Report of the

EGOWS ' 97 Meeting

held at

METEO FRANCE

42 Avenue Gustave Coriolis,

Toulouse

FRANCE

9-12 June 1997

1997 EGOWS Meeting at
METEO FRANCE
9 - 12 June 1997

Contents

Meteo France - *Stephanie Desbios*

Session 4 - Interactive production and new development environments

Swiss Meteorological Institute-*Christian Pauli*

UK Met office - *Peter Newcomb*

Join Session EGOWS-COST78 Please see COST78 report

Answers to the questionnaire about the caracteristics of the systems and the competences

Synthesis of these answers

List of participants

1997 EGOWS Meeting at
METEO FRANCE
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Foreword

The eighth meeting of the European Working Group on Meteorological Workstations (EGOWS) in June 1997 was attended by 32 representatives from 19 European organisations.

It was again a rare opportunity for seing demonstrations, exchanging informations, experiences, feeling tendances and above all for taking some distance from our problems and our way of working. It was as always a good place to make new contacts or develop existing ones.

For the first time and upon request from the COST78 group on Graphical Interactions a join session EGOWS-COST78 took place.

We remember you that the electronic mailing list egows-l@knmi.nl set up by Dick Blaauboer still exist and you can notify Dick of any names to be added or deleted.

Thank you again to you all for your interesting presentations.

The Swedish Meteorological and Hydrological Institute have kindly volunteered to host the next meeting and of course a volunteer is now requested for 1999

1997 EGOWS Meeting at

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EGOWS 97 recommendations on Meteorological Workstation Development

Recommendations on Meteorological Workstation Development

as agreed at the 8th EGOWS meeting (June 1997)

1. Recommendations on European cooperation

1.1 Lessons from the recent past

- The Egows group is now 8 years old.
- Exchanges of ideas has been very fruitful, but met.services may regret not to have been able to go any further (i.e. exchange of source code,...)
- Advanced technical cooperation has been proved quite weak in the last years, due to technical and architectural choices on the one hand, to more strategical or political reasons on the other hand.
- The EGOWS members observe, as a logical consequence, that their systems, when developed, have not much in common, but (some times) the basic layers (system, RDBMS, graphical packages,...)

1.2 Problems to solve

- Meteorological workstation (MWS) development is often compared to NWP model development : this comparison looks relevant as for the size of the corresponding source codes, but cooperation in the field of MWS seems much more tricky : source architecture may be more complex, as MWS mean both interactivity and integration ; Moreover, some requirements may differ from a meteorological to another, specially in the (recent) field of graphical interaction and meteorological production.
- The EGOWS group has not found in the recent past the convenient political frame at the met.services HQ level (Eumetnet ?), to make cooperation a priority or a necessity.
- New development environments might make module exchange easier (Corba,...)
- For small countries which cannot afford the development of a MWS, cooperation or purchase of an OTS (off the shelf) system may be the only ways.

1.3 Towards a european MWS development ?

- The EGOWS members agree on the need to be ready to answer to the question of the feasibility of a common development on the 2nd generation MWS, which could be launched in a next future.

2. Requirements for a Meteorological Workstation System (MWS)

2.1 Scope of MWS

There is now an agreement on a larger definition of what a MWS should offer to its users :

- access to data
- data visualisation and manipulation
- graphical interaction and database feeding by forecasters
- product derivation if requirement for a human intervention

Meteorological production, when human intervention is necessary, is the combination of graphical interaction by forecasters and product derivation from a forecaster's database.

2.2 Access to data

- Access to all types of meteorological data, messages, plotted observations, satellite and radar images, fields from NWP, elaborated maps and products, climatological databases and geographical data.
- Access to all products including those created from automatically generated information.

2.3 Data visualisation and manipulation features

2.3.1 Interactive features

- An intuitive user-interface for the forecaster, based on icon representation and mouse (or equivalent) interactions. Accelerator keys, function keys and macro functions can be used.
- Personal configuration of default interface variables, maps etc.
- As short a response time as possible.
- A 2-D graphical display. This is still the main purpose of an operational MWS, though 3-D graphics should be investigated to identify how they can best be used in operational forecasting.
- Display manipulation including superimposition, animation, roaming, zooming, retransformation and colorisation.
- Automatic updating of the observations and other meteorological information.
- Interactive manipulation of NWP data to create and display products such as cross-sections and meteograms.
- Manipulation of data : including interpolation from NWP fields, derivation of additional parameters, trajectories, image manipulation, dynamical or statistical interpretation, verification procedures.
- On-demand computation of as many products as possible in preference to using pre-computed products.

2.3.2 Background features

- Monitoring of observational and NWP data on arrival
- Issue of an alarm to the user when pre-set criteria are matched. Ability to point out spurious data.

2.4 Graphical interaction and database feeding by forecasters

- On-screen graphical editing, addition of new information and interactive modification of automatically generated information. Facilities to edit maps.
- More generally speaking, facilities to fill a database allowing forecasters to add value to raw data through " graphical interaction " within a geo-referenced (or not) frame.
- Graphical interaction (together with the subsequent forecaster's database) seems necessary to the Egows member to implement a massive production process.

2.5 Product derivation

- This field of development should be considered, at this requirements level, as a part of the MWS purpose.
- Product generation tools may anyway be developed separately from the MWS. In this case, a generic interface for forecaster's data access is required.
- Ability to save and disseminate output products.
- Not any country is going toward a fully automated product derivation process, but it is agreed that the concept of forecasting assistant is slightly vanishing.

2.6 Miscellaneous

- The ability to archive data and/or products.

3. Recommendations on Standards

3-1 Meteorological

- The GRIB and BUFR WMO codes should be used for data representation.
- The exchange format for data should be uniform, following WMO guidelines, but each country should be able to keep its own internal storage format. For internal handling of observations in particular an alternative format to BUFR may be considered for performance reasons.
- Standard GRIB format is currently being updated and should be able to handle 3-D information in future.
- Extended GRIB format, currently in use by ECMWF, France and Brazil, should be considered for the exchange for satellite image data. There may still be a problem storing tracking information for polar-orbiting satellites.
- It is recommended that BUFR is used for the exchange of radar images. Specifications are expected from OPERA/Eumetnet by 1998.
- Extended BUFR code should be used for the exchange of additional information such as jet streams, or more generally for " forecasters data ' exchange, when these data deal with significant weather objects. A proposal for the extension has been accepted by the code sub-group of WMO.

3-2 Computational

3.2.1 Hardware

- No recommendation is given on the hardware platform to be used. Care should be taken to specify sufficient memory if X-terminals are used. Screen sizes should be maximised.

3.2.3 MWS architecture

- Modularity of applications, where clear separation between data handling, graphics and the user-interface is essential.
- The overheads of operational monitoring, supervision and support should not be overlooked.
- A multitasking capability using a UNIX operating system, Windows NT or equivalent is desirable.
- Object-oriented methods should be considered when designing the next generation of meteorological systems.

3.2.4 System and commercial softwares

- The X-Windows system is ideal for visualisation using the MOTIF tool-kit to develop the user-interfaces. Windows NT can be considered too.
- PC/MAC Desk Top Publishing (DTP) software should be part of the MWS, ideally via integrated command libraries.
- The look-and-feel of meteorological applications should follow the look-and-feel of less specialised IT applications. A uniform style guide should be developed as this reduces user training costs.
- The Common Desktop Environment (CDE) is useful for style management and work area personalisation although some network dependencies can prove troublesome.
- The X-Windows system (Xlib), GKS and Open GL are the accepted graphics standards. The ISO Computer Graphics Metafile (CGM) output format should be considered for the exchange of graphics information as its rich format maps onto many drivers.

3.2.5 Programming languages

- C and C++ are the recommended programming languages. FORTRAN 90 can be considered too.
- JAVA can allow an easy exchange of modules.

3.2.6 Data storage and access, Formats

- An extended form of SQL is already in use and is worth considering for accessing organised databases. Several sites successfully use NEONS, but a replacement is under development and is awaited from the US Navy.
- Compression techniques suited to the data type can be used to improve data transfer rates and storage capacity at the expense of accuracy and fine detail. MPEG is suitable for animations without too many colour variations. GRIB is good for NWP data. Fractal techniques can be considered for imagery.
- Intranet systems are useful for the internal exchange of data across a network. HTML is recommended for on-line documentation.
- For printing purposes Postscript, Encapsulated Postscript, T4, PCL and PDF (which is 90% postscript) might be considered. It was noted that Hewlett-Packard are not expected to support postscript on their next family of printers.
- MWS should have the ability to convert data into GIF, MPREG, JPEG (images), or into HTML (text).

4. Questionnaire on know-how among the Egows members

It was agreed that the need exists to identify '' who is keen on what ? ' among the Egows members. Hence the idea of asking this question, for a set of sub-domains, to each met.service through the Egows representative.
The synthesis of the answers is given below.

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Introduction

From Intranet to Java Computing

Guest speakers : Dominique Arnal and Marc Fleury

Sun Microsystems

From Intranet to Java Computing

Météo France

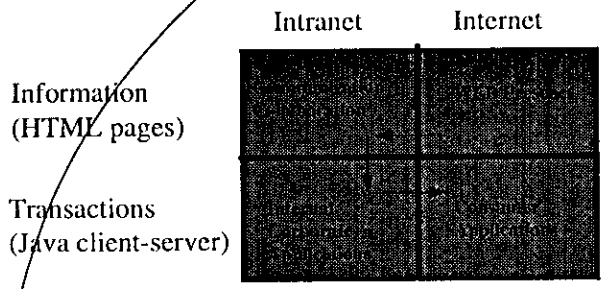
Monday June 9th 1997

Dominique Arnal - darnal@France.Sun.COM
Marc Fleury - mfleury@France.Sun.COM

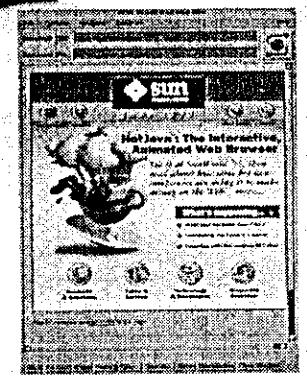
Agenda

- **Java Computing Architecture**
  - *Concept*
  - *Network Computer: JavaStation*
  - *Netra J*
- **Java Architecture**
  - *Java language and APIs*
  - *Java Development Kit - JDK 1.1*
  - *Development tools (Java Workshop ...)*
- **Advanced Java**
  - *Introduction to JavaBeans (Object Component Models)*
  - *Database and Java Connectivity - JDBC*

Corporate WEB Adoption Cycle

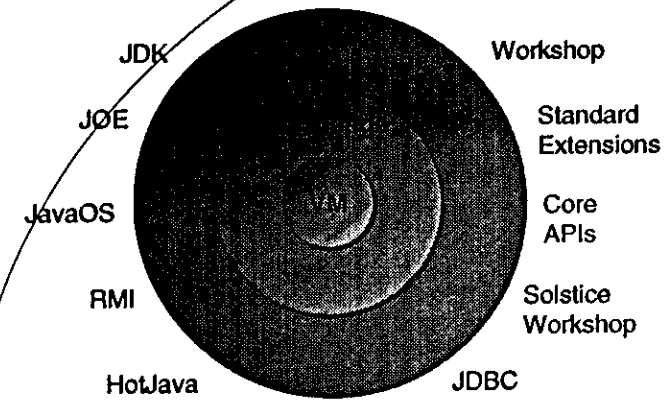


The Web Revolution



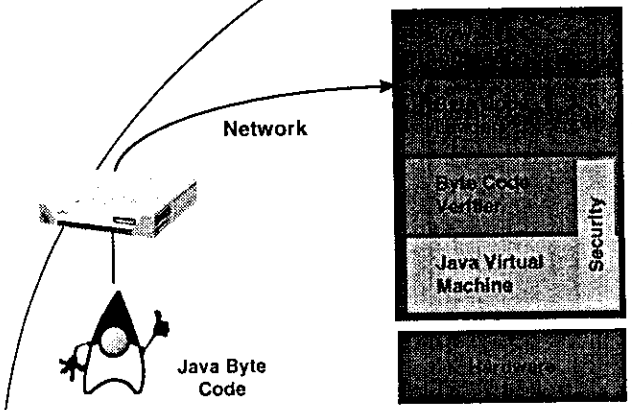
- Standardized, universal interface to data
- Graphical Representation
- Broadcast Capability
- *Publish Once, Reach Millions*

What is Java ?

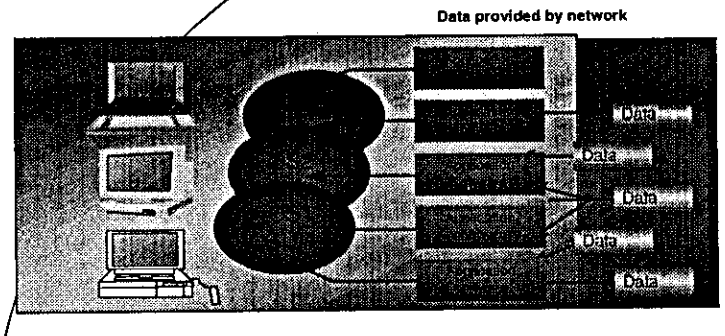


Java is a Software Platform

What is Java ?

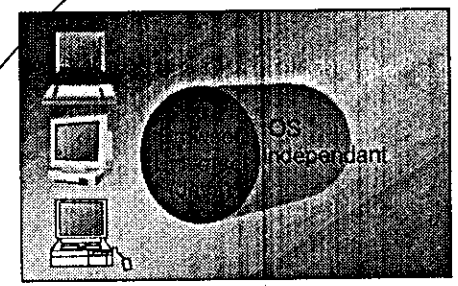


Today's Computing Architecture



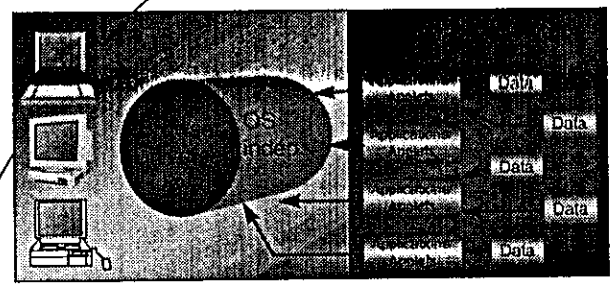
User's responsability: purchasing, installing, upgrading, using

Platform Independence



User's responsability: purchasing, using

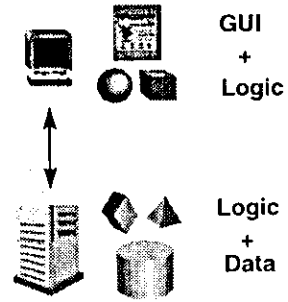
JAVA computing



Optimizes client administration, cost per seat, security, application distribution

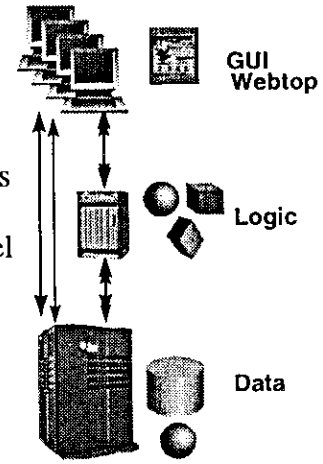
From Fat Client ...

- **"Fat Client" Model**
- Application logic spread out
- Deployment costs
- Exploitation costs
- Software Maintenance costs
- Evolution costs
- Low flexible architecture



... to Java Computing

- **"Thin Client" Model**
- "Webtop"
- Large diminution of costs
- Centralized exploitation
- Object/Component model
- Flexible architecture
- Scalable architecture

