JAVA code. Climatological products that have to be delivered regularly will appear as a GUI-element (e.g. a button) in the production editor. The GUI-element activates a fixed query on the data base and the different products will be filled up by these data. Special requirements of the customers have to be selected separately in the climate visualization tool. Thus, there is a second connection type from the visualization to the production. A drag and drop mechanism which will be realized.



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# WDC, Weather Data Collector

WDC

Weather Data Collector

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The system of collecting and processing meteo data

WDC

“Weather Data Collector “

Authors:

Krzysztof Barteczko

Stefan Karamuz

Consultant: Anna Ordak

## 1. System's tasks

- receiving the meteorological data (GTS)
- decoding
- entries to the database

## 2. Basic characteristic of WDC

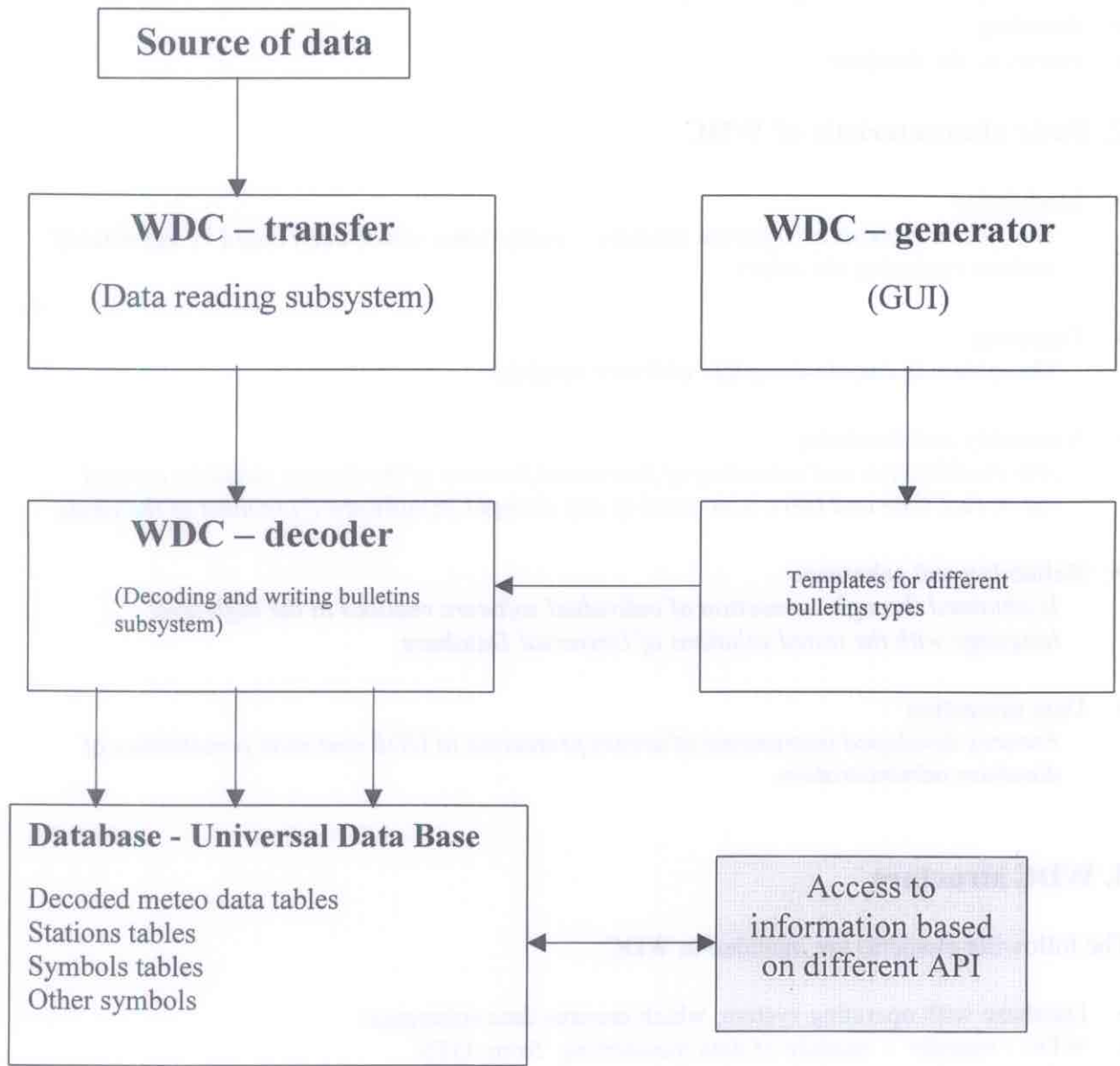
- Modularity  
*The system consists of separate modules – subsystems, which each could be substituted without replacing the others.*
- Openness  
*The system is easy-to-complete with new modules.*
- Versatility and flexibility  
*Any modification and extending of functional features of the System could be carried out in real time and there is no need of any changes in software (!) in most of the cases.*
- Reliability and coherence  
*Is obtained through connection of individual software realised in the high level language with the tested solutions of Universal Database.*
- Data protection  
*Ensures developed instruments of access protection in UDB and wide possibilities of database administration.*

## 3. WDC structure

The following elements are included in WDC:

- Database with operating system, which ensures data coherence.
- WDC - transfer - module of data transferring from GTS
- WDC - decoder - module of decoding
- WDC - generator – visual generator of the decoding templates

The operating schedule is shown in Fig. 1



#### **4. Database**

Structure of the Database results from the system of database administration Universal DB2, what ensures as follows:

- a possibility of collecting of great number of data, effective access and advanced data mining,
- versatile access to information (various API, base's multimedia, connection to Internet),

The presented database structure ensures coherence, comfortable and effective access and data protection.