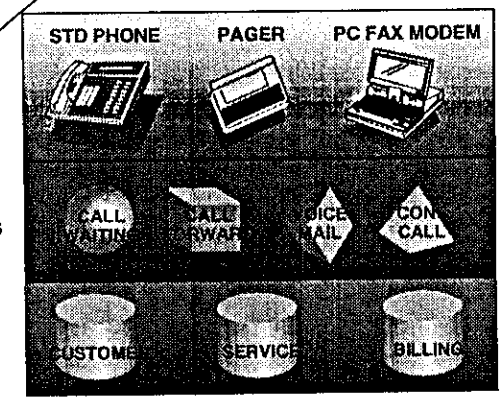


Telephone Analogy

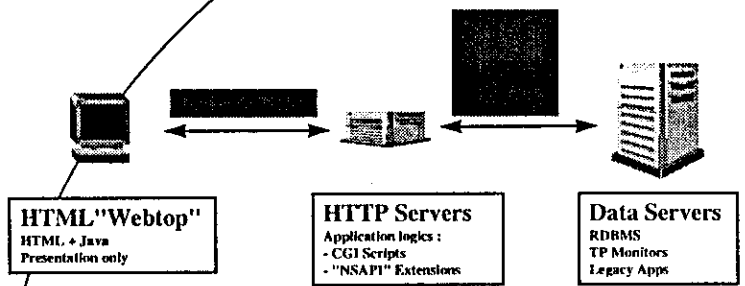
Multiple Client Access

Network Shared Services

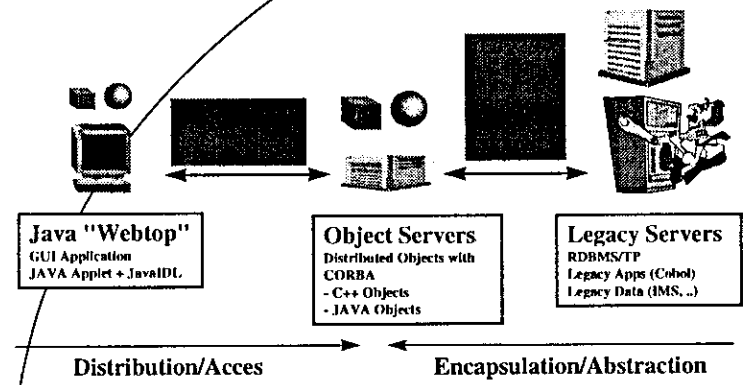
Corporate Data



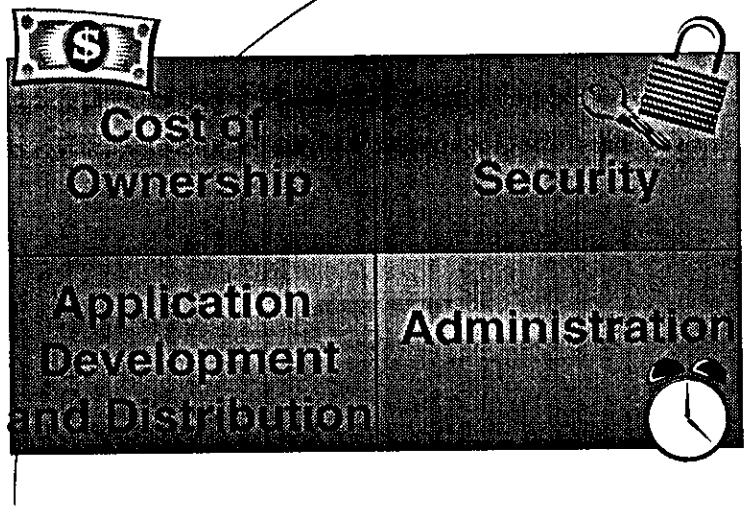
HTTP Universal Application Protocol



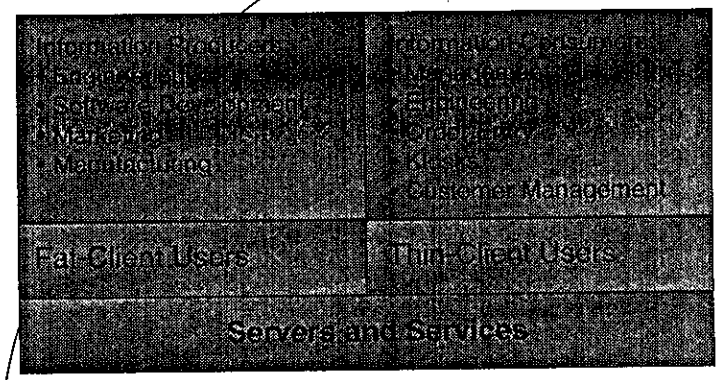
Java/CORBA Integration



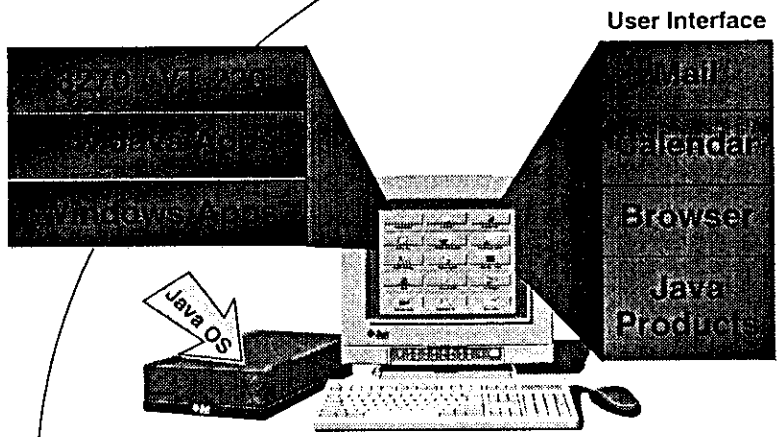
IT Organization Problems



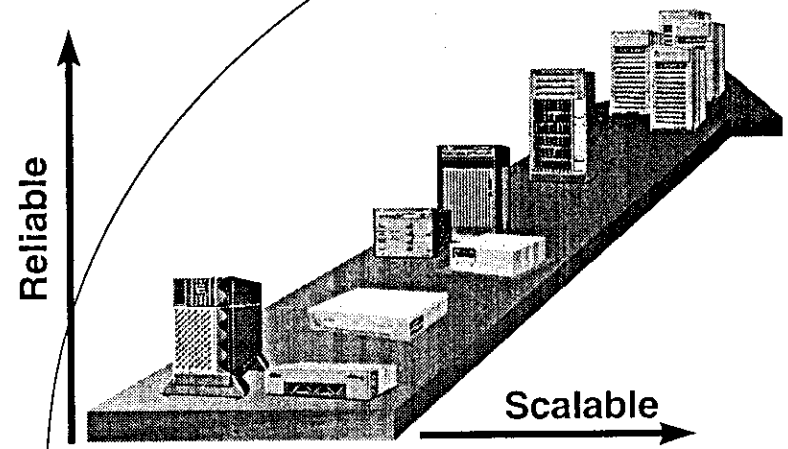
The Information Enterprise



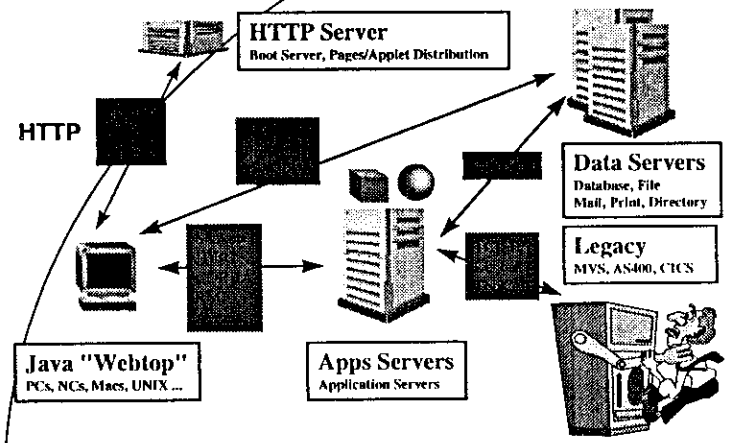
The Web Top - JavaStation



Sun Servers with Java Computing Architecture



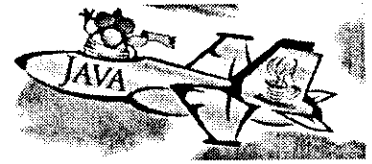
HTTP and Java Computing



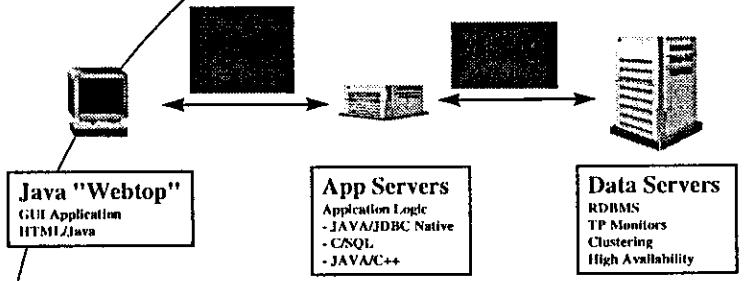
Conclusion

Java: Write Once, Run Anywhere

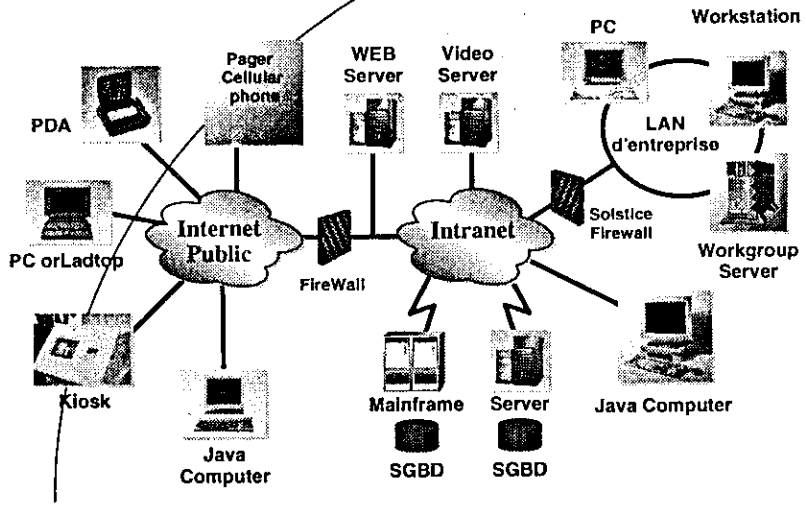
The network is the distribution vehicle for software applications



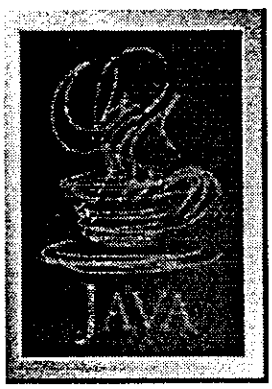
ntégration Java/RDBMS Integration



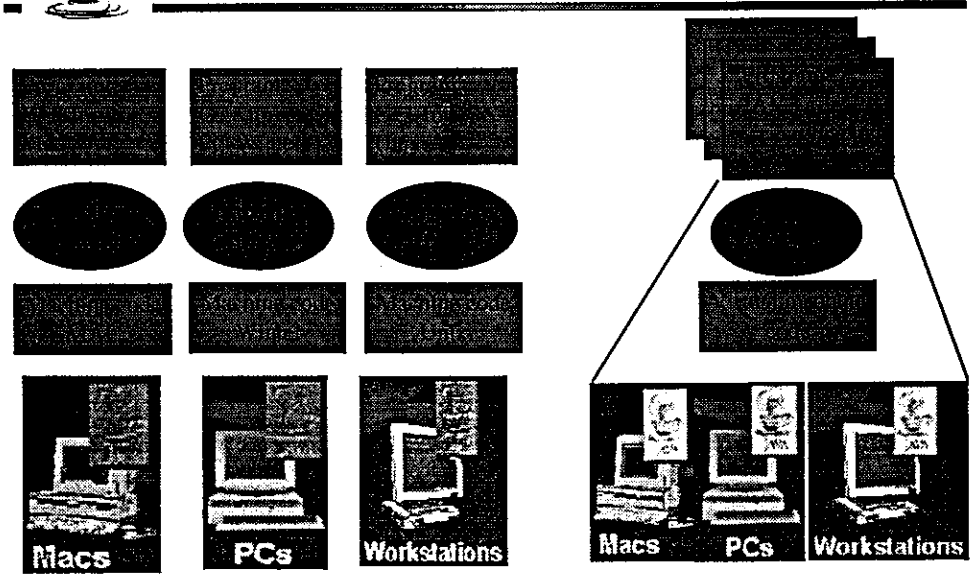
Network Computing



Météo France
Jdk1.1 &Software architecture



JAVA : The Virtual Machine



The Java virtual machine

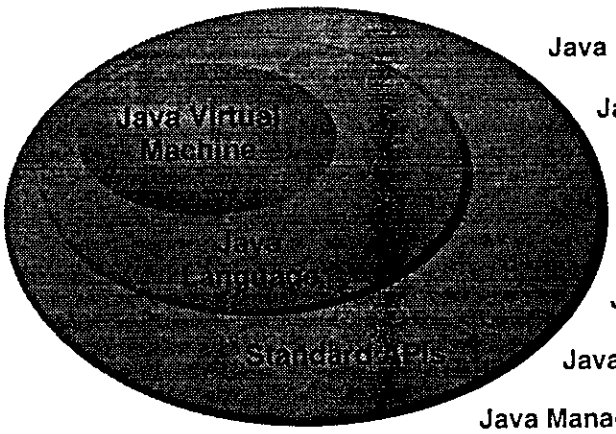
- **Disponibility on most OSs**
- **WIN 95/NT**
- **Mac OS**
- **RT OS (VXworks, OS9, ...)**
- **Unix (HP-UX, Irix, OSF1, Solaris, Linux, ...)**
- **JavaOS**
- **...**

The Java model: Software Pull

- Download software on demand
- As easy as a browser click
- Small classes for internet pull
- Platform independence

The Java platform

Java Platform APIs:

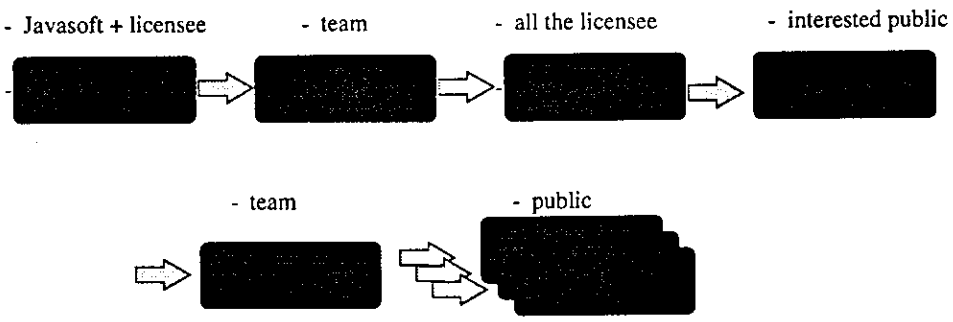


- Java Beans API
- Java Commerce API
- Java Media API
- Java Servlet API
- Java Security API
- Java Enterprise API *
- Java Management API

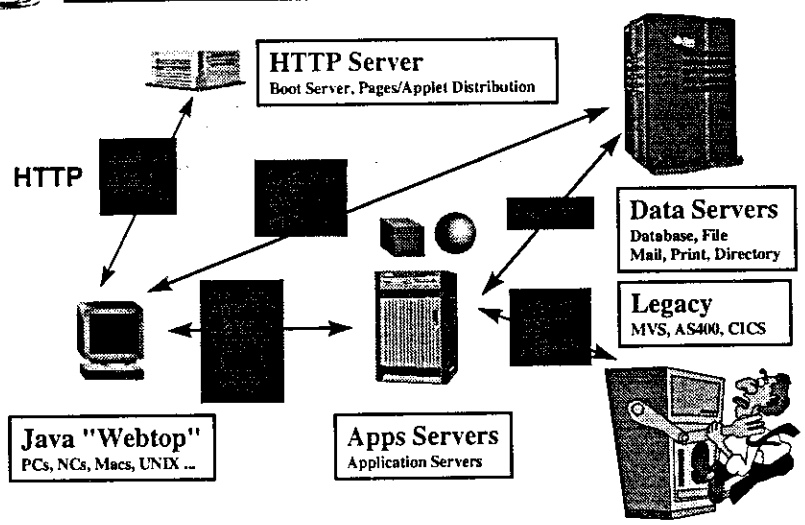
* librairies standad dans JDK 1.1

Java: Api extension

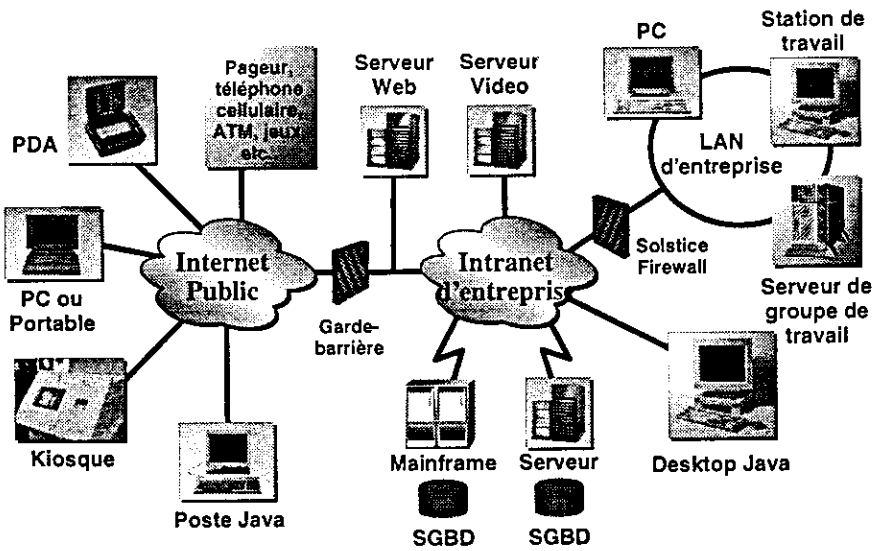
- **In collaboration with Industry**
  Adobe, Oracle, Netscape, Apple, SGI, Intel, ...



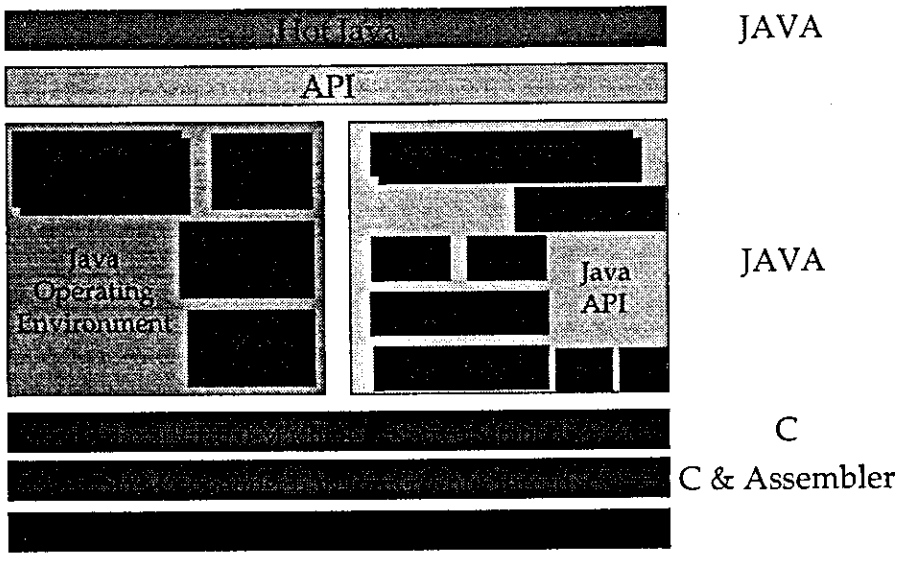
Java Distributed architecture



JavaComputing at large



JavaOS: architecture



AWT 1.1

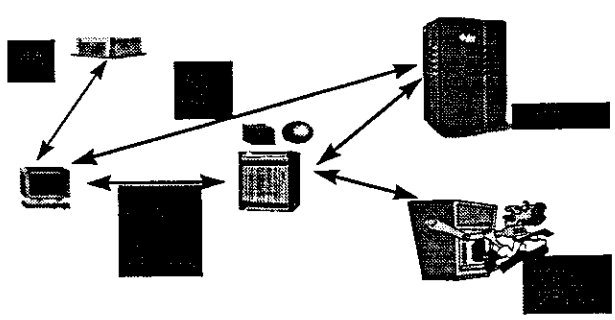
- Printing
- Popup menus
- Cut & Past
- Cursor with components
- Event delegation by Call propagation
- Faster rendering
- Lightweight components

Security API

- Authentication = Digital signature
- Authorization = Access Control List
- Confidentiality = Encryption
- Auditing = Security Manager
- Containment = VM & Security Mgr

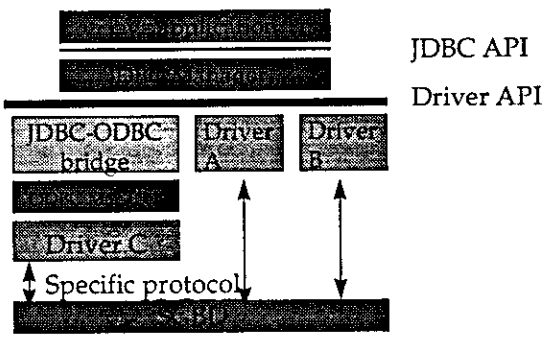
Java Enterprise

- **Distributed computing, legacy & SGBD**
- **JDBC : SQL DataBases**
- **JavaIDL : Access to CORBA**
- **Java RMI : Remote Methode Invocation**



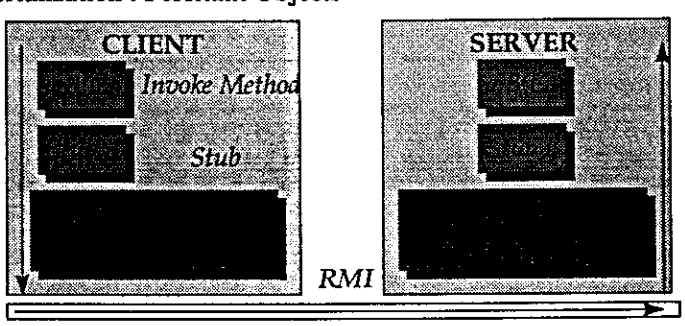
JDBC

- JDBC Native drivers
- Standard SQL statements
- Platform independant: 100% Java
- Supports metadata for db discovery
- JDBC-ODBC bridge standard



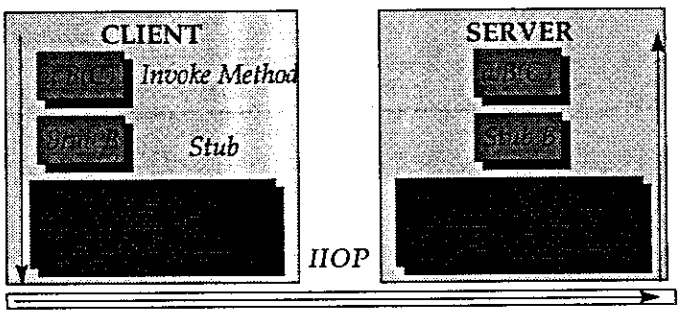
RMI

- Remote Method Invocation
- Typed RPC Java object Model
- Simplicity
- Dynamic loading
- Between Virtual Machines
- Serialization : Persitant Objects

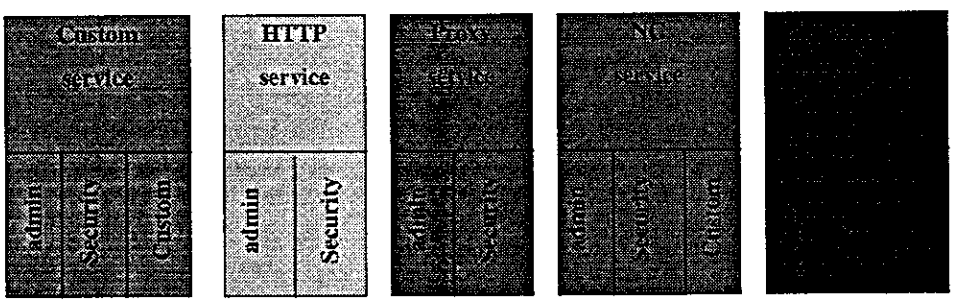


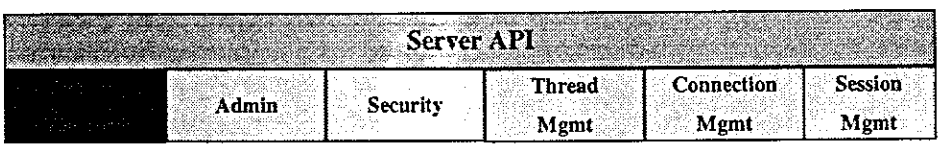
IDL

- Distributed objects
- IDL to Java standard: Java IDL compiler
- JOE is a Java client ORB
- Standard IIOP
- Any Language on any ORB



Java Server Architecture





JavaBeans

Write once -reuse everywhere

- Component philosophy for *Visual Builders*
- Portable integration
- Supports introspection, serialization, reflection, customization, awt event model
- Interoperability :
  - LiveConnect (Netscape)
  - OpenDoc (Apple + IBM)
  - ActiveX (Microsoft)
- JDK 1.1 is "JavaBeans ready"

Java Media

- Java 2D : abstract imaging model
- Java Animation :animated 2D
- Java Telephony : Phone calls, téléconférence, transferts.
- Java 3D : OpenGL en Java
- Java Share :White boards
- Java Media Framework: clocks & Media players

Java Management API

- JMAPI : managing enterprise network
- Collaboration : Cisco, Bay Networks, CA, OpenVision, etc...
- Standard Extension API
- Disponibles JDK 1.0.2 et JDK 1.1

Development tools

- Java WorkShop (Sun)
- JavaPlan (Sun)
- Visual Café (Symantec)
- Jbuilder (Borland)
- Supercede (Asymetrix)
- Bongo (Marimba)
- J++ (Microsoft)
- Visual Age (IBM)
- ...

1997 EGOWS Meeting at
METEO FRANCE
9 - 12 June 1997

Session 1 : Visualisation / Recent development :

Hydrometeorological Institute of Slovenia - *Matjaz Mencej*

The Irish Meteorological Service - *Jim Hamilton*

Deutscher Wetterdienst - *Hans - Joachim Koppert*

European Center for Meteorological Weather Forecast - *Jens Daabeck*

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Centre for Computing and Communication

Visualisation of Meteorological Data Using HTML Format

Matjaž Mencej

Abstract

In order to be able to use the available meteorological products efficiently for the operational forecasting environment it was necessary to produce a user friendly interface. Since WWW technology and HTML standards present a ready to use tool for graphical and textual presentation, we have decided to use this as a user interface. The products were made available to the forecasters as well as other employees of the Hydrometeorological Institute of Slovenia via an intranet WWW page. The entry level layout can be seen on Fig. 1. There are a couple of applications running on a daily basis producing the available products. The focus of this presentation will be on the automatic meteorological stations data. These are fed into an Oracle database. There is a new set of data every half an hour. We have created an application, which browses the database for the specified period through an SQL-query, and converts the retrieved data into proper graphical or textual form for visualisation purposes.

1 Introduction

Every day a large amount of data is produced from various models and observations. These data have to be presented in a usable way for the forecasters. That means processing some data to get graphical output, or arranging text so it is more readable, or browsing a database to get the needed data.

Since the introduction of the WWW technology it has become apparent, that this is a good way of interfacing to the data, be it in textual or graphical format. We have therefore developed an interface in html format, which is used primarily by our forecasters, but also by other colleagues at the Institute. The entry page can be seen on Fig. 1. We decided to use the frames, since this enables us to have access to all the data at all times, and simplifies changing from one set to another. The WWW technology is also very flexible, so it is very easy to suit any additional needs the forecasters might have.

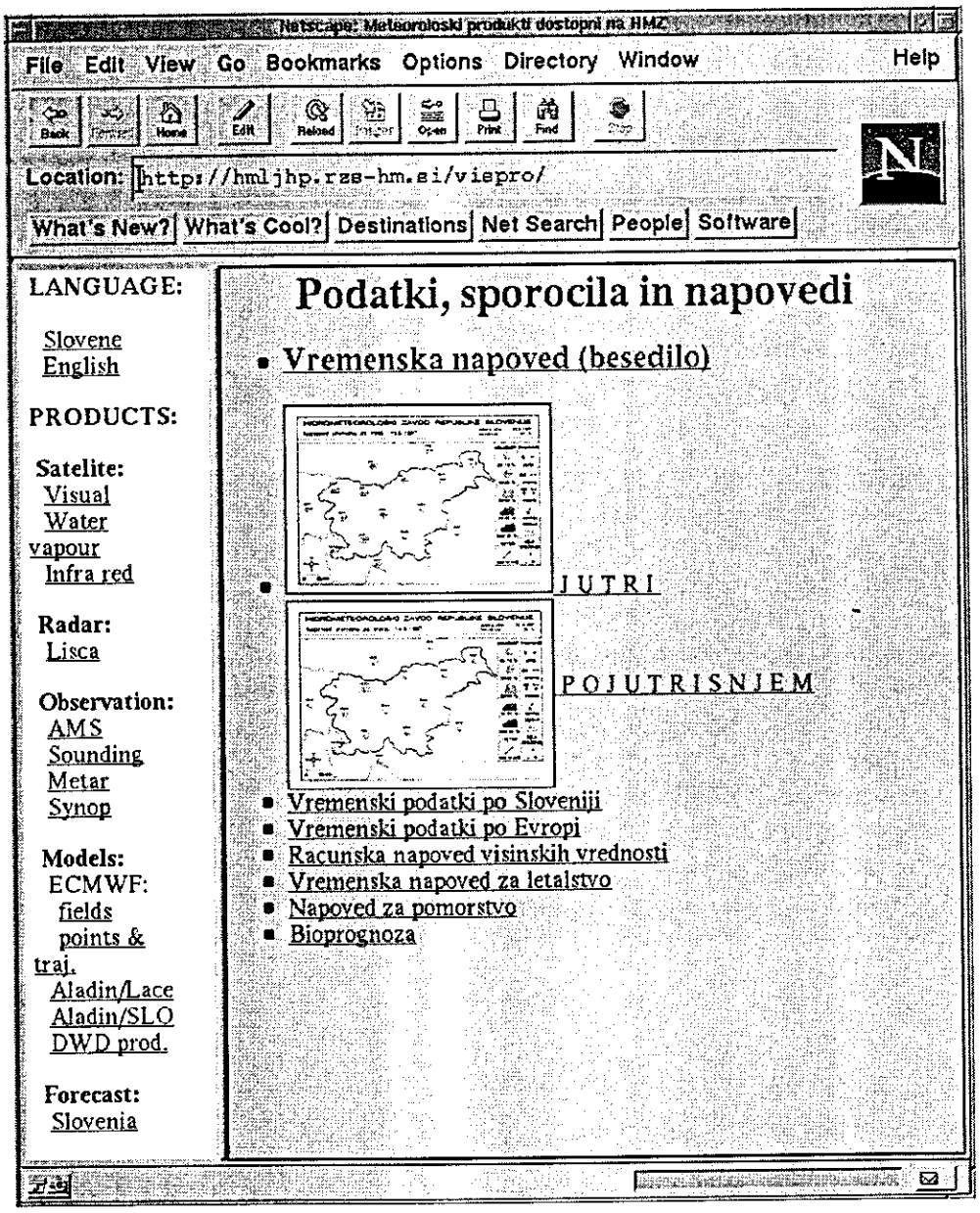

Figure 1: Entry page for intranet WWW products

Most of the data available through the WWW document is produced every day and is static. This is not so for the satellite images updated every half an hour, and radar images, updated every 15 minutes. The data from Automatic Meteorological Stations are stored in a database and accessed online via a form and SQL query, produced by the script, servicing the form.

The data are organised in an Oracle database. New data come into the database every 30 minutes, and we have data available in this form for the past 2 years. The HTML form allows the forecaster to choose the period and the parameters, as well as the stations he wants the data for (see Fig. 2). The stations are divided into groups by the nature of data. Within each group the user can choose the parameters to be displayed. In the tables produced or graphs plotted we group the same parameter for different stations on the same graph or in the same table.

In the future it will be possible for the user to choose which parameters to group together. The user can also choose the period for which the data should be extracted, and the interval between two consecutive entries. The resulting entry is then processed by a script, which produces an SQL query to extract data from the database. The extracted data are then either converted into a textual table or plotted on a graph using GNUPLOT. The whole process takes a couple of minutes. Due to the slowness of the database it sometimes happens, that the results are not ready soon enough. In this case we get no output on the WWW page, since the browser times out. In the future we will try to speed up the database and give better control over the output to the user.

2 Sources of data

2.1 Satellite images

There are three satellite images at disposal, namely the visual, water vapour and the infra red spectrum images. They are updated every half an hour, and there is a mpeg movie available for the last 24 hours. The data for these images are received via a satellite link and then processed to produce gif images and mpeg movies. This is an automatic process running on one of our operational machines.

2.2 Radar images

We have a radar on Lisca, which is in the south-eastern part of Slovenia. The radar images are transferred via a modem link to the Institute and then processed to filter out the errors and convert them to gif format. the images are updated every 15 minutes, and there is a gif-movie available for the last 11 images.

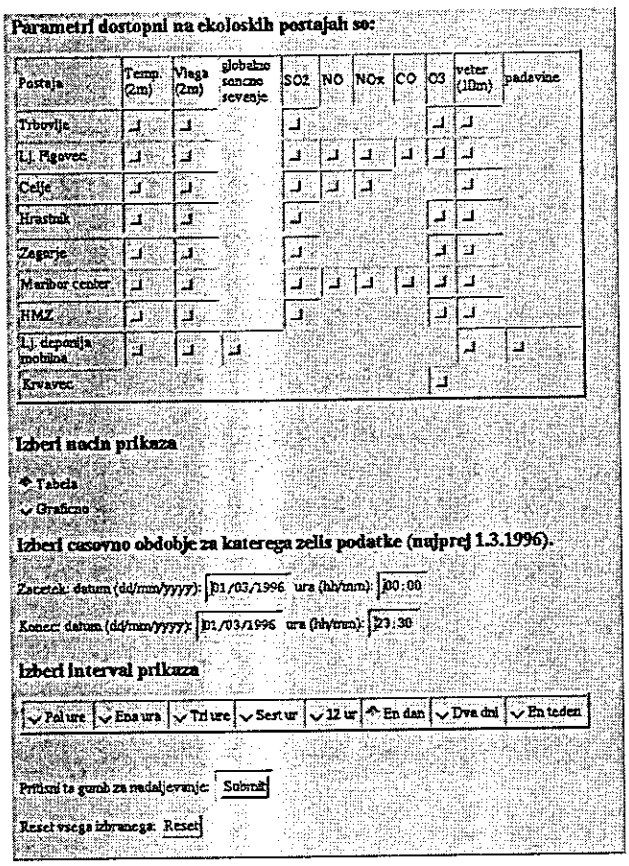

Figure 2: Choices for AMS data

2.3 Observations

2.3.1 Automatic meteorological stations

The data from automatic meteorological stations (AMS) are stored in an Oracle database. There is a new set of data every half an hour. There are currently arround 60 AMS scattered around Slovenia. The data from the stations are transferred to the Institute via modem links, checked and entered into the database. There are up to 25 parameters measured at each station, and all of them are available in the database. We have created the entry forms so it is apparent which parameters are available at which stations. The amount of data in the database is growing rapidly, so after 2 years we will most likely start transferring some data on other media, which will be available by request only.

2.3.2 Sounding

A radio sound is emmited every morning in Ljubljana, and we also receive sounding data from Graz, Udine, Zagreb, Wien, and Muenchen. The data are transformed into graphical form to produce a gif image, which is available on the web. For Ljubljana we are also producing a zoomed smaller image and some diagnostic images.

2.3.3 Metar and Synop data

GTS data are received via the MSS system. The data are in textual form, and currently we only parse the data to divide the messages by type. There is no graphical presentation available at the moment. The data are updated every half an hour.

2.4 Models

2.4.1 ECMWF

These data will be available when Slovenia becomes an associate member of the ECMWF.

2.4.2 ALADIN/LACE

At Meteo France an application of the Aladin model is run on the LACE domain (see Fig. 3), and we receive the results of this run every morning. The data are then processed to produce graphical output and some grid point forecasts. The available data are on Fig 4.

2.4.3 Aladin/SLO

Every morning we run a workstation version of the Aladin model at the Institute. The domain of this model is shown on Fig. 5. The results are then processed to produce graphical and textual output. The available data in graphical form can be seen on Fig. 6, there are also prognostic point data available (see Fig 7.), and precipitation forecast for some places (see Fig. 8.), as well as a prognostic satellite image movie in mpeg format.

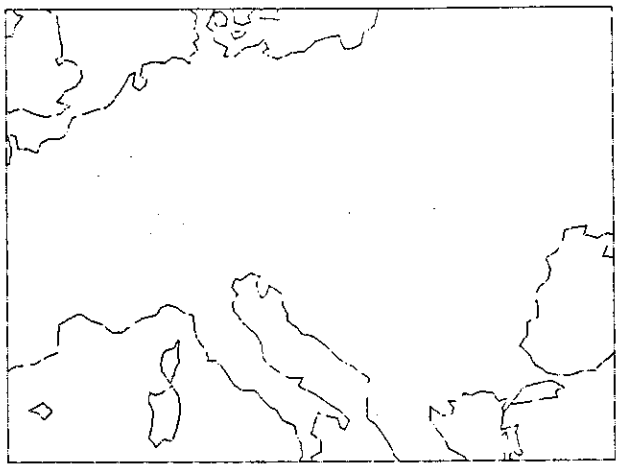

Figure 3: Aladin/LACE domain

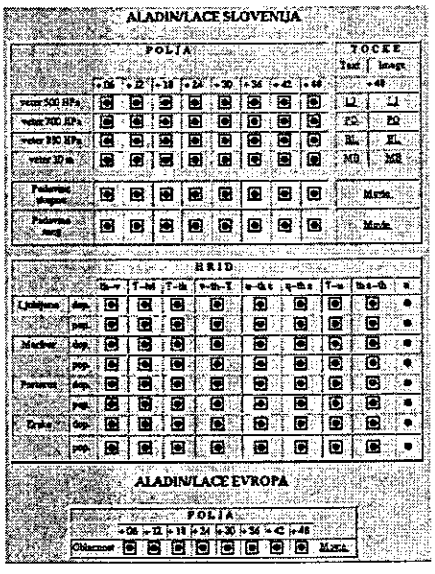

Figure 4: Aladin, LACE Available products

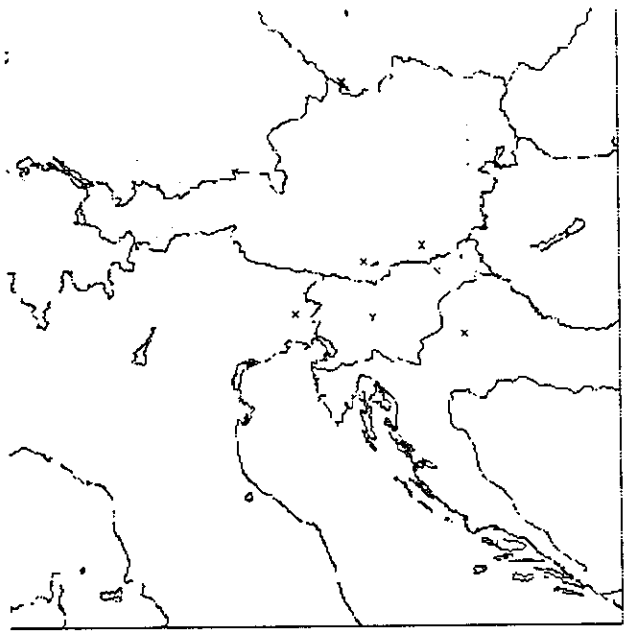

Figure 5: Aladin/SLO domain

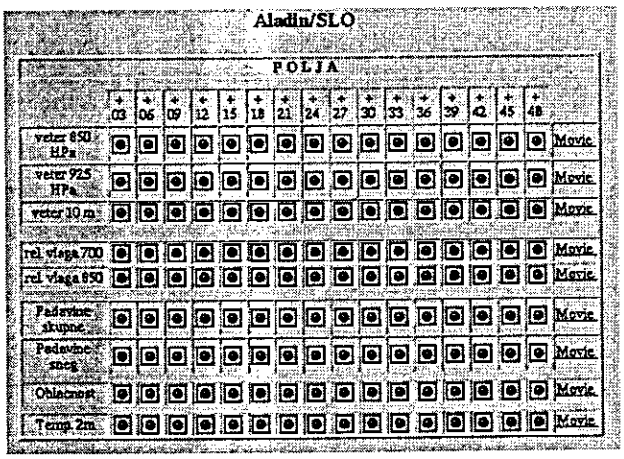

Figure 6: Aladin/SLO graphical output

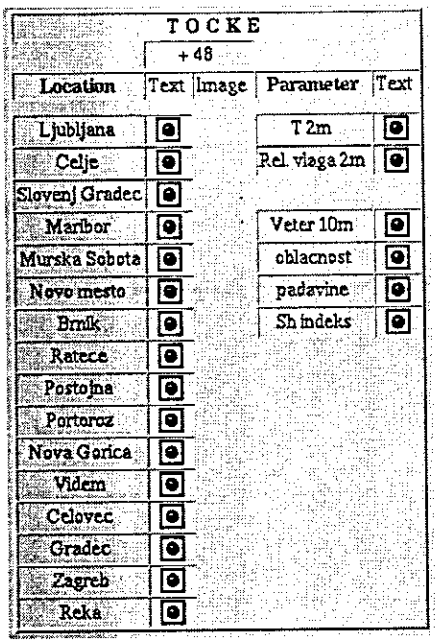

Figure 7: Aladin/SLO point data

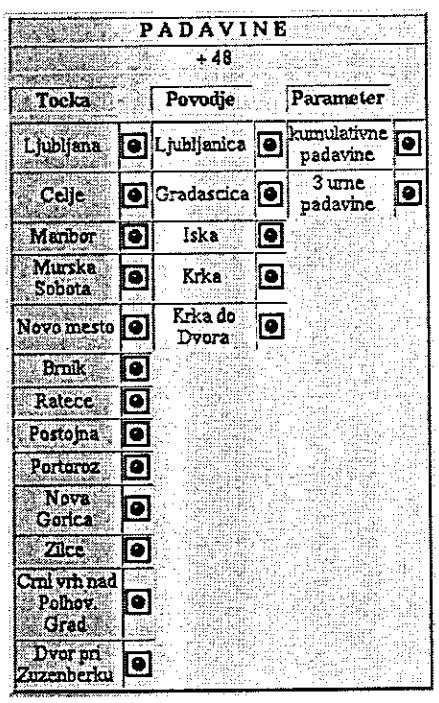

Figure 8: Aladin/SLO prognostic precipitation data

2.4.4 DWD products

We are receiving DWD products via a satellite link from Germany using a VCS FAX-E system. The data are originally in tiff format. We then transform them to gif format to make it possible for web browsers to show them. The data are available for the current day and the day before.

2.4.5 Regional forecasts

There are also a regional forecasts available. This page also appears in the right frame when entering the meteo products page (Fig 1.). The textual part is updated every morning, and the graphical parts are produced around noon every day.

3 Design of the entry point page

We have decided to use frames, since this enables us to have all the sets of data available at all times. This kind of design is also very flexible, so it is very easy to add or change certain parts. The main criteria when designing the page were the wishes expressed by the forecasters. Our main goal was functionality rather then aesthetic looks.

There are two frames on the page at all times (Fig. 1). The left frame contains the possible choices of groups of data and available products. The right frame contains either tables with further choices (eg Fig. 4) or the final product. These products are in textual or graphical form.

The frame with choices changes every now and then, when new products become available, or when we organise existing products in a different manner. This is always done in coordination with the forecasters.

4 Automatic Meteorological Stations Data Interface

There are currently more then 50 Automatic Meteorological stations scattered around Slovenia. They are all connected to the Institute via dial-up modem links. The data are polled from the stations every half an hour, checked and fed into an Oracle database. The database resides on a VMS computer. The data are available for the period from March 1996 till now.

We have installed SQL-Net on an HP workstation, to be able to access to the database from a Unix machine. In this way it is possible to access the database transparently. The application retrieving the data is written in Tcl/Tk script language with SQL extensions. The retrieved data are then formatted with a C program in case the user decided for textual output, or a graph is drawn using Gnu-plot, if the user decides for graphical output.

The user interface is designed so it is simple and easy to use. The only textual input from the user is the dates between which the data should be retrieved. All the other choices are

made using click-able buttons in a table. The entry form for one set of automatic stations can be seen on Fig. 2.

At the moment it takes a long time to get the results of a query. Usually from 2-4 minutes per entry in the table. The problem lies in the speed of the database. It seems it is not optimally tuned for this kind of queries. It is therefore advisable not to exaggerate with the amount of data one wants to retrieve in a single query.

5 Experiences so far

The whole of the intranet page is of great use to the forecaster, as well as other departments of the Institute. We are constantly improving the contents and the design of the page. The part with the data from the automatic meteorological stations is still in a test phase, so we do not have many experiences so far. Some sections are being used for the purposes of checking the data (the solar radiation data). The response times are still too large for the data to be useful for frequent queries.

We also used a slightly modified version of this page for some events where we needed dislocated access to data. One example was a gliding championship, where we provided them with the meteorological data at the airport. At that time we designed a series of scripts, which were updating the data on the site, so there was no need to transfer the images via a modem when they were needed. Another experience was a ski jumping contest, where we had an ISDN link to the Institute, so it was possible to transfer the data on line, rather then have a local depository at the site. In both cases it was fairly simple to adapt the existing design and supporting scripts and use them at a remote site.

6 Future Plans

We will continue adding the products to the list of available products. We are also aiming at the improvement in the response times of the database. We will try to give more choices for formating of output data from the AMS (eg. plotting different parameters on the same graph). Also the design of the graphical output is constantly being improved to make it more readable and therefore more useful.

We also intend to follow the developments of the possibilities for the visualisation using html technology, such as plug-ins and extensions of the HTML standard. Some of the features we could use are zooming, animation, and eventual interactivity.

7 Conclusion

The presented interface using HTML as the basis for the design is an easy to use and very adaptable interface for the meteorological data of all kinds. It is also very inexpensive in terms of the man power needed and platform independent. The decision to use HTML seems to have been the right one, since it was readily accepted by the forecasters. The

interface is not very complicated and is very easily adaptable to the specific needs. The AMS data interface is giving satisfactory results, but still needs some improvement in speed and output formating.

There are also some down sides of using HTML technology. It is fairly slow and not interactive in comparison to the integrated dedicated systems running on workstations.

USE OF GRAPHICS WORKSTATIONS AT MET EIREANN

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1. INTRODUCTION

This paper summarises the graphics hardware and software systems in use at Met Eireann - the Irish Meteorological Service. Particular attention is paid to the use of workstations for the display of NWP output using X/Motif. Three programs are discussed in detail viz. **plotxw**, used to display plotfiles [i.e. pre-calculated metafiles]; **xgrbplt**, used by the Research division to examine GRIB output from the Hirlam NWP model; and **xcharts** used in the Forecast Offices to look at NWP output from various centres. The latter replaces a command driven system called CHARTS [Hamilton 1984]. Much of the discussion will concentrate on developments since the last EGOWS meeting [Hamilton 1996] and plans for the future.

2. HARDWARE

We have quite a mix of hardware but at present we are moving more and more towards unix platforms. The following is a summary of the systems relevant to this paper [for further details see Hamilton, 1995 and Hamilton, 1996] :

A VAX cluster [MicroVax 3100 and two VAX 4200] used for telecommunications

A MIPS RS-4000 Millenium used for decoding observations and NWP products and for the graphical display of such products. [An older, and less powerful, MIPS RS-3000 Magnum is used as a backup.]

A Silicon Graphics Power-Challenge server [with six processors] which is used for running the Hirlam NWP model. [This is an upgraded version of the two processor Challenge-L we were using last year. The new computer is eleven times as fast as the old.]

Nine Silicon Graphics Indy R4000 workstations used by the Research, Computer, General Forecasting and Aviation Forecasting Divisions. Their primary use is to display output from numerical models.

A number of Pentium PC's [running MS-Windows and LanWorkplace for Windows] used in the General Forecasting Division as X-terminals to provide additional screens.

Various DEC workstations are used to process and display radar data [Gematronix and Ericsson] and PDUS satellite data [VCS].

Figure 1 summarises the hardware configuration. Note that it includes hardware used by the Climatology Division [a Sun Ultra server running Ingres], a VAX cluster [used for the Dublin Airport radar] and various networked PC's.

3. SOFTWARE

There are a number of computer graphics packages in use in the service – some are commercial systems and some were developed in-house. Generally speaking, the various packages are not well integrated and it is hoped to rectify this in the future.

A package, developed by Gematronix, is used to display the output of the Ericsson Dublin airport radar and the Gematronix Shannon airport radar on a DEC alpha workstation.

We have a number of self-contained satellite display systems which use secondary data. We have just acquired a VCS PDUS system which uses DEC alpha workstations for display.

The in-house developed batch graphics systems is used to display observations and/or NWP products. It is used to produce hardcopy output on pre-printed sheets using on-line Hewlett-Packard Draftmaster pen-plotters. In addition, plots can be produced using Canon laser printers, Hewlett-Packard PostScript printers and/or a Tektronix colour PostScript printer.

Plots, which will eventually be produced as hardcopy, are stored as random access binary files containing vectors. Each file may contain one or more plots [e.g. a file could contain a number of plots of geopotential at various standard levels]. Header records contain size information and alpha-numeric labels. Packages exist to display such plot-files on the available output devices which include X-windows workstations.

Since 1984 the forecasters have had access to an on-line command-driven interactive graphics system [called CHARTS] which allows the display of NWP products on a colour graphics terminal [Hamilton, 1984]. Since 1993, this program has been supplemented by an X-windows system called **xcharts**. It uses many X-windows features [such as pull-down menus, icons etc.] but is still backwards compatible with the old system via a command line interface. Such features as animation, cross-sections and solid shading where added in 1995 [Nishimura, 1995]; while, during the past year, a more versatile hardcopy option, more derived products and various customised products needed for

Met Éireann

Computer and Lan Configuration at Glasnevin H.Q.