#### **5. The subsystem of data reading from external sources (WDC - transfer).**

The subsystem is realised as a separate unit which communicates with the System by means of the standard IPC elements (InterProcess Communication). In this case the optimal element IPC we presume so called the Named Pipes. For such assumption the following features decide:

- The named pipe is created for the processes, which operate in one computer, or in different computers in local network – there is an untroubled possibility of separating the tasks.
- The built-in functional synchronisation elements – there is a possibility to write the data from various sources into the named pipe.
- The data could be written as a stream of characters and reports – the weather data have natural structure and rhythm in transferring in portions i.e. bulletins.

The reading process is carried with accordance to the schedule:

- Initialisation of carrier/carriers of meteo data transferring e.g. canal of serial transmission or TCP/IP "socket". The initialisation parameters – in command line of the program or/and in suitable file.
- Creation and initialisation "Named Pipe" for communication with the decoding process,
- Operation of fragment/fragments of data reading from transmission carriers. The priority of the fragments is "time critical"...

The data are reanalysed from the point of view of placing a start and an end of the bulletin – in each fragment of the read-outs.

The result – single bulletin, written into the named pipe as report.

#### **6. The subsystem of decoding and creating of the cables (WDC - decoder and WDC - generator)**

While the bulletin is being decoded the technology based upon the processing of external templates is applied (symbolic information about the structure of bulletins and operation of decoding and creating the bulletins), what gives high flexibility and openness.

This enables to make independent the program (programs) of decoding upon the changes the shape of bulletins.

The meaning of “template” determinates writing the external information (comparing with the program) which regards:

- Data structure,
- Sequence of controlling bulletin’s elements,
- Conditions of particular bulletin’s data,
- Methods of source data transformation to table fields DB,
- Connection of particular report’s data and the DB fields.

The templates (and since the instructions of report’s decoding) are created through the meteo specialist what increase liability and avoiding any failures of decoding process.

The easy-to-use, visual system of generating of the templates (WDC - generator) enables the persons without special computer’s knowledge to operate with the template.

## 7. Development perspective

The WDC is under constant development.

In the first stage the effective and reliability of the Weather Data Collector is achieved with the active database. At present the meteo information from various types of the reports is saved in continuous way and being collected in the database. Then the information can be processed by open and versatile elements.

Further expending of the System concerns developing of metatypes of decoding (at the moment the reports are decoded with the code-position structure, what is not convenient when binary report is applied).

The most significant is that now on the Weather Data Collector should be treated as a basis of complex solutions of software’s in Institute of Meteorology and Water Management which forecast the advanced analysis of data and the systems with external access.

The initial work has commenced which include interface creating (among others Java applications), which should enable various transferring of the information from database in Internet and Intranet. The first tests are convincing and the good results should be received.

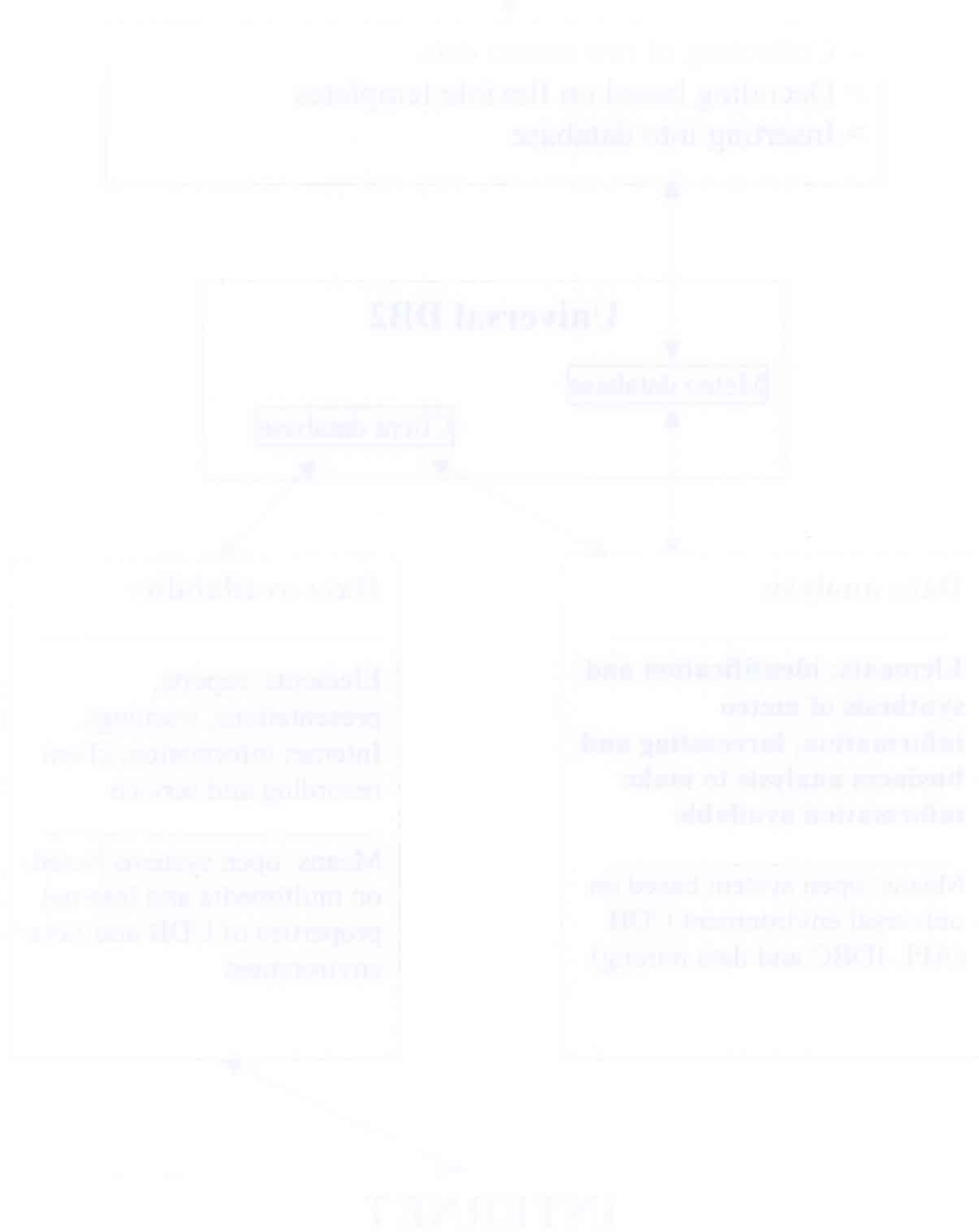
We do state the presumed up-to-date solutions in the Weather Data Collector (as well as recognition of the problems) permit the mentioned further stages in near future:

- Creating wide spectrum of analysing systems and weather forecasts,
- Enabling the modern means of access to various types for IMWM’s customers and coherent system of recording, processing and operations of information transactions,
- Integrating the different processes: receiving – processing – accessing of information in a modern environment, what connect the advanced synthesis and data analysis (also “data mining”) and, in wide sense, multimedia technique of presentation.