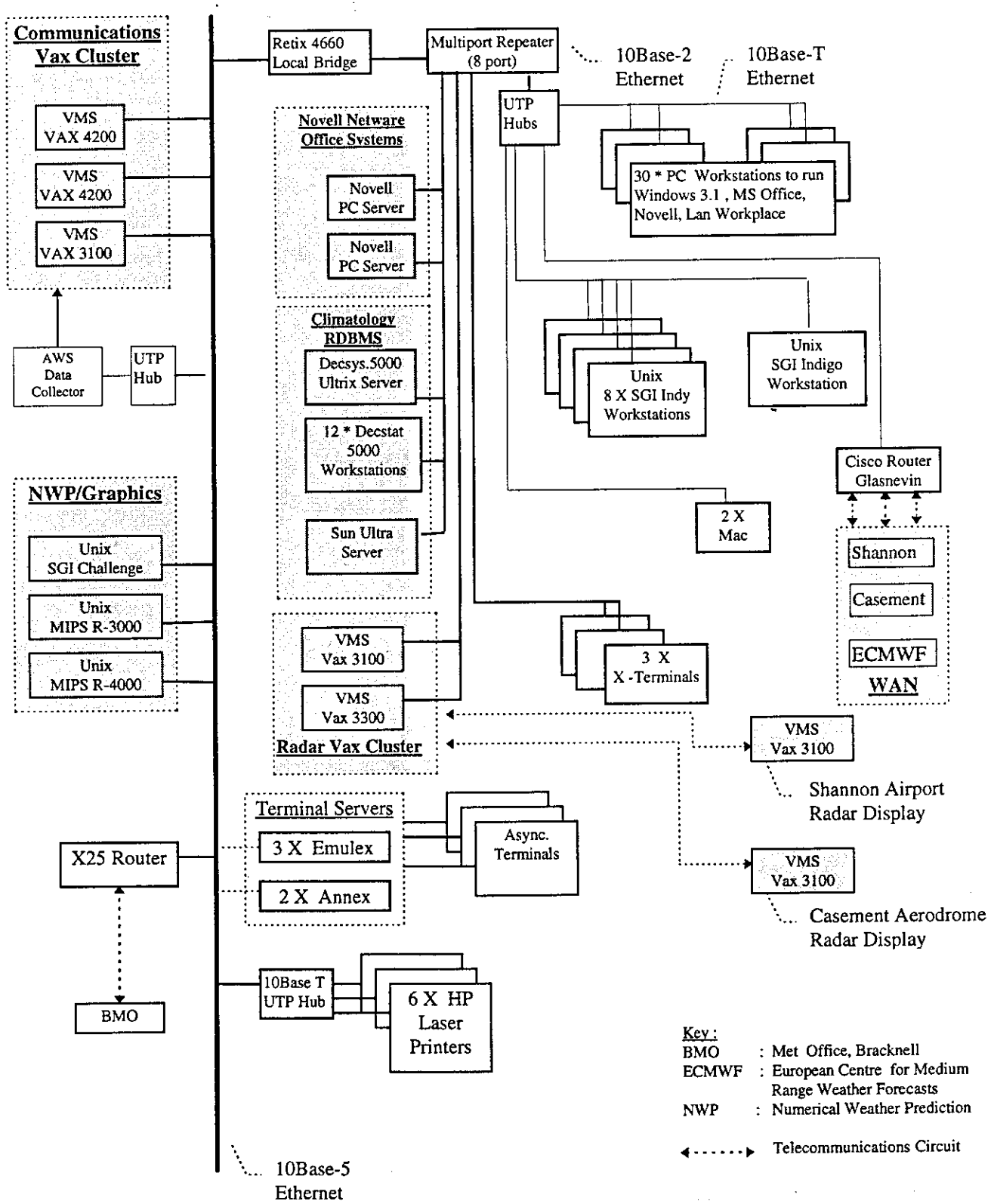


Figure 1 : The hardware configuration at Met Eireann - the Irish Meteorological Service.

FASTEX [i.e. the Fronts and Atlantic Storm Track Experiment, FASTEX 1997a and FASTEX 1997b] were added.

4. USE OF X-WINDOWS / MOTIF

A number of applications have been developed using X/Motif. The following are the main ones used by the Research and Forecasting sections :

plotxw : This package can display a plot-file [produced using the 'batch' plotting system] on an X-terminal. It is in daily operational use in the main forecasting office. Recent enhancements allow the forecaster to draw in fronts using the mouse.

xgrbplt : This program is used for plotting NWP GRIB-code output from the Hirlam model. It is mainly used by the Research Division.

xcharts : This package is an X-windows/Motif replacement for the command-driven CHARTS program. It is used, by the forecasters, to display NWP output and observations.

All three systems are written in a mixture of C and Fortran. They do not use any third party graphics libraries [apart from Motif and Xlib] and were written without the aid of a 4GL design tool. The main routine, which handles the Motif widgets and the various call-backs, is written in C; this then calls various Fortran packages [such as the contouring package]; and finally the Fortran packages call low level C routines [such as XDrawLines and XFillPolygon] to produce the actual output.

5. PLOTXW : DISPLAY PLOT-FILES USING X-WINDOWS

Plots destined for the Hewlett-Packard pen-plotters [or the various laser printers] are stored as random access binary files containing vectors. Each file may contain one or more plots. **plotxw** can display such plot-files on an X-terminal or workstation. The user gives the command:

plotxw plot-file.plt

where 'plot-file.plt' is the name of such a file. If the file contains just one plot then the plot is displayed and the user is presented with a menu, along the top of the chart, with the following options:

File, Bgnd, Zoom, UnZm, Hard, Help

The 'File' button calls up a menu which includes the 'quit' option and various 'save as postscript' options including colour postscript, monochrome postscript, vector postscript and bitmap postscript. The 'Bgnd' button allows the user to display the plot

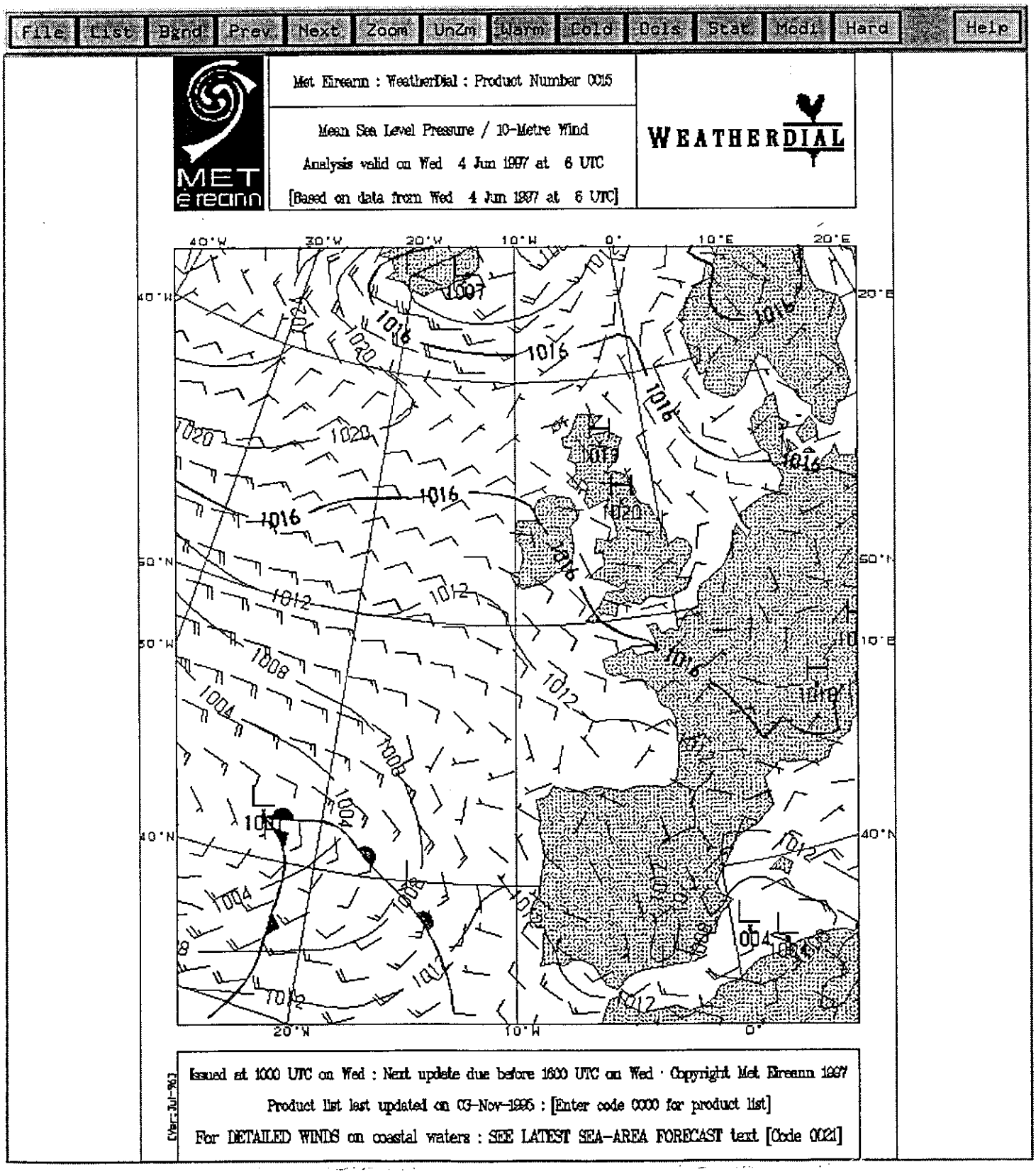


Figure 2 : Use of **plotxw** to display a chart used as input into the premium rate fax system. The fronts were added manually using the mouse.

on a map corresponding to one of the pre-printed backgrounds used with the Hewlett-Packard pen-plotters; the 'Zoom' button allows the user to select a rectangular zoom area by defining its two opposite corners using the mouse; the 'UnZm' button cancels the zoom and displays the whole chart; the 'Hard' button produces a hardcopy [of the area on the screen, which may be a zoom area]; and finally the 'Help' button produces some help text. The user can cascade zooms but the 'UnZm' option will always return to the entire plot [not the previous zoom level].

If the plot-file contains a number of plots then the menu contains additional entries and looks like this:

File, List, Bgnd, Prev, Next, Zoom, UnZm, Hard, Help

The 'List' button allows the user to list details of the plot-file entries [viz. alpha-numeric labels/comments within the plot-file] and then select one from the list; the 'Next' button moves to the next entry in the list; the 'Prev' button moves to the previous entry. If the user selects a zoom it remains in place as the user moves back and forth between plots within the plot-file. The program starts with a blank screen – the user must select the first plot for display.

A large number of plot-files are generated automatically each day and they are used by the forecaster as needed. For example, the file 'ecwave.plt' contains ECMWF wave forecasts. When the forecaster selects the 'List' button he/she sees a list like this :

Block 1 : Analysis valid 12Z Fri 6 Jun 1997 : Combined Height/Period of Sea

Block 2 : Analysis valid 12Z Fri 6 Jun 1997 : Height/Period of Swell

Block 3 : Analysis valid 12Z Fri 6 Jun 1997 : Height/Period of Sea

A more advanced version of **plotxw** contains extra buttons on the main menu line which allow the forecaster to draw in fronts [warm, cold, stationary or an occulsion] on the chart using the mouse. Figure 2 is a screen dump which illustrates this. The plot shown is used for a premium rate fax service. At present, such charts are input manually [by making a hardcopy and inserting it into a fax machine] but it is planned to produce HPGL files [including the fronts entered by the forecaster] and then include these products in the fax system automatically.

At the moment, we are investigating the possibility of allowing the forecaster to drag, modify, delete and insert lines and thus alter the contours and the depths and positions of lows and highs.

6. XGRBPLT : DISPLAY GRIB-FILES

This package is used to display GRIB output files form the Hirlam model. It is mainly

used by the Research Division. A Hirlam GRIB file typically contains all the output data for a given time level i.e. it usually has a number of surface fields [such as msl-pressure, rainfall etc.] and a number of multi-level fields [e.g. temperature, geopotential, wind components etc.]. The user runs the package by giving the command:

xgrbplt fc9705150024pp

where 'fc9705150024pp' is the Hirlam 24-hour forecast [from 15-May-1997] after post-processing onto pressure levels. [The system can also plot files on model eta-levels].

The program starts by reading the GRIB file and determining the grid geometry and the list of products in the file. Then it draws a polar-stereographic map which just covers the grid. The user is then presented with a menu [see figure 3 for an example]:

File, Optn, List, Prev, Next, Zoom, UnZm, Xsec, Hard, Help

The 'File' menu button includes the 'quit' and the various 'save as postscript' options; the 'Optn' button [discussed later] is used to select various options; the 'List' option allows the user to select a field for plotting; the 'Next' and 'Prev' buttons move to the next and previous plot in the list, respectively; the 'Zoom' button is used to specify a zoom using the mouse; the 'UnZm' button cancels the zoom; the 'Xsec' button is used to define a cross-section; the 'Hard' button produces a hardcopy and the 'Help' button produces some help text.

The 'List' button produces a list of products by looking at the contents of the file. The following is an example :

06 100 200 : Geopotential on Isobaric surface
06 100 300 : Geopotential on Isobaric surface
06 100 500 : Geopotential on Isobaric surface
01 103 000 : Pressure on Specified altitude
33 105 010 : Wind on Specified height level
11 105 002 : Temperature on Specified height level
61 105 000 : Total precipitation on Specified height level
62 105 000 : Large scale precipitation on Specified height level
63 105 000 : Convective precipitation on Specified height level

The three numbers at the start of each line are the WMO parameter code, the WMO height code and the height value. Hence, the first entry specifies the 200mb geopotential, the fourth entry is the msl pressure etc. The package combines the u- and v- wind components [i.e. parameters 33 and 34] to produce a plot of WMO wind arrows.

The package allows the user to resize the window. When the window is resized the plot is redrawn i.e. re-contoured and a new background map generated. This is to allow

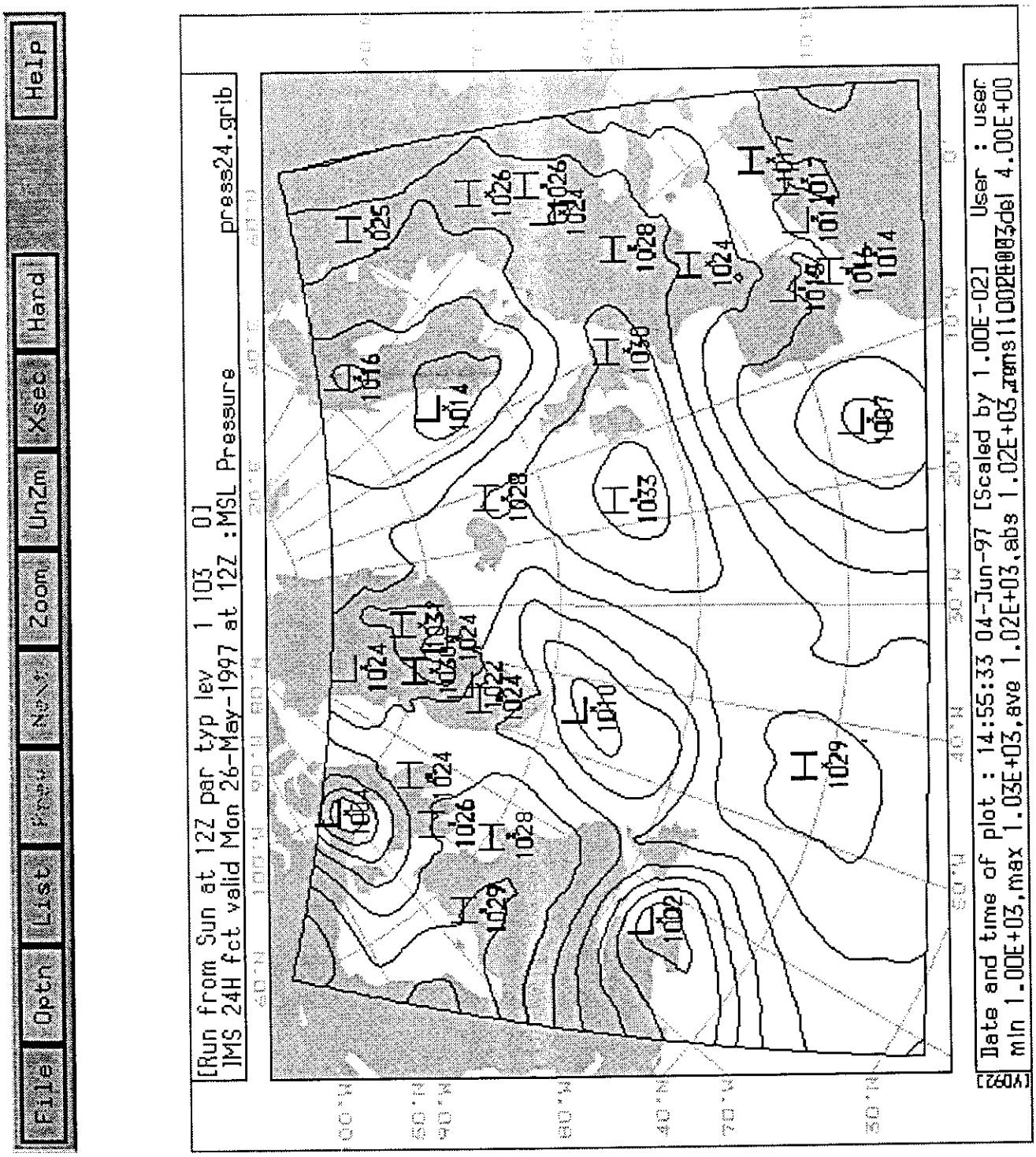


Figure 3 : Typical output of **xgrbplt**. The plot shows output from the Hirlam model.

for changes in resolution due to the resizing: the labels on the plot remain at constant size in terms of pixels.

The zoom option uses a cursor which follows the latitude/longitude lines i.e. the cursor appears as a circle intersected by a straight line on a polar-stereographic map. Basically, the user specifies two points on the chart, and the zoom area is defined by the range of latitude and longitude defined by the points. A plot area is then calculated which includes the area requested by the user; the plot is realligned so that the central meridian of the requested area is vertical. A label is drawn at the top of the plot.

The cross-section button is used to select a line joining two points on the map and then generate a cross-section plot by running a separate process. Figure 4 shows an example.

The user can plot difference charts with **xgrbplt**. The command is similar but two GRIB-files must be specified. They must be on the same area but need not contain the same number of fields or have the fields in the same order. The 'List' button will show just the fields common to both files.

Finally, **xgrbplt** can be used to plot observations if the appropiate file is specified on the command line. The package uses a 'de-clutterring' algorithm to select the observations for display and the number displayed varies with the size of the plot on the screen and the zoom level. Currently, the package uses a special ASCII format for the observation files but it is planned to change this to BUFR format.

A typical plot can consist of a geographical background, a contour plot and a plot of observations. The 'Optn' button allows the user various choices via sub-menus. These include tabulation of data values, control over the contour spacing, various methods of plotting observations and a choice of coastline resolution.

7. XCHARTS : AN X-WINDOWS VERSION OF CHARTS

Until recently, CHARTS [Hamilton, 1984] was the main forecaster interface to NWP output. This is a command driven interactive system which allows the display of charts on a DEC VT-340 terminal. It uses a command language which has been designed to be as easy to use as possible. Commands can be abbreviated; there is an on-line HELP system, a hardcopy option, a script option [viz. the so-called 'obey' files], and ambigious or incorrect commands produce meaningful error messages. The system remembers the parameters entered with previous commands and these become the defaults for subsequent commands – this reduces typing to a minimum.

Using CHARTS the forecaster can access output from the Hirlam model as well

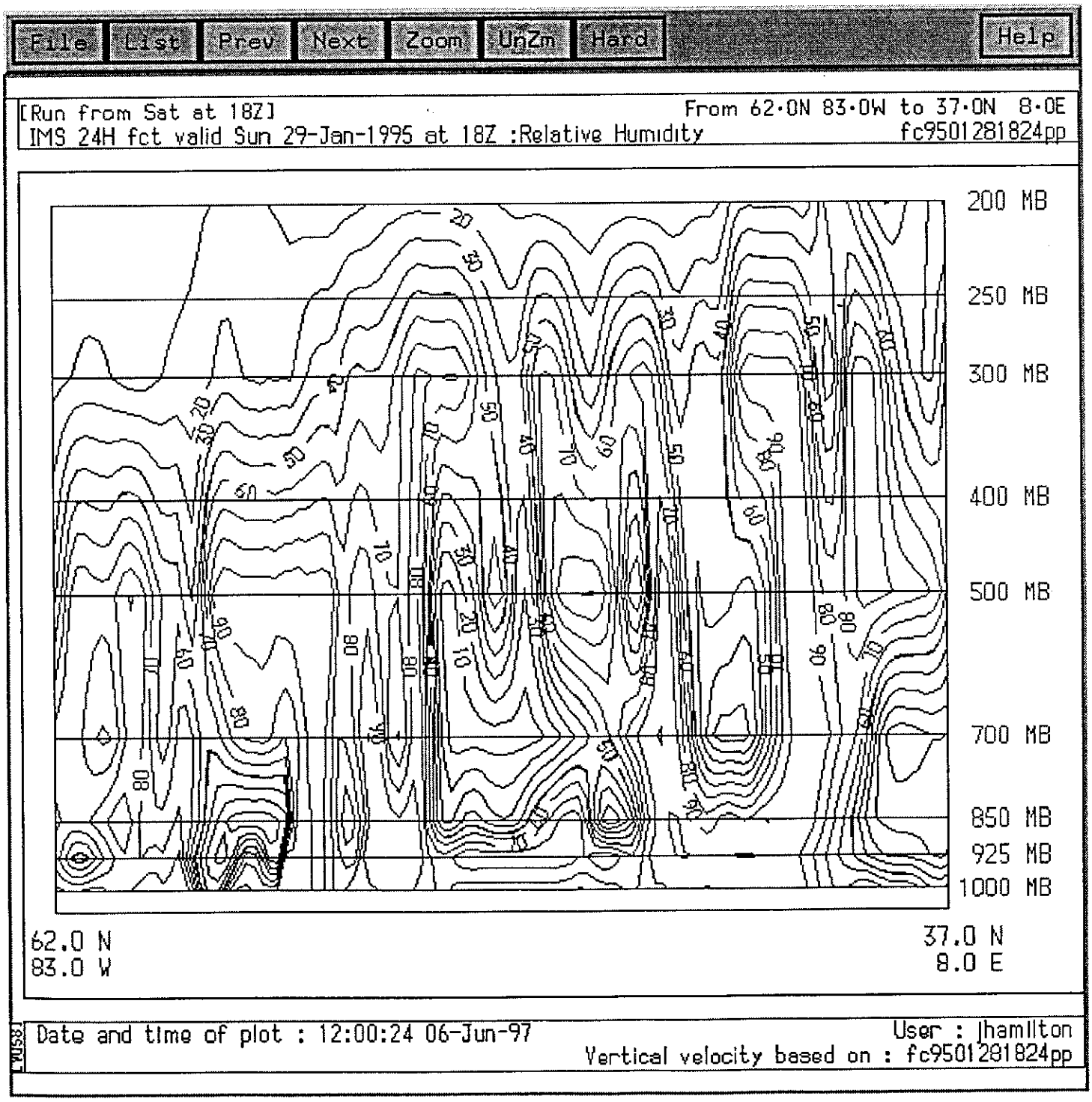


Figure 4 : Typical output of the cross-section option of **xgrbplt**.

as the models of ECMWF, DWD and UKMO. Available output includes plots of wave data. The forecaster can also request plots of upper-air ascents as tephigrams.