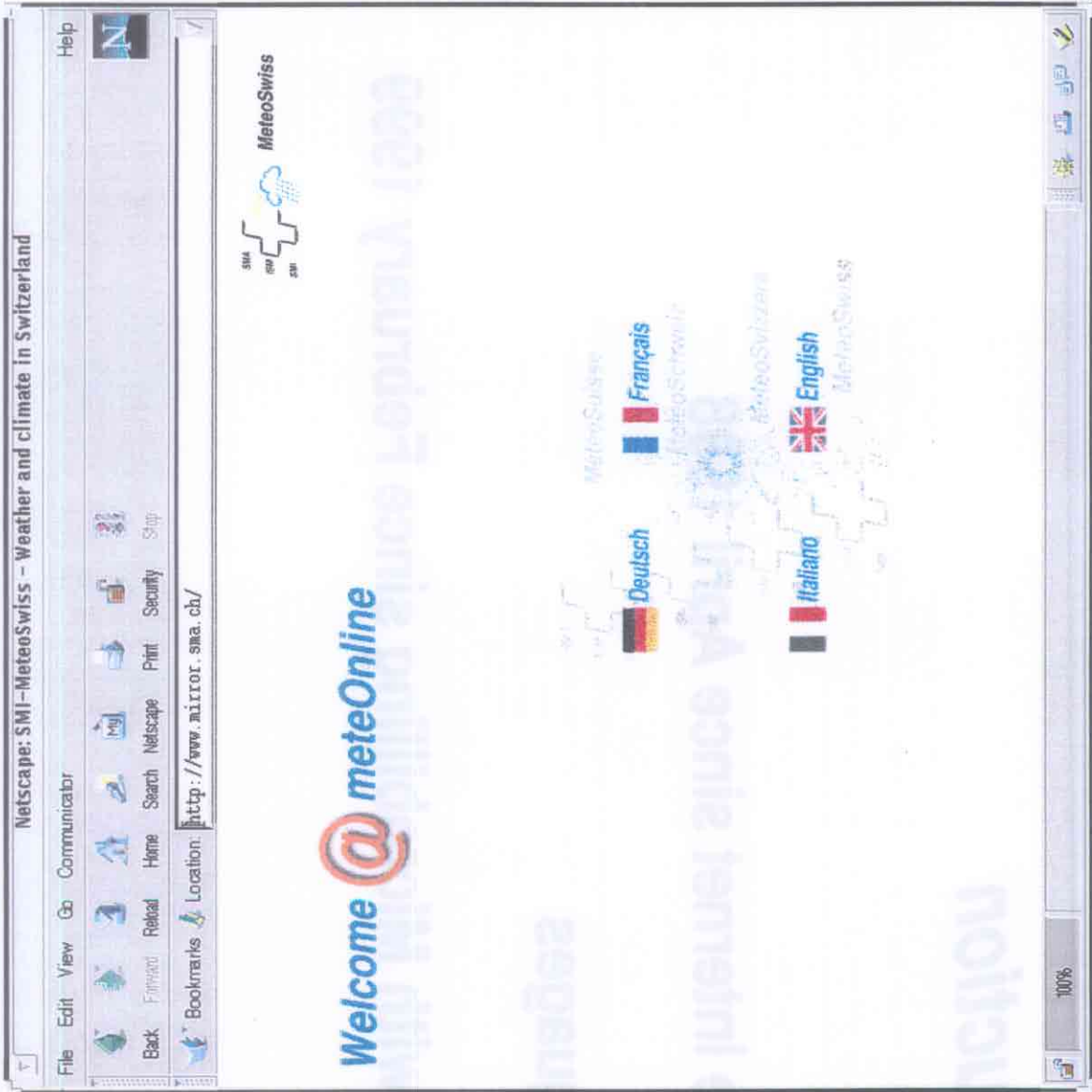
The schematic idea is shown in Fig.2



# Swiss weather and climate on the Internet







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## ***Introduction***

- **on the Internet since April 1998**
- **4 languages**
- **shop with Microbilling since February 1999**

## Overview

- Introduction
- How does our Internet service (shop) work?
- How successful is our Internet service?
- What are the future plans for our Internet service?

Netscape: SMA-MeteoSchiweiz: Wetter Aktuell Schweiz

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Bookmarks Location: <http://www.mirror.sma.ch/de/wetter/>

SMA  
1234  
5678

MeteoSchiweiz

**WETTER AKTUELL**  
**NOAA Satellitenbild**

3-JUN-1999 07:25 / © by SMA-MeteoSchiweiz

Die Satelliten, von denen diese Bilder stammen, heissen NOAA-12, NOAA-14 und NOAA-15. Bei den NOAA-Satelliten handelt es sich um solche, die auf einer polaren Umlaufbahn in einer Höhe von 830 - 870 km die Erde rund 14 mal pro Tag umkreisen. Sie liefern deshalb nicht - wie z.B. Meteosat - immer Bilder

meteo: alps  
 ▶ Meteosat Einzelbild  
 ▶ Meteosat Animation

WETTER AKTUELL  
 DIENSTLEISTUNGS-PRODUKTE  
 WIR ÜBER UNS  
 A BS Z  
 SHOP

Prognose Schweiz  
 Prognose Mittelst  
 Lokalprognose  
 Prognose Dorec  
 Satellitenbild  
 Wetterradar  
 Vegetationsstand  
 Europaewetter  
 Aidsalk  
 techn.berichte  
 Modellklima  
 Wetterflash  
 Sonne und Mond

## Working method

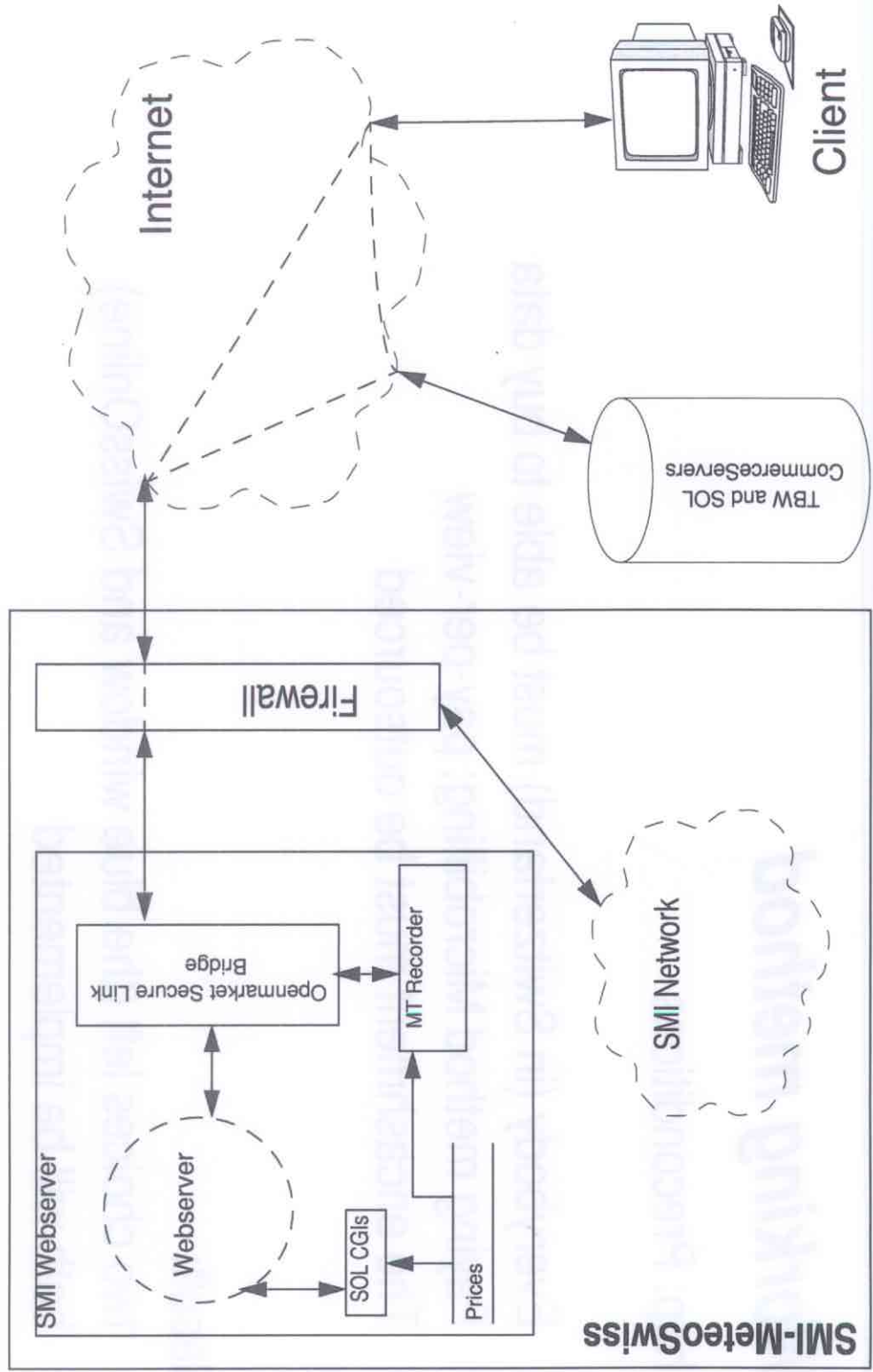
shop: Preconditions

- Everybody (in Switzerland) must be able to buy data
- Paying method Microbilling: pay-per-view
- The encashment must be outsourced

Result:

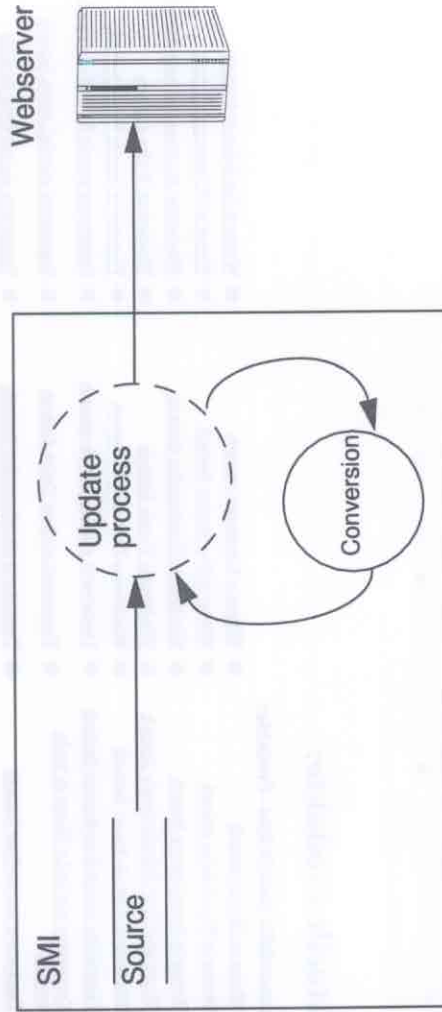
- two choices left (the blue window and SwissOnline)
- both will be implemented

# Working method



## Working method

- Updating
- Controlling



Netscape: Web content control

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Bookmarks Location: [http://www.mirror.sma.ch/bin/check\\_web.cgi](http://www.mirror.sma.ch/bin/check_web.cgi)

Zeit: 03.06.1999 09:26:58 UTC

[Darec aktuell](#) [Alarm 1](#) [Alarm 2](#)

**Alarm:**

**Kommerzielle meteOnline-Produkte:**

- [Wetter an Uebersee deutsch](#) [Skywetter deutsch](#) [Wetter an Uebersee französisch](#)
- [Wetter in Uebersee fröhenisch](#)

**Aktuelle Produkte:**

**Kommerzielle meteOnline-Produkte:**

- [Wetter im Balkan deutsch](#)
- [Wetter in Skandinavien deutsch](#)
- [Wetter in Zentraleuropa deutsch](#)
- [Windwetter Ost-Mittelschweiz deutsch](#)
- [Windwetter Zentralschweiz deutsch](#)
- [Tageswerte einzeln Schaffhausen deutsch](#)
- [Tageswerte einzeln La Chaux de fondz deutsch](#)
- [Tageswerte einzeln Bern deutsch](#)
- [Tageswerte einzeln Jungfrauoch deutsch](#)
- [Tageswerte einzeln Locarno deutsch](#)
- [Tageswerte 14 Tage Basel deutsch](#)
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- [Tageswerte 14 Tage Chur deutsch](#)
- [Tageswerte 14 Tage Sion deutsch](#)
- [Tageswerte 14 Tage Lugano deutsch](#)
- [Messwerte Hochtemperaturen Gasterm deutsch](#)
- [Messwerte Sonne deutsch](#)