The forecasters are very familiar with the old system and so the new system was designed to be as compatible as possible with the old. The new system is called **xcharts**.

The user interface in **xcharts** combines a command line with menu buttons. This allows for continuity between the old and new systems; it also allows the use of the current set of script [i.e. 'obey' files]. Ideally, all features should be available with either the command interface or the menu interface but, in practice, some of the more obscure features are only available through the command line. However, in practice, the users almost always use the menu buttons.

The menu interface contains the following buttons [see figure 5]:

File, Optn, Modl, Parm, Levl, Time, Misc, Prev, Help

and, in addition, icons for zooming, un-zooming, hardcopy, animation, cross-sections, page-layout and the selection of the next and the previous plot. Also, the 'Plot' button is available as a pop-up menu when the user presses the right-hand mouse button in the drawing area. [See Nishimura [1995] for a discussion of the icons]. We will look at these options in turn.

The 'File' button produces a menu with the options 'Reset' [which resets parameters to their default values]; 'Save' [which saves the plot as a postscript file]; 'Quit' [which exits the system] and 'Obey' [which allows the user to select and run an 'obey' file i.e. a script file with a chart definition].

The 'Plot' button [obtained by pressing the right-hand mouse button] produces the main menu of which the following is a [greatly-simplified] version :

HIRLAM	Pressure	Surface	Analysis
ECMWF	Geopotential	1000mb	12hour
UKMO	Temperature	925mb	24hour
DWD	Windarrows	850mb	36hour
...	...	...	...
Plot		OverPlot	

The procedure is for the user to specify a model, parameter, level in the atmosphere and length of forecast. Then, clicking on the 'plot' button will produce a new plot; clicking on the 'overplot' button will superimpose the chart on the previous plot. The system remembers previous values [which are highlighted] and it is unnecessary to specify any value which has not changed. Difference charts and thickness charts are specified by

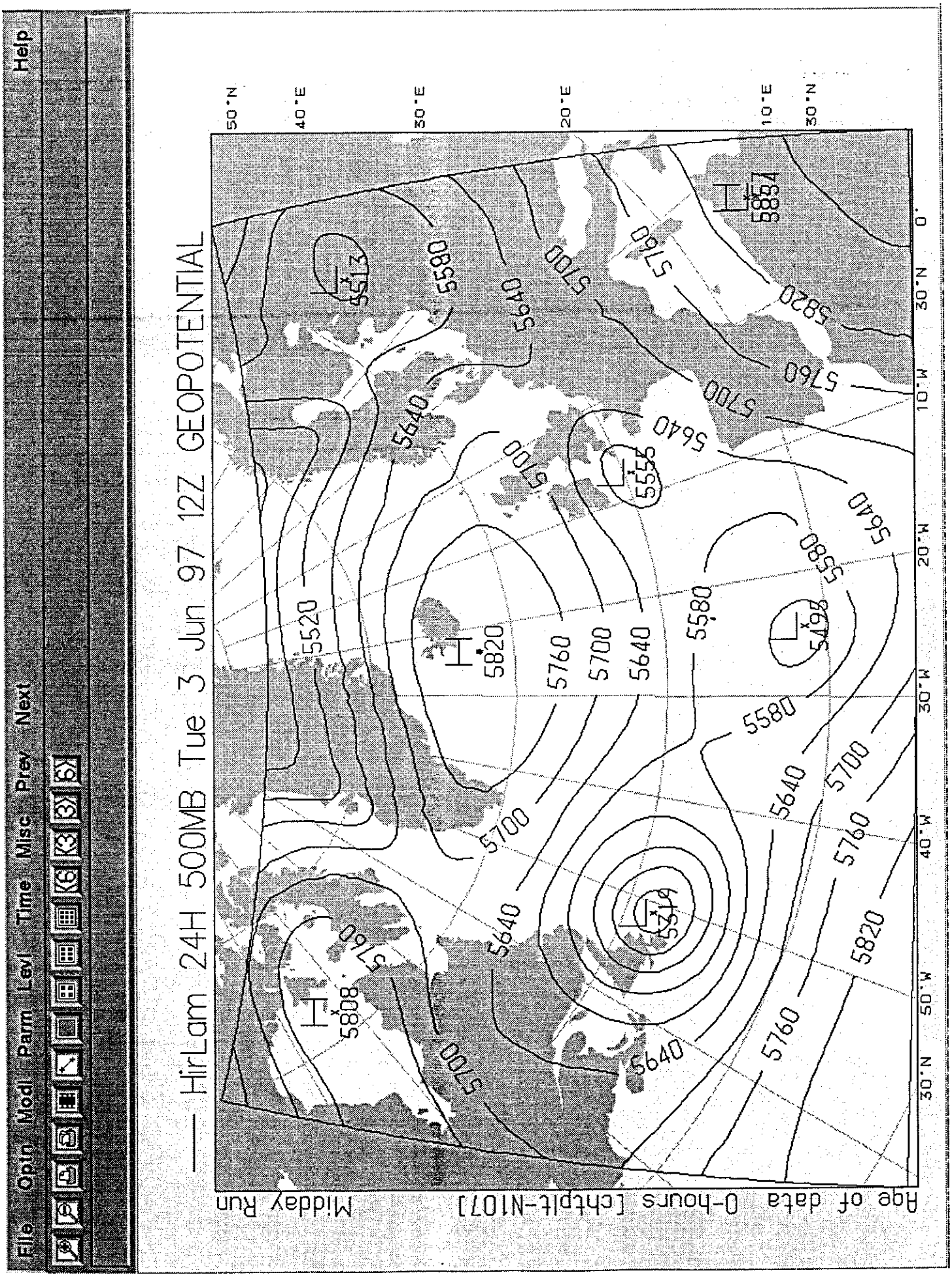


Figure 5 : Output of **xcharts** showing a plot of surface pressure. Note the menu line and icons.

means of sub-menus [not shown].

The 'Optn' menu allows the user to specify various options, such as the colour of the plot, which are of secondary importance.

The 'Modl', 'Parm', 'Levl', 'Time' and 'Misc' buttons are 'short-cut' buttons which are designed to reduce the amount of typing required. Thus, the 'Modl' button is used to change the model [e.g. from Hirlam to ECMWF] and plot immediately. So, for example, if a 24-hour Hirlam forecast of surface pressure is displayed and the user clicks on the 'ECMWF' option in the 'Modl' menu then a similar ECMWF chart will be displayed, without the need to click on anything else.

The 'Prev' and 'Next' buttons are used to retard or advance the time of the plot. Thus, if the plot consists of a number of superimposed charts, these buttons will retard/advance all the charts. The 'Prev' button has the options '-3hours', '-6hours', '-12hours', '-18hours' and '-24hours' with similar options for 'Next'. In addition there are arrow icons corresponding to 'Prev-6', 'Prev-3', 'Next+3' and 'Next+6', respectively.

The 'Zoom' icon implements a similar zoom to that used in **xgrbplt** where the zoom cursor is defined as a latitude/longitude intersection i.e. as a circle of latitude and a straight line of longitude. The new area is defined by the lower-left and upper-right corners in latitude/longitude. All charts are recontoured after the zoom; if observations are being displayed a 'de-clutter' algorithm is applied.

The 'UnZm' icon cancels a zoom [i.e. it displays the entire chart]; the 'Hard' icon produces a hardcopy and the 'Help' button displays a help menu with some simplified help on various options.

The 'Animate' icon allows the user to animate the display. This option was developed by E. Nishimura [1995]. The 'Cross-section' button is used to select two points to define a track and the cross section along the track is then displayed in another window.

The user can divide the screen into sections and plot four, six or nine charts. Figure 6 shows an example.

Finally, the user can display tephigrams by first selecting a plot of the data available and then pointing at the required station. Figure 7 shows the chart used to select a station and Figure 8 shows a tephigram plot.

8. DESIGN CONSIDERATIONS IN XCHARTS

The program is based on the earlier command driven CHARTS program. Consequently, it still allows users to use a command line. In fact, clicking buttons actually generates command strings which are sent to the original CHARTS command interpreter.

Figure 6 : Output of **xcharts** showing the screen divided into 4 sections. If required, more than one product can be displayed in each of the sub-windows.

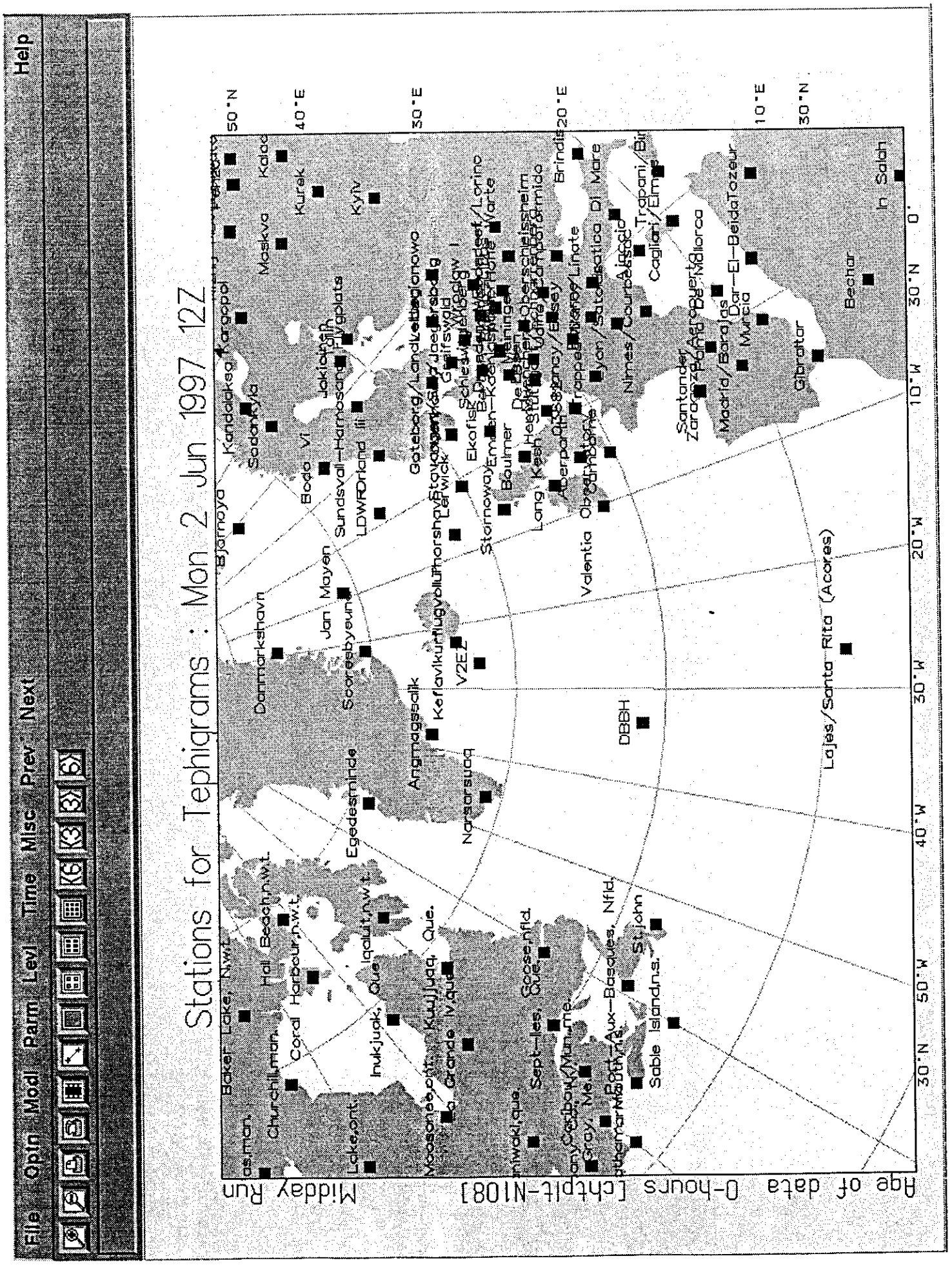


Figure 7 : Output of **xcharts** showing the chart used to select a station whose tephigram is required for plotting.

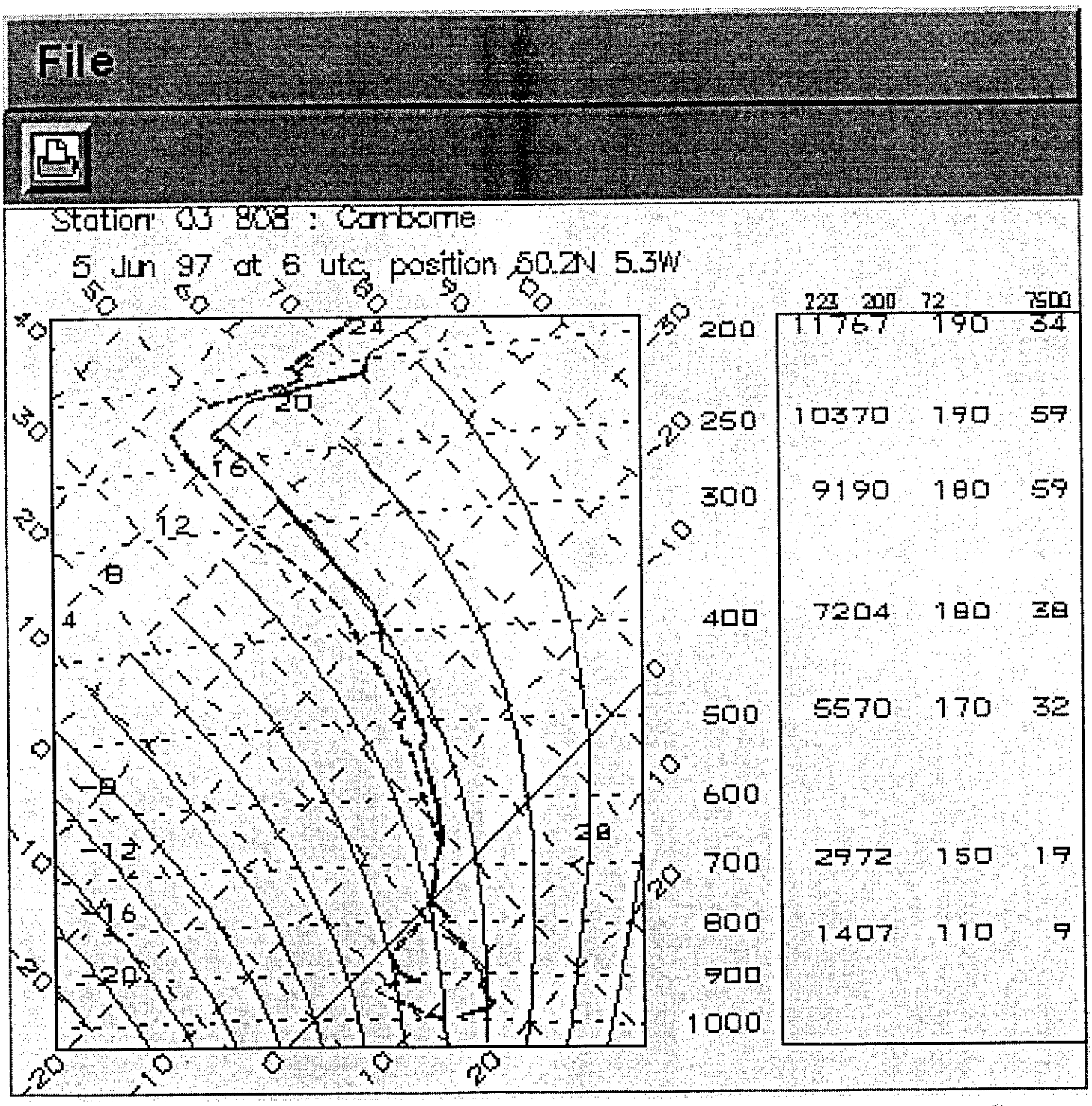


Figure 8 : Output of **xcharts** showing a tephigram plot.

The 'obey' file option has been retained and users can write scripts to display charts. The following file will display a set of Hirlam forecasts [with the screen divided into quarters] :

Underplot Quarter=1 Hirlam surface press 6Hour

Underplot Quarter=2 12Hour

Underplot Quarter=3 18Hour

Underplot Quarter=4 24Hour

Display

The 'Underplot' command stores a chart for later plotting. Thus the first four commands define the 6-hour, 12-hour, 18-hour and 24-hour Hirlam forecasts of surface pressure in the four quarters of the screen. The 'Display' command then displays the plot.

The user can use the main 'Plot' menu [or the command line] to select non-existent products [e.g. Hirlam 3-day forecasts are not available]. In such a case the system prints a warning message.

Versions of **xcharts** has been installed in the general forecast office [viz. CAFO] in Dublin and in the aviation forecast office [viz. CAO] in Shannon Airport. The latter is approx. 200 Km from Dublin.

The raw field data, used by **xcharts** in CAFO, is stored as a set of GRIB fields on a server machine. The data disks are nfs mounted on the workstation. Tests with routers and/or bridges and with 64-kilobit/128-kilobit lines have shown that this approach is too slow for Shannon. So, in this case, as soon as the GRIB products become available [either from a run of Hirlam or from one of the sets of model output we receive over the GTS] they are copied to Shannon where they are stored locally on the workstation. This makes the response time much faster. It also makes the system more resilient to line outages, server breakdowns etc.

9. EXPERIENCE WITH FASTEX

The experimental phase of FASTEX was run from Shannon Airport and a team of forecasters from Met Eireann, in conjunction with other teams from France, Britain, Canada and the USA, were involved with forecasting frontal development, deepening of lows, flight planning etc.

Each team of forecasters had their own graphics system and it was very useful to be able to compare **xcharts** with other systems and to get ideas for enhancements and improvements.

Various modifications were made to **xcharts** including the definition of a background map covering the areas of interest to FASTEX, the production of extra products including plots of vorticity and Cb-tops, enhancement to the 'Save as postscript' options to produce postscript files suitable for display on the Fastex web pages and a better version of the cross-section option.

The Irish forecasters identified the main strength of **xcharts** as its ease of use and access to multiple models. They identified its main limitation as its inability to deal with image data [satellite data and/or radar data]. Hence, we are currently investigating the possibility of including such data within the system and initial results are promising.

9. FUTURE PLANS

We hope to continue the development of **xcharts** and include more derived products such as potential vorticity. We are investigating the feasibility of including satellite data and radar data. **xcharts** currently plots observations using data from a special set of ASCII files – we want to modify it to read BUFR data. [We plan to make similar modifications to **xgrbplt** which also uses the ASCII observation files.]

The command-line version of CHARTS is likely to persist for quite some time since it can be run from an ordinary graphics terminal over a relatively slow line; the X version needs a workstation or X-terminal with at least a 64-kilobit line.

The forecaster can add fronts to charts using a drawing option in **plotxw**; in the future we would like to extend this option to allow him/her to modify contours and/or alter the depths and positions of lows and highs.

REFERENCES

FASTEX [1997a]: see A. Joly et al 'Definition of the Fronts and Atlantic Storm-Track Experiment [FASTEX]' to appear in Bull. Amer. Meteor. Soc. (1997).

FASTEX [1997b]: see the following URL's for information on the FASTEX experiment and sample plots from various graphics systems :
http : *//www.cnrm.meteo.fr* : 8000/*dbfastex/joss*$_c$*atalog/index.html*
http : *//www.cnrm.meteo.fr* : 8000/*cnrm/fastex/*
http : *//www.atd.ucar.edu/dir*$_o$*ff/projects/FASTEX.html*

Hamilton, J.E.M., [1984]: 'The Design of an Interactive Graphics System for the Display of Meteorological Fields', Software Practice and Experience, Vol. 14, No. 6, p. 587-600 (June 1984).

Hamilton, J.E.M., [1995] 'Graphics Workstations at the Irish Meteorological Service', Fifth Workshop on Meteorological Operational Systems, ECMWF, Reading, Nov 1995.

Hamilton, J.E.M., [1996] 'Irish Meteorological Service : Report to EGOWS-7 [1996] Meeting', European Group on Operational Meteorological Workstations [EGOWS], Meteorological Office, Bracknell, June 1996.