**Kommerzielle meteOnline-Produkte:**

- [Wetter in Osteuropa deutsch](#)
- [Wetter in Suedeuropa deutsch](#)
- [Windwetter Graubunden deutsch](#)
- [Windwetter Tessin deutsch](#)
- [Windwetter Zentralalpen deutsch](#)
- [Tageswerte einzeln Zuerich deutsch](#)
- [Tageswerte einzeln Vaduz deutsch](#)
- [Tageswerte einzeln Altdorf deutsch](#)
- [Tageswerte einzeln Geneve deutsch](#)
- [Tageswerte einzeln Lugano deutsch](#)
- [Tageswerte 14 Tage Schaffhausen deutsch](#)
- [Tageswerte 14 Tage La Chaux de fondz deutsch](#)
- [Tageswerte 14 Tage Bern deutsch](#)
- [Tageswerte 14 Tage Jungfrauoch deutsch](#)
- [Tageswerte 14 Tage Locarno deutsch](#)
- [Messwerte Blitz deutsch](#)
- [Messwerte Luftdruck deutsch](#)
- [Messwerte Temperatur deutsch](#)

**Kommerzielle meteOnline-Produkte:**

- [Wetter in der Schweiz deutsch](#)
- [Wetter in Westeuropa deutsch](#)
- [Windwetter Nordwestschweiz deutsch](#)
- [Windwetter Wallis deutsch](#)
- [Tageswerte einzeln Basel deutsch](#)
- [Tageswerte einzeln St. Gallen deutsch](#)
- [Tageswerte einzeln Luzern deutsch](#)
- [Tageswerte einzeln Chur deutsch](#)
- [Tageswerte einzeln Sion deutsch](#)
- [Tageswerte einzeln Samedan deutsch](#)
- [Tageswerte 14 Tage Zuerich deutsch](#)
- [Tageswerte 14 Tage Vaduz deutsch](#)
- [Tageswerte 14 Tage Altdorf deutsch](#)
- [Tageswerte 14 Tage Geneve deutsch](#)
- [Tageswerte 14 Tage Lugano deutsch](#)
- [Messwerte Feuchtigkeit deutsch](#)
- [Messwerte Regen deutsch](#)
- [Messwerte Tiefsttemperaturen Gasterm deutsch](#)

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Bookmarks Location: [http://www.mirror.sma.ch/cgi-bin/mpd\\_diverse.cgi](http://www.mirror.sma.ch/cgi-bin/mpd_diverse.cgi)

**MeteoSchweiz**

**PROGNOSEN**

Die Pollenprognose wird einmal pro Woche - in der Regel am Mittwoch Nachmittag - aktualisiert, das Segelwetter zweimal täglich - jeweils um ca. 10 Uhr und 19 Uhr - und der Spezialwetterberichte einmal täglich um ca. 17:30 Uhr. Sollte eine Aktualisierung ausbleiben, werden die verarbeiteten Daten entsprechend markiert und stehen kostenlos zur Verfügung.

**Diverse Prognosen**

	Letzte Aktualisierung
Alpenwetterbericht Fr. 1.95 	02.06. 15:04 Uhr
Pollenprognose Schweiz Fr. 1.45 	02.06. 12:49 Uhr
Segelwetter Fr. -.50 	02.06. 18:59 Uhr
Spezialwetterbericht Fr. 1.95 	02.06. 17:29 Uhr

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SwissOnline Payment Service

the blue window

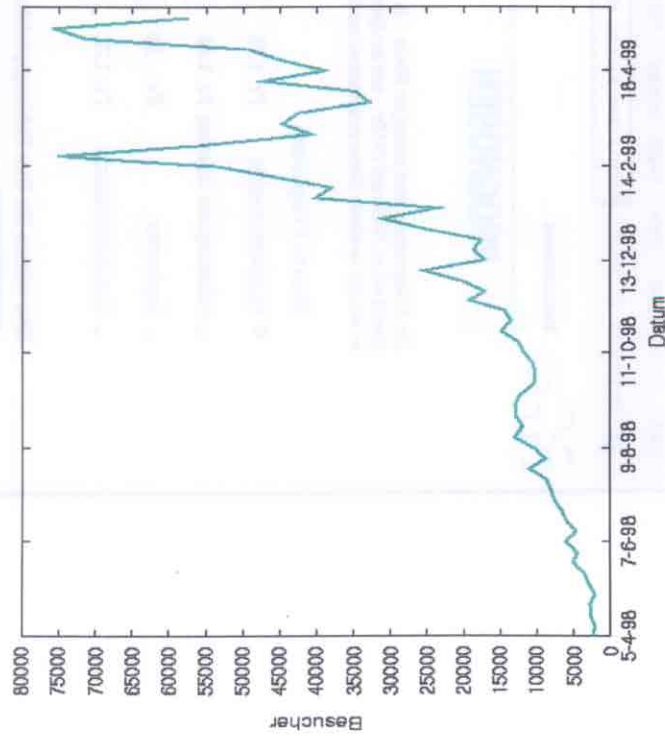
INFO | PROGNOSEN | WETTERDATEN | KLIMADATEN