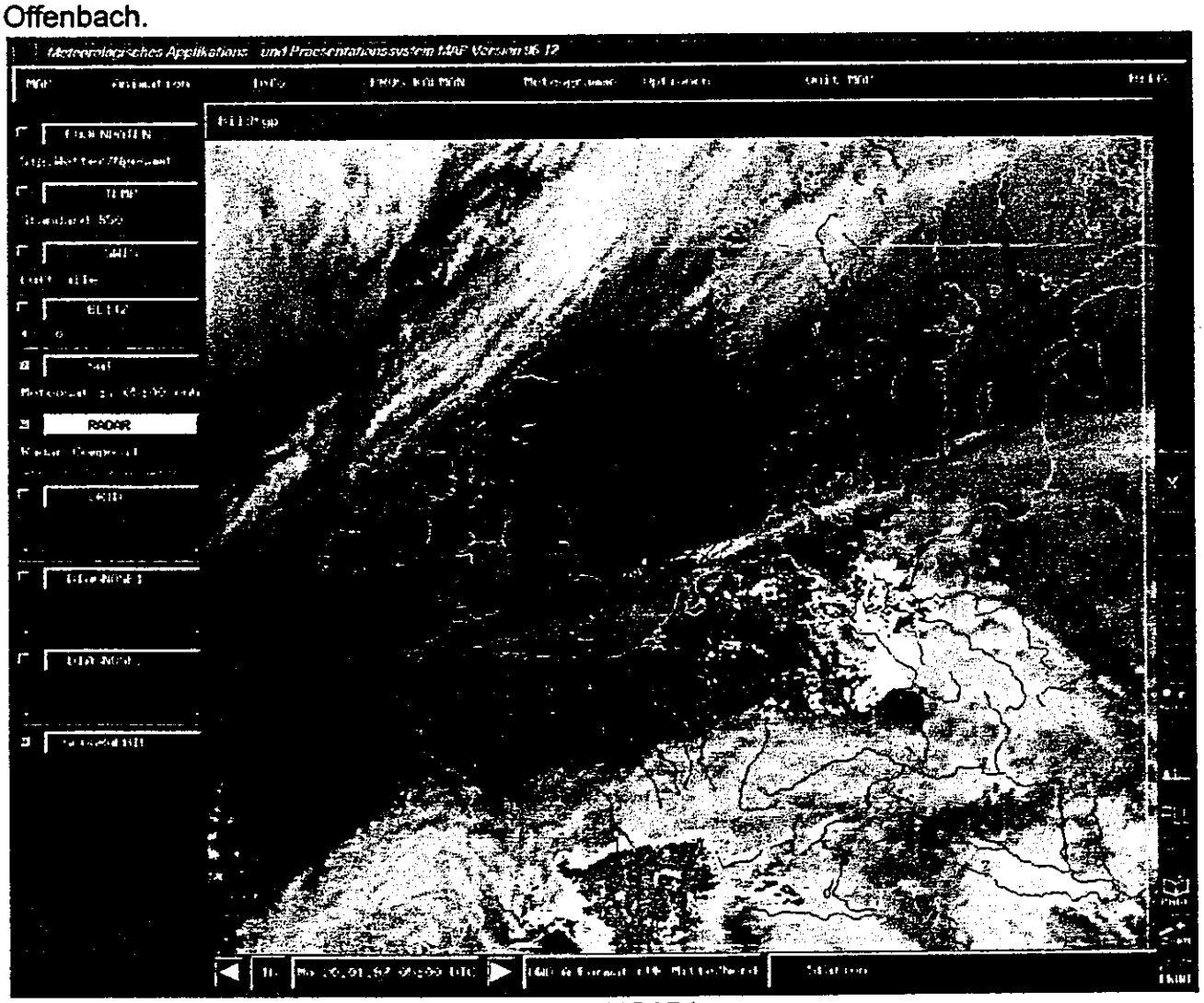
Nishimura, E., [1995] 'Recent Developments in X-Charts', Hirlam Progress Report No. 3, Irish Meteorological Service, Dublin 1995.

MAP
Update 97.4

Deutscher Wetterdienst
Geschäftbereich Vorhersagekunden-Medien
Referat Entwicklungen-Anwendungen Potsdam

Michael Pogoda
Email: mpogoda@dwd.d400.de

Since last year the version 97.4 was developed. With this version the GKS libraries are replaced by our so called „Allgemeine Graphikschnittstelle" (AGS).
This AGS consists of 2 screen renderers (OpenGL and X11), a CGM renderer for (export and printing) and a toolbox. At the moment the toolbox contains routines to import and export TIFF images and a GKS metafile interpreter.
The GKS metafile interpreter allows us to display metafiles produced by mainframes at Offenbach.

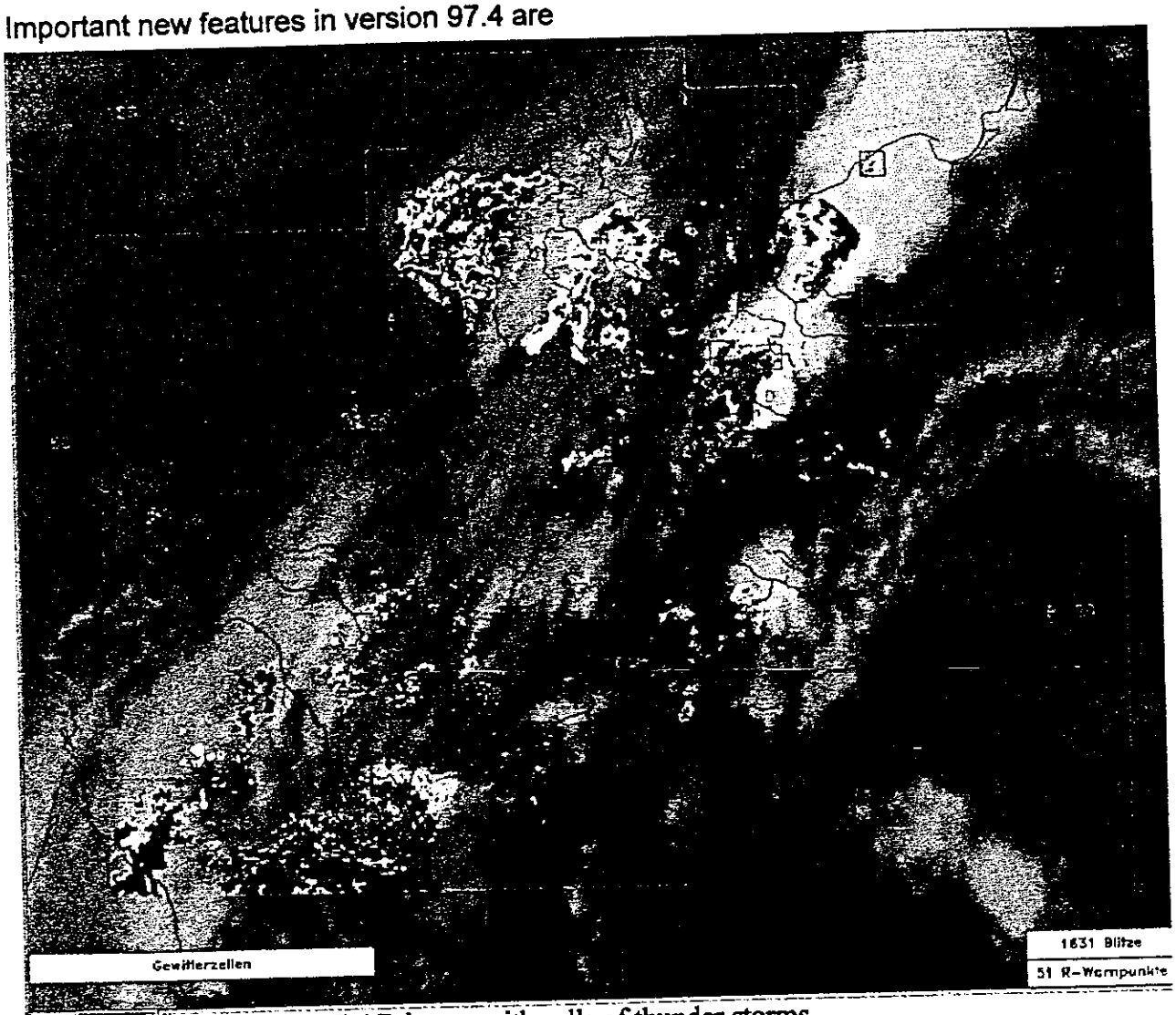


picture 1: geographical background with satellite and RADAR image

The advantages of our AGS are:

- better event handling
- overlay of different images (with transparency)
- faster rendering
- portability

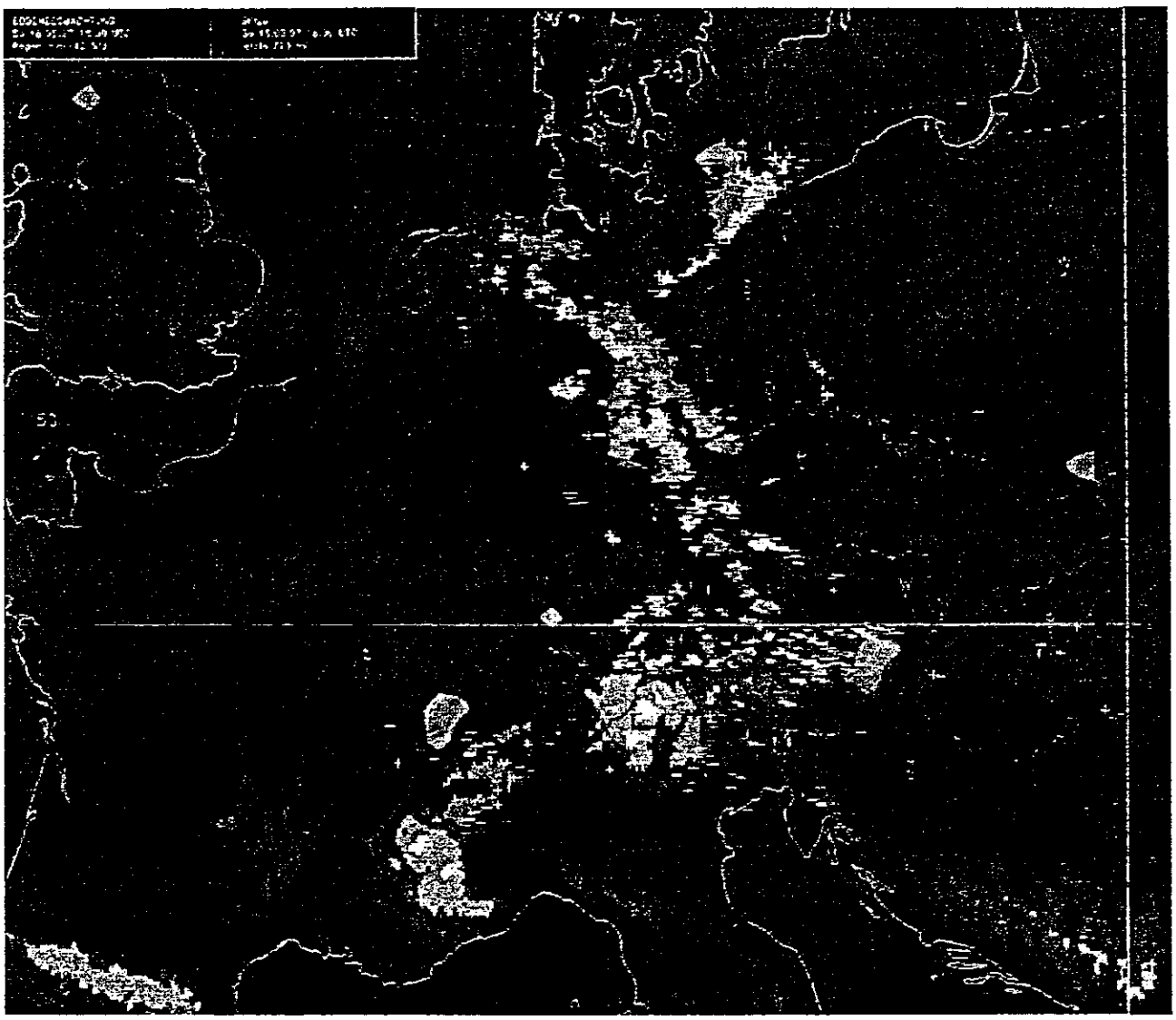
Important new features in version 97.4 are



picture 2: satellite and RADAR image with cells of thunder storms

- nowcasting tools
  - RADAR composit with warning points
  - rubberband for distance and speed mesurement
  - extrapolated satellite images
- NWP products based on GRIB
  - local storage of GRIB
  - local calculation of derived elements
  - realtime decoding of GRIB and calculation of isolines

- isolines and isoareas can be configured by user
- improved algorithm for calculation of isolines based on observations
- geographical background for europe
- overlay of all data (with all image data)
- Web based help system



picture 3: rain over 12 hours, lightning data over 6 hours (age from green to red)

The local MAP „database" consists of 53 different datatypes.

A Linux version of MAP is also available.
This Linux-MAP is a full MAP-Client without animation. At the moment animations are not available because of Xserver problems (usage of different visuals in one session). This problem should be solved with a new release of the Xserver (Accelerated-X 3.1). It will be tested in June.

The reference installation is:

- Intel Pentium 166 MMX

- 64 MB memory
- Matrox Mystique 4MB SGRAM (1280*1024 pixel with 24 bit depth)
- Linux Kernel 2.0.21 (ELF, System V IPC)
- Xi Motif 2.0 runtime
- Xi Accelerated-X 2.1 (Xserver)
- Xi OpenGL

and uses the OpenGL renderer. The X11 renderer can be used also, but is not as fast as the OpenGL renderer.
Xi Motif 2.0 runtime, Xi Accelerated-X 2.1 (Xserver) and Xi OpenGL are commercial products.

What is at least necessary for a Linux-MAP:

- 32 MB memory to avoid swapping (using RGB images)
- graphics adapter with 2MB memory (1024*768 pixel with 16 bit depth)
- Linux Kernel 2.0 (ELF, System V IPC)

Motif could be linked statically, so no comercial products would be needed.
The CPU should be as fast as possible, but MAP runs on Intel 486 too.

VISUAL

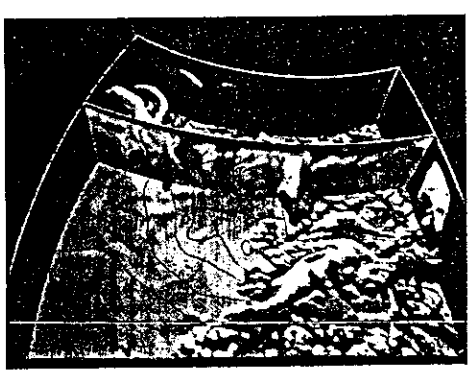
Hans–Joachim Koppert, Deutscher Wetterdienst

- Introduction
- Visualization
- Project Visual
  - Visualization Concept
  - Operational Status
- Outlook

Visualization ◆ Presentation

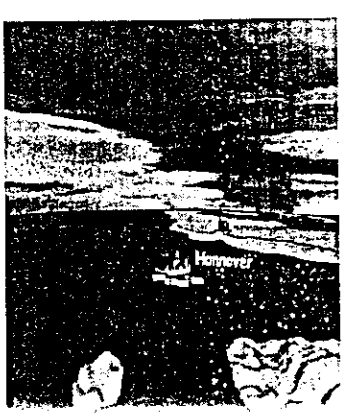
- Visualization:
  - Understanding Data

VISUAL

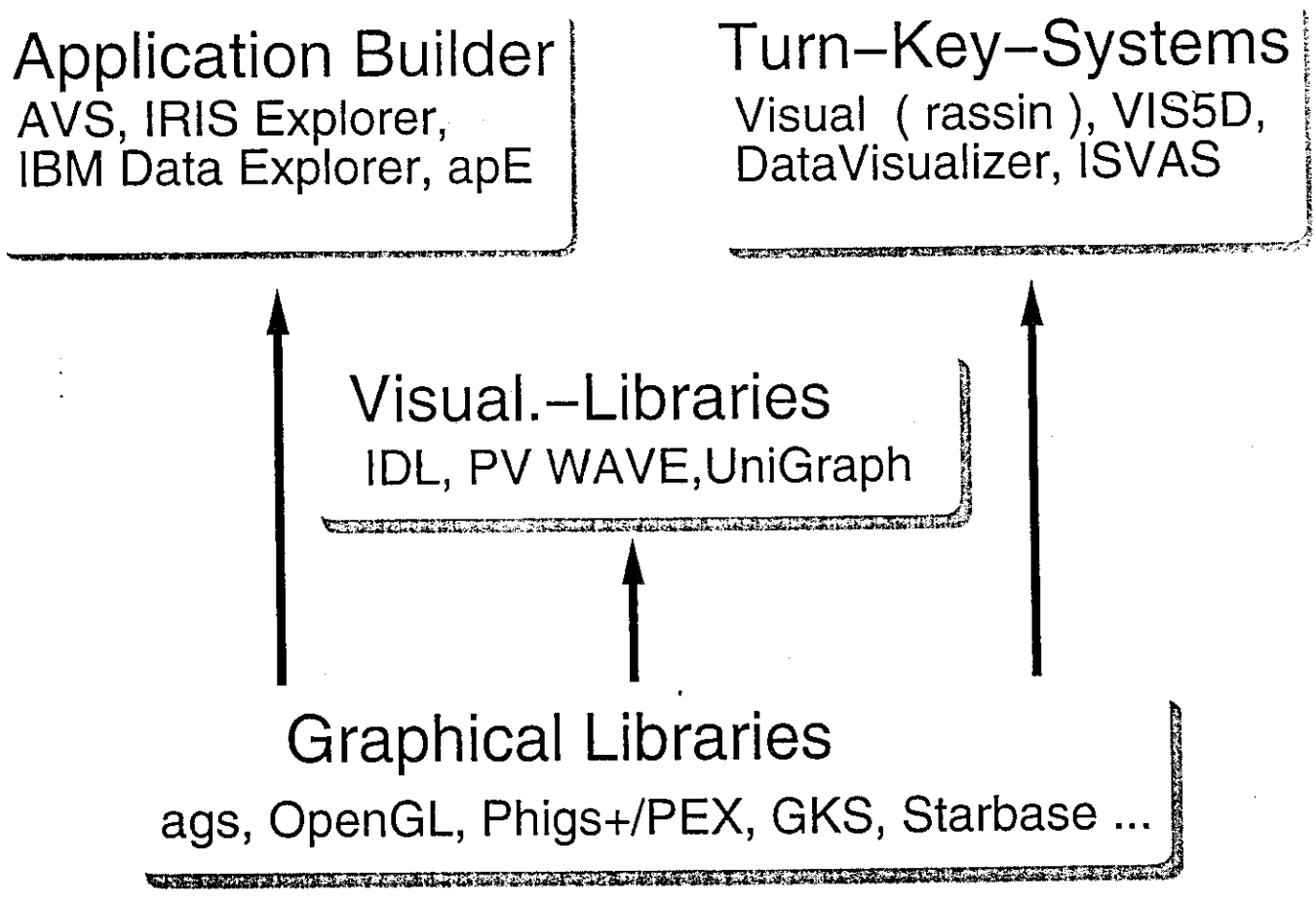


- Presentation:
  - Communicating the Results

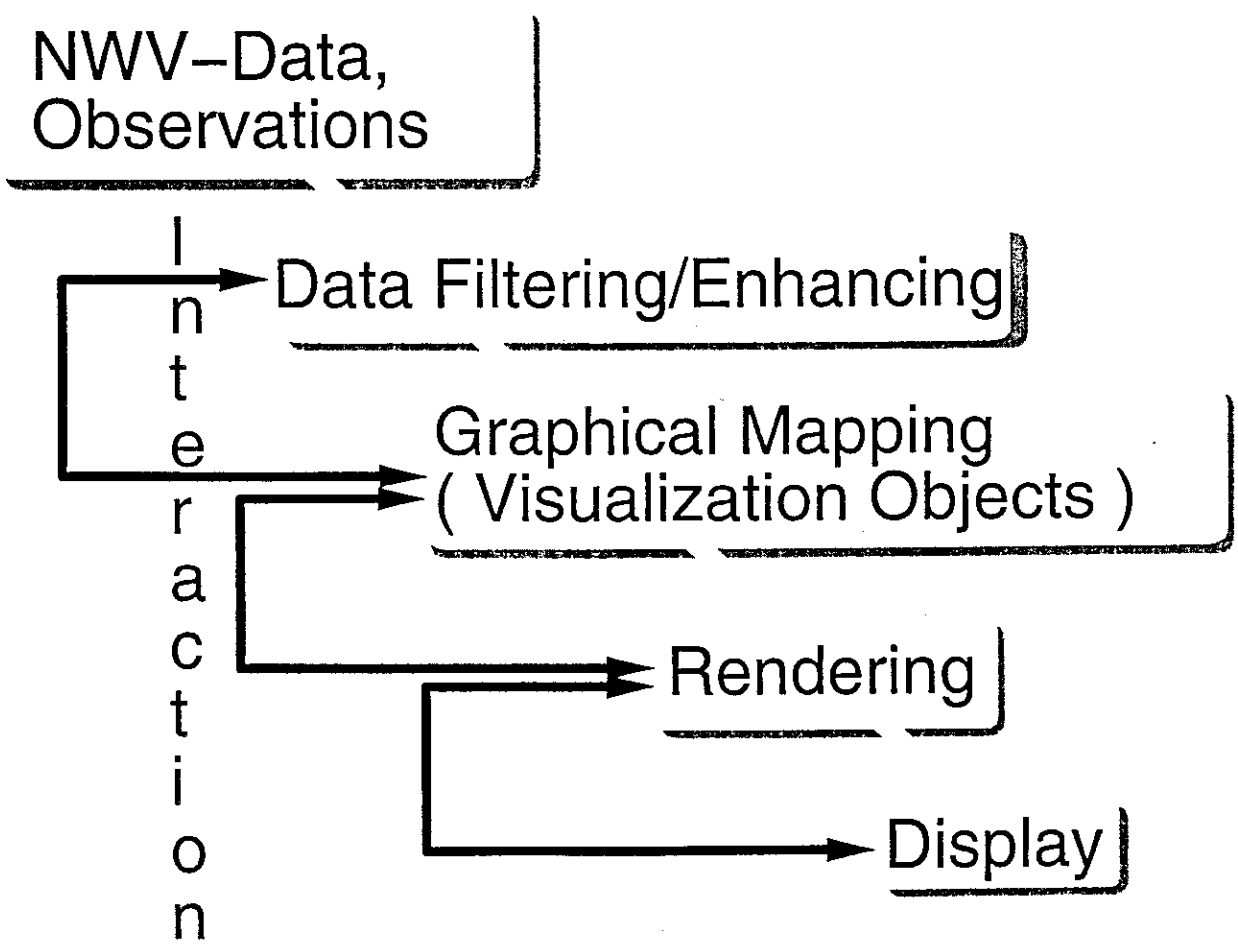
TriVis



URL: http://wxod.igd.fhg.de



The Visualization Process

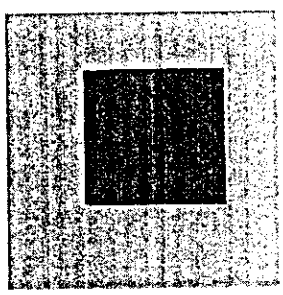


Principals of Visualization

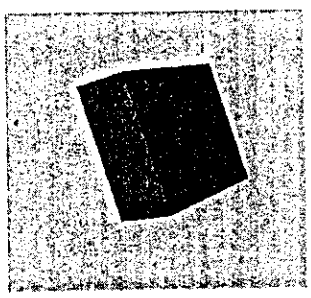
- Visualization Techniques According to the Meteorological Element

- Understanding of Dynamic Developments only through Animation

- Objects in 3D–Space are only Accesible through Interactive Evaluation of the 3D–Data–Set.



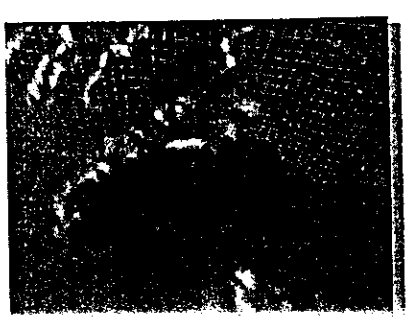
A sheet of paper ???



A cube !!!

VISUAL

- General Concept
  - Calculation and Visualization only on Original Grids:
    - Visualization at the Original Gridpoints
    - Sampling on the Original Grid
  - Tailored User Interface



VISUAL : Status

(Developed together with FhGIGD, Darmstadt)

- Operational Test of 3D–Applications

- Currently 3D–Visualizationtool for DWD–Models:
  - EM3MO

181x129

  - DM3MO

109x109

  - LM
    (non–hydrostatic)

300x300

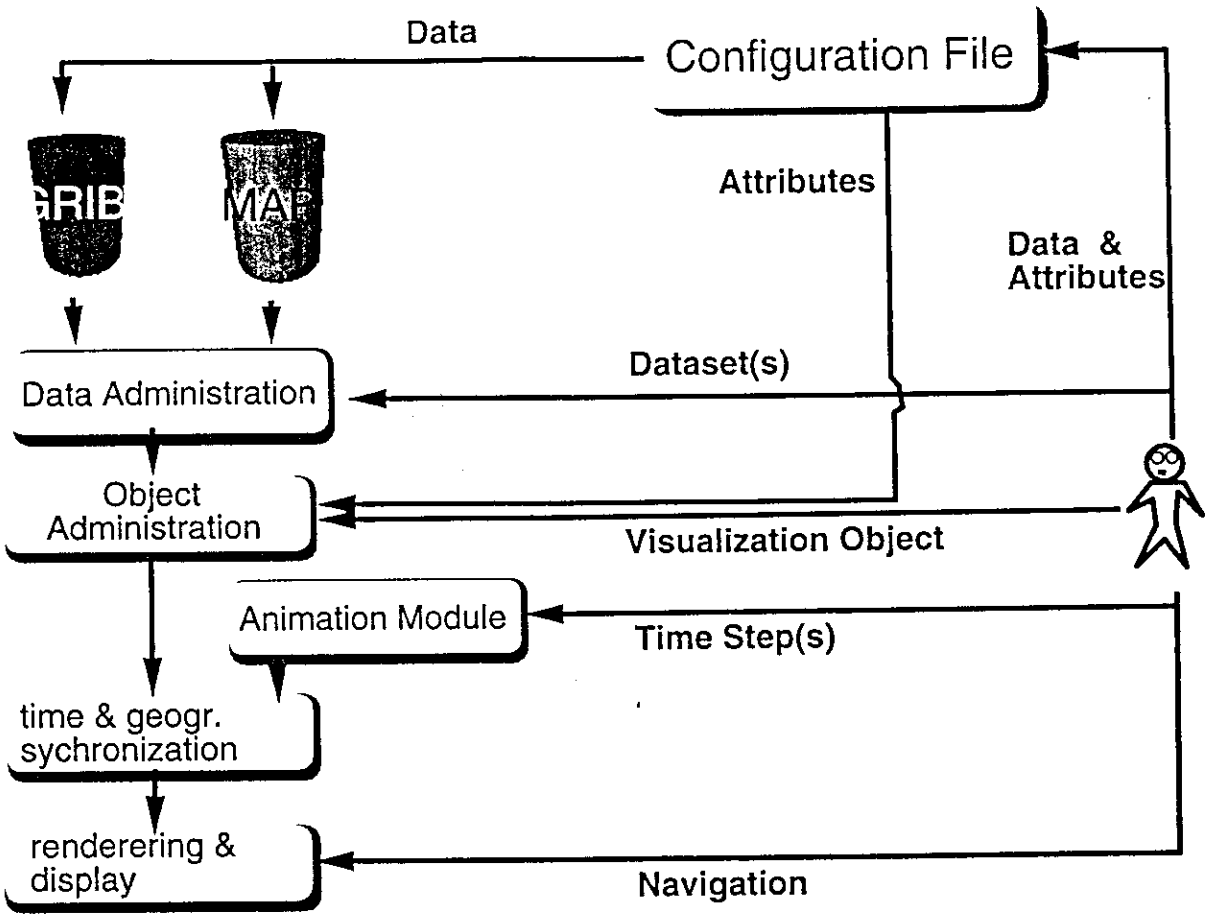
Standards

- Data Import
  - Grib: from Bank/File (local – Client/Server)
  - Observations: MAP–DSP

- GUI: OSF/Motif

- Graphical Libraries:
  - OpenGL
  - VisAVis on top of OpenGL (FhG IGD),
    (Test: SGI–Optimizer, when available)

System Architecture



Data Types

- **Surface Observations**
  (Limited Interaction)
- **2D–Scalars** (lvtyp=1,105) :
  - T2m, N, Tx, Tn, RR .....

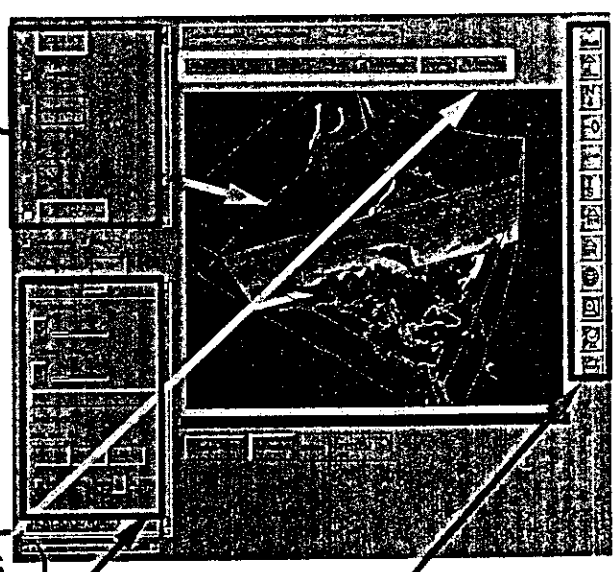
- **3D–Scalars** (lvtyp = 109,110) :
  - Temperature, Liquid Water, Geopotential ..

- **3D–Vectors**
  - Winds

Visualization Techniques

- Vertical– and Horizontal Slices
  (Model–, p– und z–surfaces)
  - Contour Lines (Splines)
  - Color Shading
    – color bands
    – continous shading
  - Vectors
    (limited to the horizontal)
- Isosurfaces
- Text, Icons and Symbols
- 2D–point–probing (uses pixel color)

User Interface



- Rendering Window
  - Virtual Trackball
- Elements
  - data specific widgets
    (slices, geogr. context, Obs.)
  - Attributes
    (graphical attributes, position slices ...)
- Iconlist (view points , mouse behavior ...)

VISUAL

Hans–Joachim Koppert, Deutscher Wetterdienst

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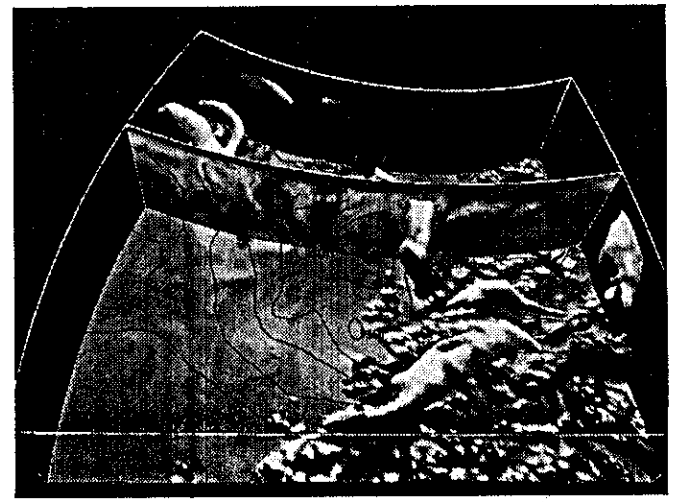
Visualization ◆ Presentation

- **Visualization:**
  - ► **Understanding Data**

VISUAL



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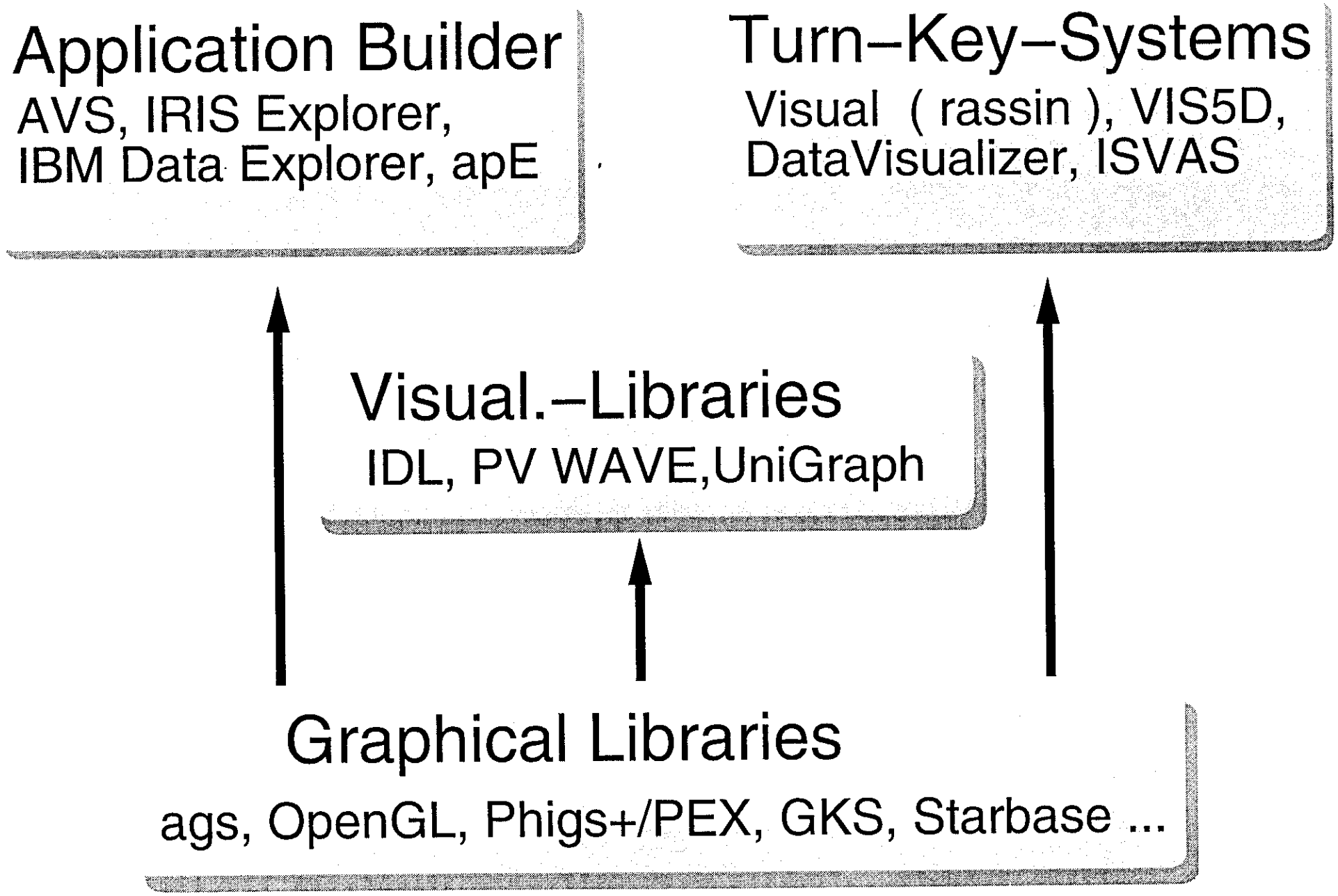
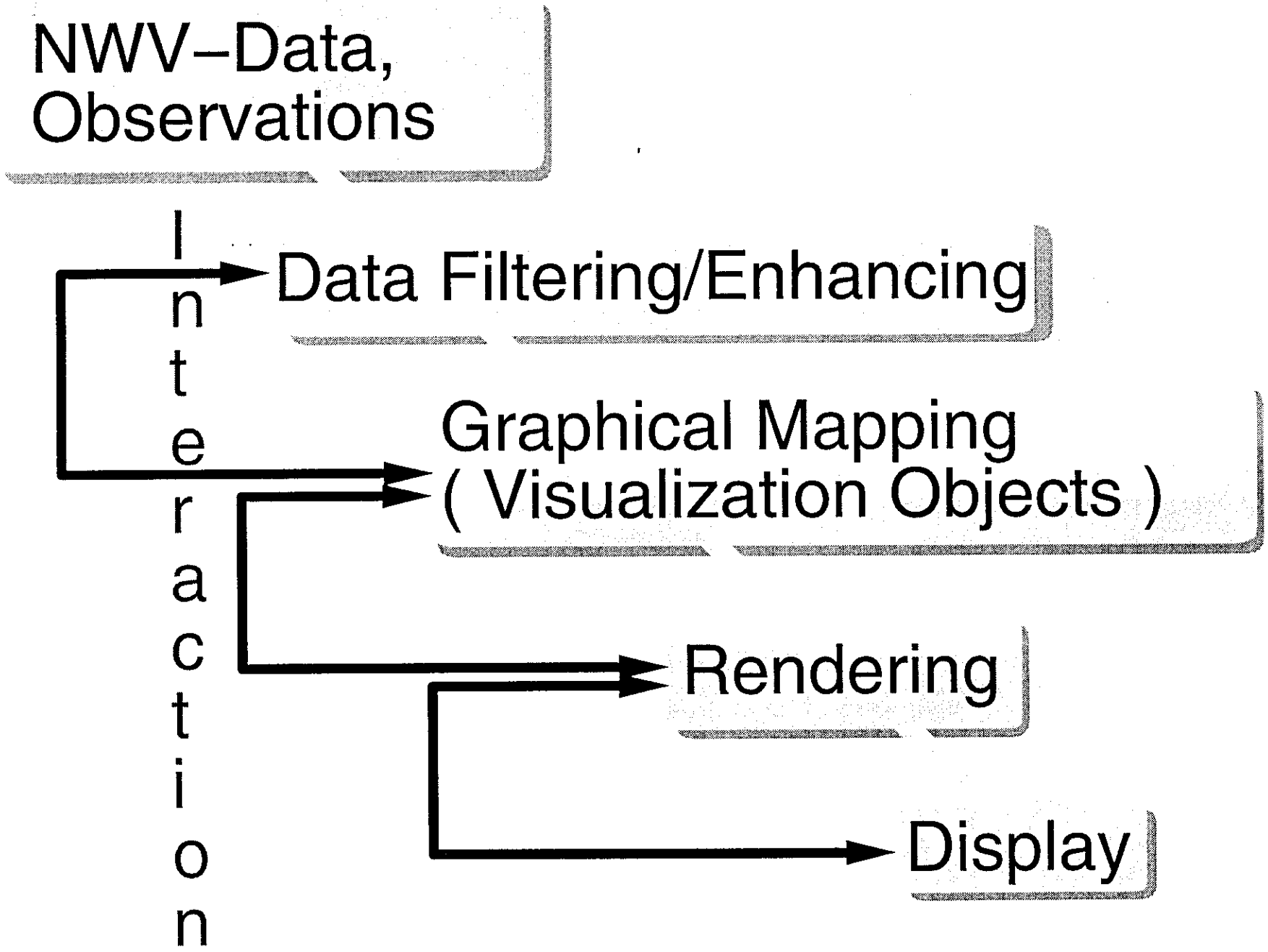
TriVis

URL: http://wxod.igd.fhg.de


Application Builder
AVS, IRIS Explorer,
IBM Data Explorer, apE
Turn–Key–Systems
Visual (rassin), VIS5D,
DataVisualizer, ISVAS
Visual.–Libraries
IDL, PV WAVE,UniGraph
Graphical Libraries
ags, OpenGL, Phigs+/PEX, GKS, Starbase ...

The Visualization Process



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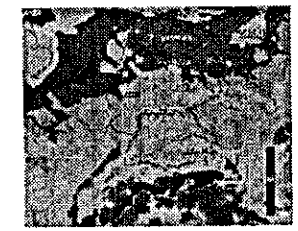

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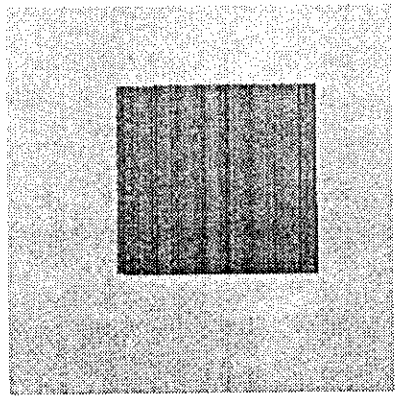
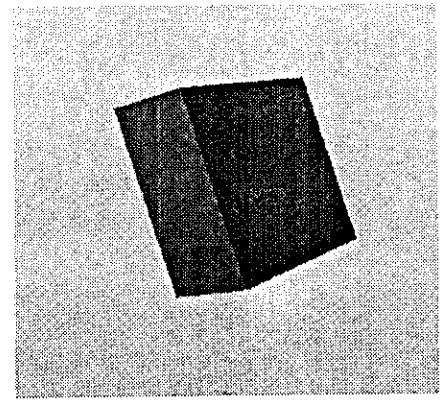


A sheet of paper ???



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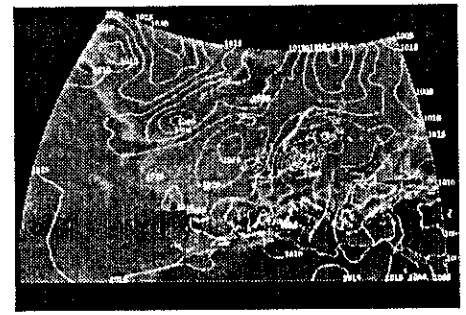
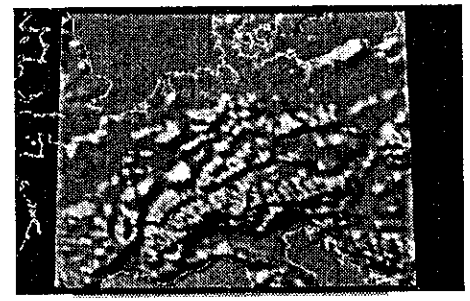


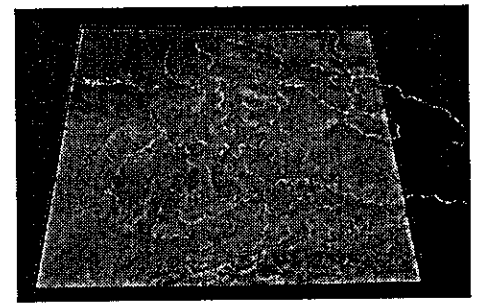
181x129

  - DM3MO



109x109

  - LM
    (non–hydrostatic)



300x300

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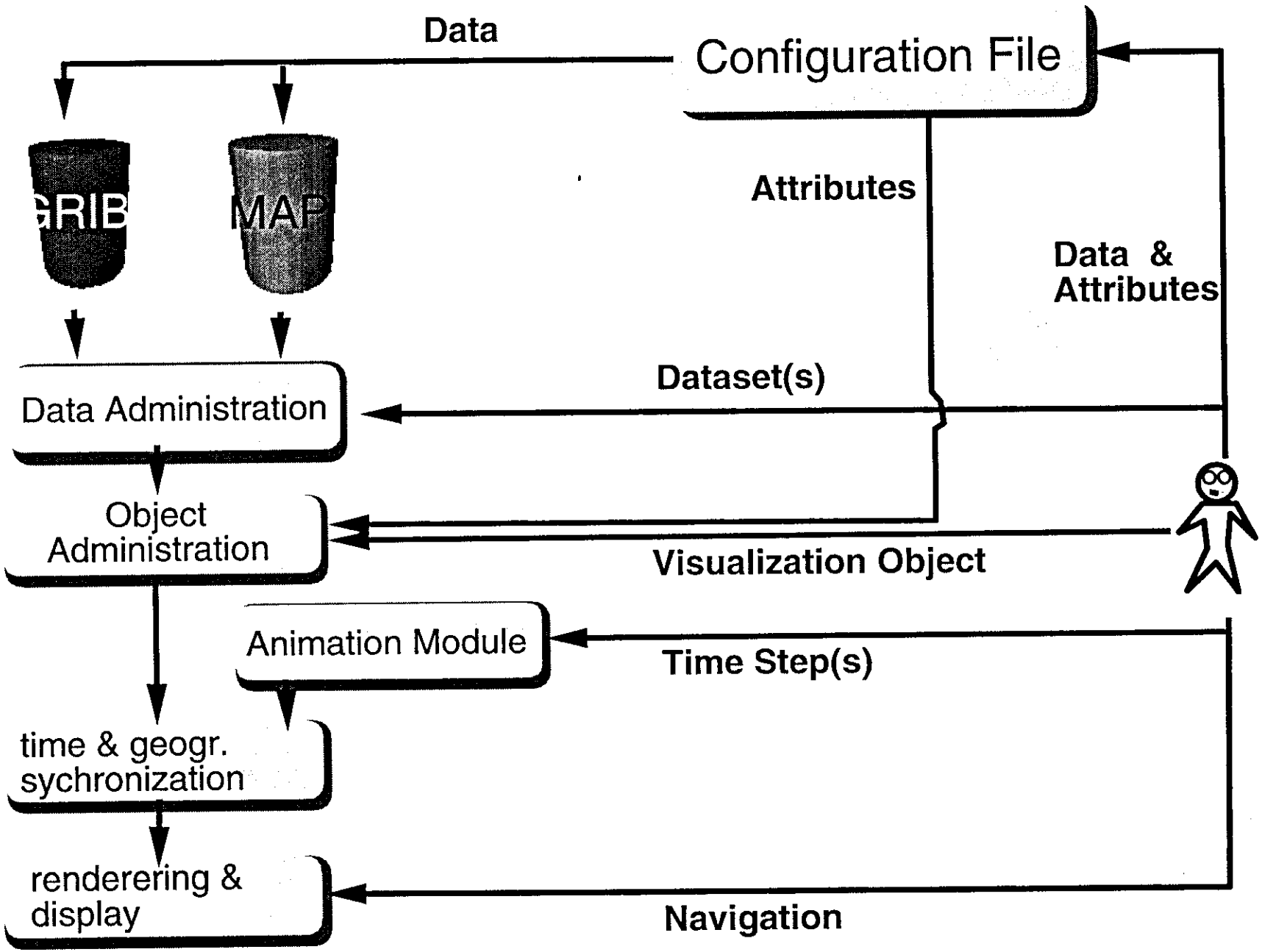

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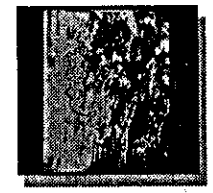
- 2D–Scalars (Ivtyp=1,105) :
  - T2m, N, Tx, Tn, RR .....