MODELLDATEN | AVIATIK

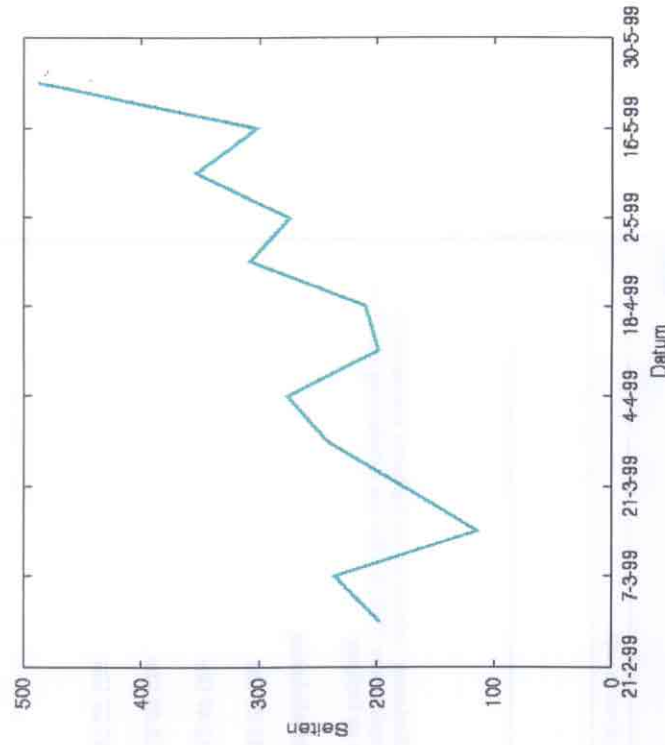
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## Success

Besucher pro Woche



Verkaufte Seiten pro Woche



## ***Future plans***

- **co-operation with portal sites, other websites, etc.**
- **advertising on our free web pages**
- **TAMSI on the Internet**
- **direct database access for clients**

## Report of sub-group on Visualisation Techniques

Chair: Hans Joachim Koppert, DWD

## EGOWS Discussion group on Visualisation Techniques

Chair: Hans-Joachim Koppert, DWD

### **2D Visualisation**

More intelligence in the visual process.

Most of the principal visualisation techniques have already been developed.

More data than before is being sent to the visualisation systems, with more products having to be produced in less time. This leads to the need for systems which can show more data in a condensed form e.g. fractal cloud technique which shows the amount of cloud cover, the depth of the cloud, thunderstorms, cloud type and precipitation.

Alert capability

There is also a need for systems that can alert the user to significant meteorological phenomena present in the data.

Derived diagnostics as a form of data post processing to create 'new products' from combinations of existing ones.

Macros which are defined by 'expert forecasters' to show meteorological features which are of interest to other forecasters.

### **3D Visualisation**

Current systems not tailored to needs of forecaster who is not acquainted with 3D systems. It is more suited to scientific use and case studies of weather events.

Identify areas of interest e.g. identify jet cores or pollution plumes to examine the results in more detail.

Local problems e.g. local cloud triggered by the topography and local wind systems.

### **Technical challenges**

amount of data, new graphics API's

## **Report of sub-group on Interaction Design**

Marie-Françoise Voidrot, Météo-France

## **Interaction Design group report**

### **Aim of the working group :**

Taking into account the duration of the working group the aim was rather an exchange of experience rather than methodologies about Graphical User Interfaces.

A definition was given of a Graphical User Interfaces as any piece of software that could help the system and the user interact in order to fulfil a task.

### **A general agreement was expressed on the following ideas:**

- \* GUI are critical to success for our type of developments because :
  - Forecasters have enough complexity to handle with the meteorological matters
  - They are time constraints
  - They have a big responsibility...
- \* A high priority has to be given to this developments even if very often an easy to use software means a big development investment in this field.
- \* A good criteria to define a good GUI is that it has to be easy to learn
- \* An iterative process and a positive dialogue is necessary to integrate the permanent feedback from the operational users.

### **A lot of common feedback**

The discussions came to define common feedback that reveal, among may be classical rules, the ones that are critical for our profile of users and we should try to implement as far as possible.

1. Always reduce the number of clicks ( GUI efficiency)  
By selecting the bests defaults, making macro-command facilities,...
2. Save the colours in order to keep as many as possible for the visualisations
3. Try to enlarge the working surface and resolution (with multiple screens or new larger screens). This point is specifically critical for forecasters that visualise simultaneously ( and have to synthesise) many different type of data on large domains with a size often higher than 1280x1024.

Meteo-France should investigate new large screens and, if it is the case, will communicate the results to the Egows list.

4. Use the sounds economically in order to avoid an additive stress (on/off option should be implemented)
5. Several levels of UNDO are necessary for any time of input . Experience shows that 3 is not enough 20 is large.
6. Online Help should be effective and well focused to expert users. (contextual, short and efficient)
7. Experience shows that the mouse is more efficient than tablets : it is difficult to handle several devices and if the GUI is good the mouse is not the problem.
8. What You See Is What You Get is necessary for production.
9. Several buttons mouses can be used but pop up menus should be used economically because they are not always intuitive.

At last one of the participants informs the community that there are methodologies and GUI design specialists that may help systems developers in this field and that there are some dedicated conferences in the US



# **Report of sub-group on Graphical Interaction & Meteorological Objects**

Ben Wichers Schreur, KNMI

## Graphical Interaction & Meteorological Objects

- Purpose
- Plans
- Possibilities
- Problems
- Pointers
- Possible relation to the other topics

## Meteorological Objects

Discuss this in the context of workstation development

Definite need for meteorological objects

- structure data -> information
- structure workflow
  - interpretation, monitoring
  - communication transfer of duty
  - group work (different time/spatial scales)
  - training
  - FMI objects as a collection of mask -> manipulation of fields

## Meteorological Objects

*Types of objects*

- scientific problem of definition
- degree of complexity from symbols to conceptual models
- object is data + method
- technical problem of definition of software objects (language, database)
- hierarchy spatial scales, time scales, dynamics, relation between them
- adapting the interaction to the forecasters view of the world (meteorological interaction differs from graphical)

## Meteorological Objects

OSFM is an object modification, relates to the normal interpretation by the forecaster

Questions, problems related to the implementation and use of meteorological objects

- operational pressure, time constraints
- how much to change and what subsequently leave to automatic processes (FMI vs. UKMO)
- loss of detail, c.q. accuracy
- challenge for research and development
- relation between (manipulation of) objects and graphical interaction
- different focus in different countries

## Graphical interaction

### Different approaches to operational implementation

- UKMO pleased with OSFM, still need boundary layer modification, preferably through physical models
- KNMI will adapt OSFM, use delta techniques for boundary layer, nowcasting
- FMI will pursue mask/matrix based modification (refuse to call this graphical: meteorological)
- MeteoFrance will consider future implementation, is in the specification stage
- SMHI interested but at the research stage
- at an early stage, everyone is still searching

## Annex 1: Programme

### Monday 7 June

- 09:00 Registration, Coffee
- 10:00 **Session 1: Introduction**  
*Chair: Dick Blaauboer, KNMI*
- 10:00 Welcome address: *Harry Fijnaut, director*
- 10:15 General information: *Willy de Bruin, Peter Lagerweij*
- 10:30 Invited speaker: *Edward Verbree, Delft University of Technology:*  
3D interaction with GIS
- 11:30 **Session 2: Recent Developments**  
*Chair: Jens Daabeck, ECMWF*
- 11:30-11:50 Jacob Brock, DMI, Denmark
- 11:50-12:10 paper withdrawn
- 12:10-13:20 Lunch
- 13:20-13:40 Lars Sveen, DNMI, Norway
- 13:40-14:00 paper withdrawn
- 14:00 Group photograph
- 14:15-14:45 Coffee break
- 14:45 **Session 2, continued**  
*Chair: Jens Daabeck*
- 14:45-15:05 Marie-Françoise Voidrot, Météo-France, France
- 15:05-15:25 Oldrich Spaniel, SHI, Slovakia
- 15:25-15:45 Dirk Heizenreder, DWD, Germany
- 15:45-17:00 Possibility to install software for demos
- 17:00 Welcome cocktailparty

## Tuesday 8 June

09:00

### **Session 2, continued**

*Chair: Stefan Nilsson, SMHI*

09:00-09:20 Metod Kozelj, SMI, Slovenia

09:20-09:40 Jens Daabeck, ECMWF

09:40-10:00 Philip Dominy, MetOffice, UK

10:00-10:20 Dick Blaauboer, KNMI, the Netherlands

10:20

Coffee break

10:50

### **Session 3: Graphical Interaction and Production**

*Chair: Stefan Nilsson*

10:50-11:20 Juha Kilpinen, FMI, Finland

11:20-11:30 paper withdrawn

11:30-11:50 Anders Larsson, SMHI, Sweden

11:50-12:10 Bernhard Niedermoser, ZAMG, Austria

12:10-12:20 Announcement of initiation of Working Group on  
Meteorological Objects and Grids in Graphical Interaction

12:20-14:00 Lunch

14:00-17:00 Demonstration session

15:00-15:30 Coffee break

## Wednesday 9 June

9:00-10:30

Discussion session in two sub-groups, with subjects:

- Visualization Techniques,  
*chair: Hans-Joachim Koppert, DWD*
- Interaction Design  
*chair: Marie-Françoise Voidrot*
- Graphical Interaction and Meteorological Objects  
*chair: Ben Wichers Schreur, KNMI*

10:30-11:00 Coffee break

11:00-12:00 Demonstration session

12:00-13:00 Lunch

- 13:00 Demonstration session
- 14:30-15:00 Coffee break
- 16:30 Departure to Utrecht
- 17:00-19:00 Visit of Utrecht
- 19:00-22:00 Dinner at Stadskasteel Oudaen, Oudegracht 99, Utrecht

**Thursday 10 June**

- 09:00 **Session 4: Miscellaneous**  
*Chair: Paolo Ambrosetti*
- 09:00-09:20 Malcolm Field, MetOffice, UK
- 09:20-09:40 Paul Davies, MetOffice, UK
- 09:40-10:00 Markus Haerri, SMA, Switzerland
- 10:00-10:30 Coffee break
- 10:30-10:50 Przemyslaw Ignatowicz, Poland
- 10:50-11:10 Arnaud de Wolf, SMA, Switzerland
- 11:10-12:30 Report of sub-groups and plenary discussion
- 12:30 Closure of the meeting
- 12:30-14:00 Possibility for lunch

## Annex 2: List of participants

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