- 3D–Scalars (Ivtyp = 109,110) :
  - Temperature, Liquid Water, Geopotential ..

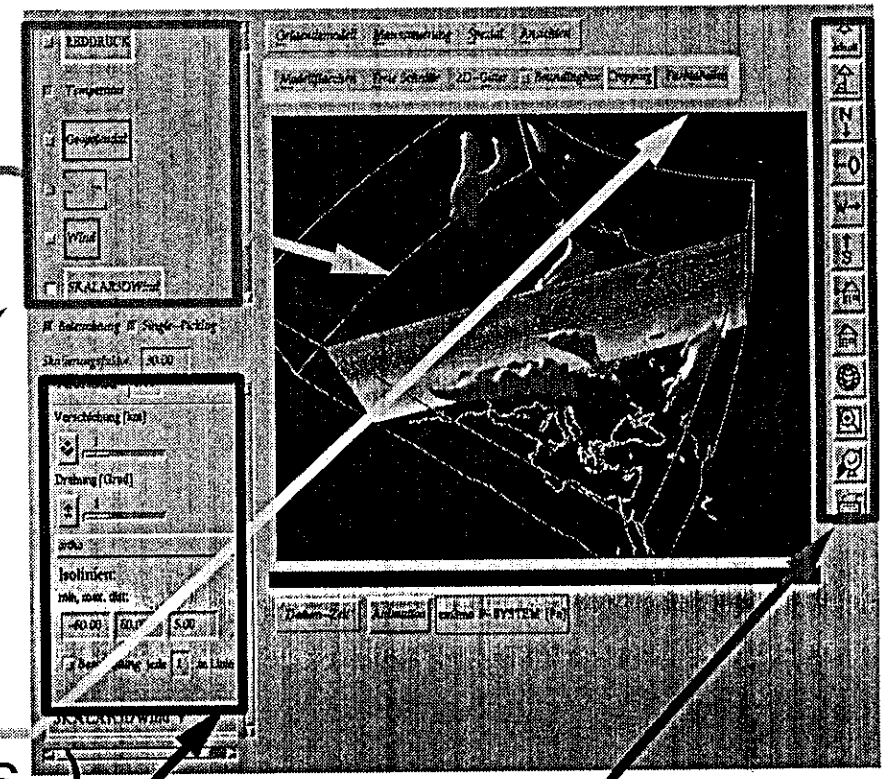
- 3D–Vectors
  - Winds

Visualization Techniques

- Vertical– and Horizontal Slices
  (Model–, p– und z–surfaces)
  - Contour Lines (Splines)
  - Color Shading
    - color bands
    - continous shading
  - Vectors
    (limited to the horizontal)
- Isosurfaces
- Text, Icons and Symbols
- 2D–point–probing (uses pixel color)

User Interface

- Rendering Window
  - Virtual Trackball
- Elements
  - data specific widgets
    (slices, geogr. context, Obs.)
  - Attributes
    (graphical attributes, position slices ...)
- Iconlist (view points , mouse behavior...)



The Metview application at ECMWF

Jens Daabeck

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EGOWS 1997

Overview

- The Metview concept
- ECMWF use
  - Operational
  - Research
- ECMWF Member States use
  - ECMWF server
  - Installed locally
- Metview 1.7
- Plans
- Concluding remarks

Metview

- Interactive meteorological application on UNIX workstations and servers
- Metview Macro language
- Based on ECMWF standards for data access (MARS) and graphics (MAGICS)
- Co-operative project between ECMWF and INPE/CPTEC, Brazil; assisted by Météo-France

The Metview Concept

- Accessing the data
  - from the 24 TB MARS archive
    Meteorological Archival and Retrieval System
  - GRIB and BUFR files
- Optional
  - Defining operations to be carried out on the data
  - Creating a visual definition
  - Specifying a geographical area
- Visualise the data

ECMWF Use

- Operational Plot Suite
- Daily meteorological operations summary
- Investigations of specific weather events
- Monitoring of research experiments and development suite
- Macros for EPS classification and display
  - *Ensemble Prediction System*

Plot Suite

- Requirements
  - Over night batch processing and prints
- Metview Macros
- SMS controlled shell scripts on UNIX servers
  Supervisor Monitor Scheduler
- Colour/monochrome A3/A4 PostScript (pages/day)
  - Printed (150)
  - Transmitted as graphical dissemination products (90)
  - External web pages (16)
    - http://www.ecmwf.int

Metview Macro Language

- Manipulates and displays meteorological data within the Metview system environment
- Can be developed/run interactively
- Called from a script

```
metview -b mymacro
```

- Re-use meteorological algorithms implemented in FORTRAN
  - FORTRAN routines can be called from Metview macros

Member States Use

- Running shell scripts on the ECMWF Member States UNIX server
- Running Metview locally
  - Interactively
  - Batch
- Data access
  - Data stored locally: Forecasts, dissemination data from ECMWF
  - ECMWF MARS

Metview
Data Access in the Member States

- GRIB and BUFR files
- *Important:* Access mechanism to locally stored data sets
  - Prototype included with software
- ECMWF MARS access
  - Proxy server/client software

Metview 1.7

- New features
- New installation procedure
- Supported platforms
- Documentation

New Features
Metview 1.5 & 1.6

- Support for new features in Magics 5.3
- Page Layout facility
- New applications
  - Potential Temperature Family (*Pott, Eqpott, Seqpott*)
  - Velocity Potential or Stream Function (*Velpot, Streamfn*)
  - Rotational Wind or Divergent Wind (*Rotwind, Divwind*)
  - Budget
  - Spectra (*Spec Graph, Spec Contour*)
- Support for 24 bit graphics hardware
- Mini-examine on BUFR files

New Features
Magics 5.3

- Better legend facilities
- New interpolation techniques (e.g. spectral to grid point)
  - *Emoslib*
- Use of external files to define GRIB table 2
- Contour shading using a new marker method

New Features
Metview 1.7

- Support for new features in Magics 5.4
- Portability enhancements
  - New installation procedure
- BUFR tool to print the content of observations
- ...

New Features
Magics 5.4

- Complete rewrite of *ordinary* observation plotting (not feedback) to make it more portable
- Plotting of 4DVAR Feedback data
- Profiler data
- SSM/I feedback data (in test)
- Checking of the ECMWF quality control confidence values
- ...

Metview 1.7
New Installation Procedure

- To enhance portability
- Installs Metview, Magics and Emoslib
  - But not S-GKS
- Makefiles made smaller and simpler
  - Common make items in included files
  - Site dependencies in included files
    - prompted interactively
    - old values used as defaults if prompting is rerun
  - System dependencies in included files
    - file to include defined by
      - operating system name
      - operating system level
- From prompting to total compilation in one go
- Customising after compilation
  - Printers
  - Remove extra icons/applications
  - Activate/modify local data access
- Final version installed into another directory

Metview 1.7
New Installation Procedure
Required Information

- Name of your site
- WMO number for your Centre
- Development directory
- Development version title bar id
- Production directory
- Metview script
- Production version title bar id
- GKS directory (GKS_HME)
- GKS library directory
- Base part of your GKS library names
- GKS prefix mnemonic
- Xpm library directory
- MARS access type
- Metview compile flag
- Metview define
- Metview make environment specifier

Each question is preceded by an explanation of what the value is used for

Platforms Running Metview

- SGI running IRIX 5.3 & IRIX 6.2 (with *old* C++ compiler)
- HP running HP-UX 10.01
- DEC Alpha running OSF1 3.1 and 4.0
- SUN SparcStation running Solaris 2.5.1
- IBM RS6000 running AIX 3.2.5
  - Developed at INPE/CPTEC, Brazil

S-GKS 3.2.3 (24 bit support for satellite images)

Metview 1.7
Documentation

- Metview 1.7
  - Chapter 1 Metview Basics (updated)
  - Chapter 2 Metview User Interface
  - Chapter 3 Visualisation in Metview (new)
  - Chapter 4 Metview Macro Language
- Magics 5.4
  - ONE document containing ALL additions since green manual set
- Planned
  - Update of Chapter 4 Metview Macro Language
  - Chapter 5 Metview Modules
  - Magics
    - S-GKS dependent document
    - Site dependent document
  - Web pages

Plans

- New visualisation module **PlotMod**
  - Same interactive layout control as in batch
  - Better support for plots not being map projections
  - Cater for both two and three dimensional output e.g. support for VIS-5D
- Migration to **OpenGL**
  - Available on all main UNIX platforms
  - Expected to increase the efficiency of Metview/Magics
  - More flexibility to the software developers
  - Problems areas
    - High quality printing
    - Batch processing
- **Macro libraries**
- Data coverage plots applications

Summary

- Operational usage at ECMWF
- Data manipulation and visualisation tool for research
- ECMWF Member States use
- Metview 1.7
- Metview now being used in many different ways at ECMWF and in the Member States

What is required to run Metview

- Data in GRIB or BUFR format
- Unix workstation with X-Window & Motif
  - SGI, HP, DEC, SUN
- Licences
  - Magics (ECMWF)
  - Conicon contouring package (University of Bath via ECMWF)
  - Emoslib (ECMWF)
- Xelion S-GKS graphics package (commercial)

What is required to install Metview

- Metview distribution file (version 1.7)
- 300+ MB free disk space
  - 100 MB absolute minimum on SGI
- Standard Unix and X11 tools
  - plus C++ compiler
  - plus Fortran compiler
  - plus Xpm library (public domain)
- To request a copy of Metview
  - Write to the ECMWF **Data Services**
    - e.g. send email to **data.services@ecmwf.int**
- Metview enquiries
  - Send email to **metview@ecmwf.int**

Recent Developments of HNMS Operational Workstation Project

J. Bassiakos, J. Alexiou and E. Mouhassiri
HAFGS/HNMS
Hellenicon, Athens
Greece

1. INTRODUCTION

This paper summarises the progress that has been achieved from the Hellenic National Meteorological Service (HNMS) on the DEDALOUS Operational Meteorological Workstation Project. It will describe the software and hardware specifications, the features and the data that are used by DEDALOUS system and the near future plans for the improvement of the system's performance and functionality's.

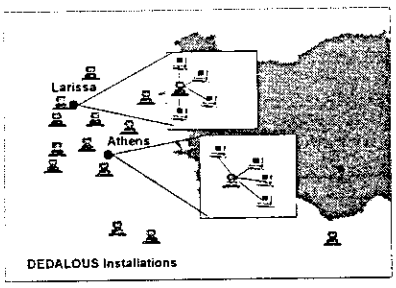
2. PROJECT ORGANISATION

The DEDALOUS project was initiated in 1993 as a response to the need to modernise the previous meteorological support system which was based mainly on teletype and FAX devices . The aim of the project is to replace all manually produced work with a system that will introduce an environment from where the forecaster can use all the available meteorological data. The responsibility of the project lies on the Met. Support Team of HNMS. The team consists of seven people among which 3 of them work at HNMS HQ and 4 at Larissa Met. Centre. The area of work of the team is in developing DEDALOUS software, the specification and implementation of new programs and the upgrading or tuning of the existing software. Also we are responsible for the installation of the system at to new sites, including the communications aspects of the system. Finally there is another Operation Team which is responsible for the daily operation of the system.

2. CURRENT INSTALLATION STATUS.

DEDALOUS ver. 1 runs on UNIX workstations and enables users at all levels of operational forecasting to access and visualise all available meteorological data. The data is initially collected at HNMS and is distributed at Larissa Regional Met. Centre which is from then on responsible to distribute all the raw data to the other end users. Up to this point the system has been installed and is operational at the Athens National Met. and Sea Forecasting Centre, the two Regional Met. Centres at Larissa and Thessaloniki and 11 Weather Offices of the major Greek military airports. Furthermore a low end display system has been developed under WINDOWS NT platforms for the use of aeronautical support. This system has been installed at

2 Weather Offices of the Hellenicon East and West Terminals. Finally to the local systems various customers are connected for the retrieval of the desired data.



3. COMMUNICATIONS

The distribution of the raw data or products to the local workstations is done by the Message Distribution System (MSS) for the GTS data, and the system itself for the GRIB and image data. The protocol used is IP and PPP and the line speeds are in the other of 64 kbits to 28.800 bps depending of the capabilities of Greek Telecom.

4. HARDWARE REQUIREMENTS

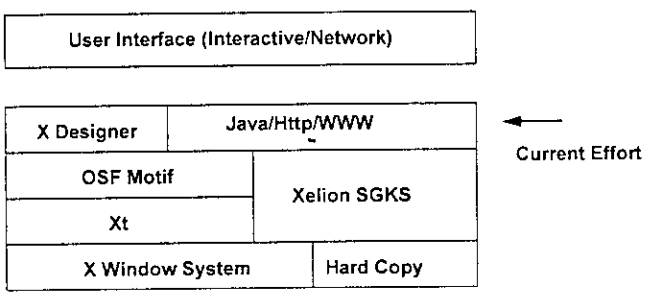
DEDALOUS software runs both on SGI and SUN platforms with 64 MB RAM and 2 GB disk space. Currently DEDALOUS main system at HNMS runs on Indigo R10000 and Indy R5000. The outstations hardware consists of Indy R4400 or R4800 and ULTRA Spark 140. The low end system runs on PC PENTIUM 166 MHz with 16 MB RAM and 1 GB disk space.

5. SYSTEM ARCHITECTURE & FUNCTIONALITY'S

5.1 System Software and Tools.

The system is designed to process and handle TEXT, GRID, GRIB, BUFER and image data. The software of DEDALOUS has been developed by the use of the following tools :

- ANSI C and C++.
- X-WINDOWS, OSF Motif, TCL and TK
- X-Designer interface generator s/w.
- SGKS.
- MAGICS
- MCIDAS



5.2 Software Design.

The software is consisting from four (4) main modules :

a. Data Archive & Decode

b. Meteorological Library

c. User Interface

d. Data dissemination/ acquisition

The Data Archive & Decode module is responsible to collect-store and decode various meteorological sources :

a. Raw PDUS (Meteosat) Data (Vis, IR, WV)

b. Raw HRPT (NOAA) Data & TOVS

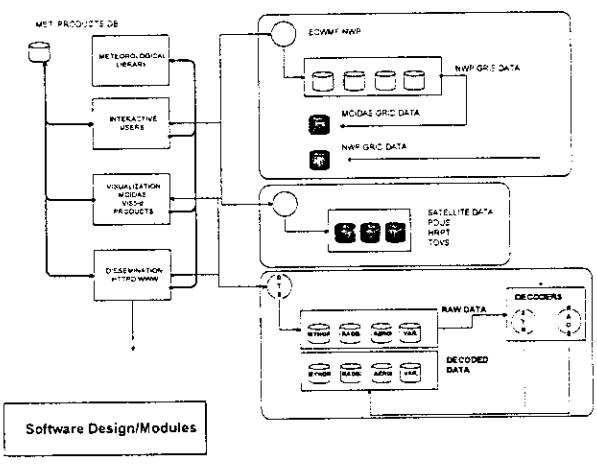
c. Numerical Weather Prediction Data from the ECMWF in GRIB Format.

d. Numerical Weather Prediction from Bracknell, Offenbach, Washington in GRID Format.

e. Numerical Weather Prediction Data from HNMS.

f. GTS & Aeronautical Data

All the data are collecting automatically from the various subsystems which are responsible to interface external sources of information.



Software Design/Modules

From the time been the data are organised in a custom made Data-Base system which is Index-Sequential oriented, next year we are planning to install a commercial RDBMS system because the current organisation of data have reached it's limits

5.3 User Interface.

The user interface consists of three parts :

a. MCIDAS software for the display of image data.

b. The GUI for the display of real time data.

c. The GUI for the display of forecast data.

The basic idea for the development of the software was that the DEDALOUS GUI should be aimed mostly to fulfil the operational work that is done from the forecasters at any level of work. Under this concept and taking into account the personnel limitations it was decided to break down the project into two parts. One minor project to improve the MCIDAS interface and to develop the decoding software needed for the conversion of the data to MCIDAS Format. The second and most time consuming sub-project was to understand up to that point all the operational needs of the forecaster and to develop the GUI in a way that it would not be far away from their expectations.

The improvements on MCIDAS GUI where concerning on mostly to decide the macros that where going to by included a TCL GUI environment that was to make the usage of the package more friendly to the forecaster. The real problem was to develop the decoding software for the MCIDAS format conversion of ASCII, GRIB and Image data, because the manuals of the package explained very little of the SCEMA format that was needed to be produced for the decoders.

The next step of the project was to start with the development of DEDALOUS ver.1 software for the visualisation of the real time GTS data. By the middle of last year a first approach to the problem was

introduced at all end users. This part of the GUI can handle all the GTS data in both ASCII and BUFR format and includes modules that covered most of the manual work that was done at Weather Offices. The same order of work was done to develop the interface part of DEDALOUS for the visualisation of forecast data. The users by the end of the year returned to the Met. Support Team with their comments on design problems and many new requests for the inclusion of new features to the system GUI. At this point the team solved most of the operational problems and ver.2 of the system has been installed. Finally for the research users METVIEW software has been installed on SGI R10000 workstations.

5.3 Production Level

DEDALOUS interface covers most of the forecasters needs for the manipulation of all available real time and forecast data. It also gives the ability to produce various products both for the operational use of the forecaster and the needs of HNMS customers.

5.4 On-line Sub Projects.

The team is working on a sub-projects that will introduce new features as : observation plotting and visualisation of satellite data with MAGICS and visualisation of METAR. Also work is been done on the optimization of the software for the tuning of the performance of the system.

6. FUTURE PLANES

The major projects that are in progress are the inclusion of Nowcasting Techniques, and a RDMS at each workstation. Finally by the end of July 1997 the system will be installed at Cyprus Met Service.

7. CONCLUSIONS

HNMS the last four years has put a lot of effort into the development of DEDALOUS. We think that the work that has been done taking into account the available personnel has covered most of the operational needs of the forecasters. With the development of DEDALOUS ver.2 are aiming to include more forecasting tools in to the systems abilities and to optimise the software so that it can use the hardware resources in a more effective manner.

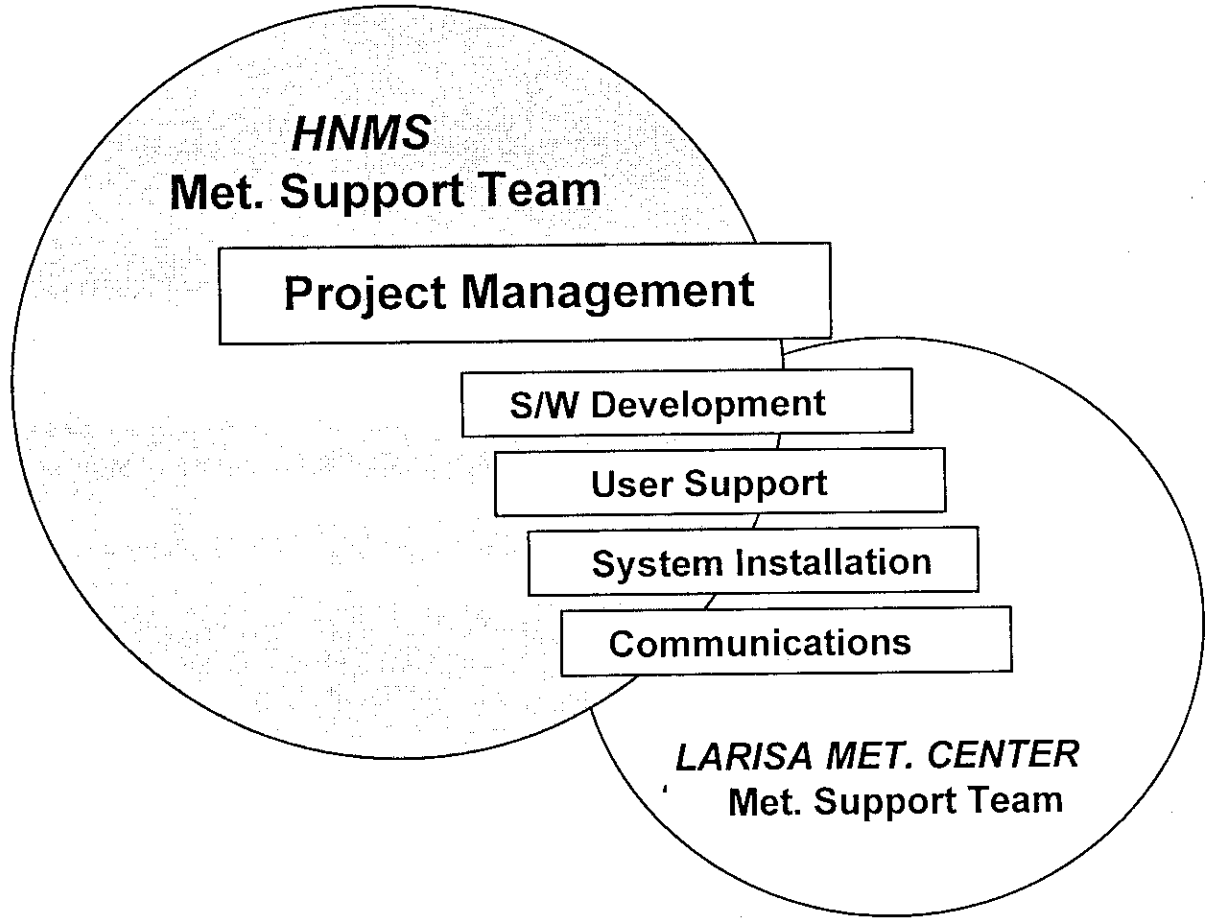
DEDALOUS

Operational Workstation System

DEDALOUS Operational Workstation Project

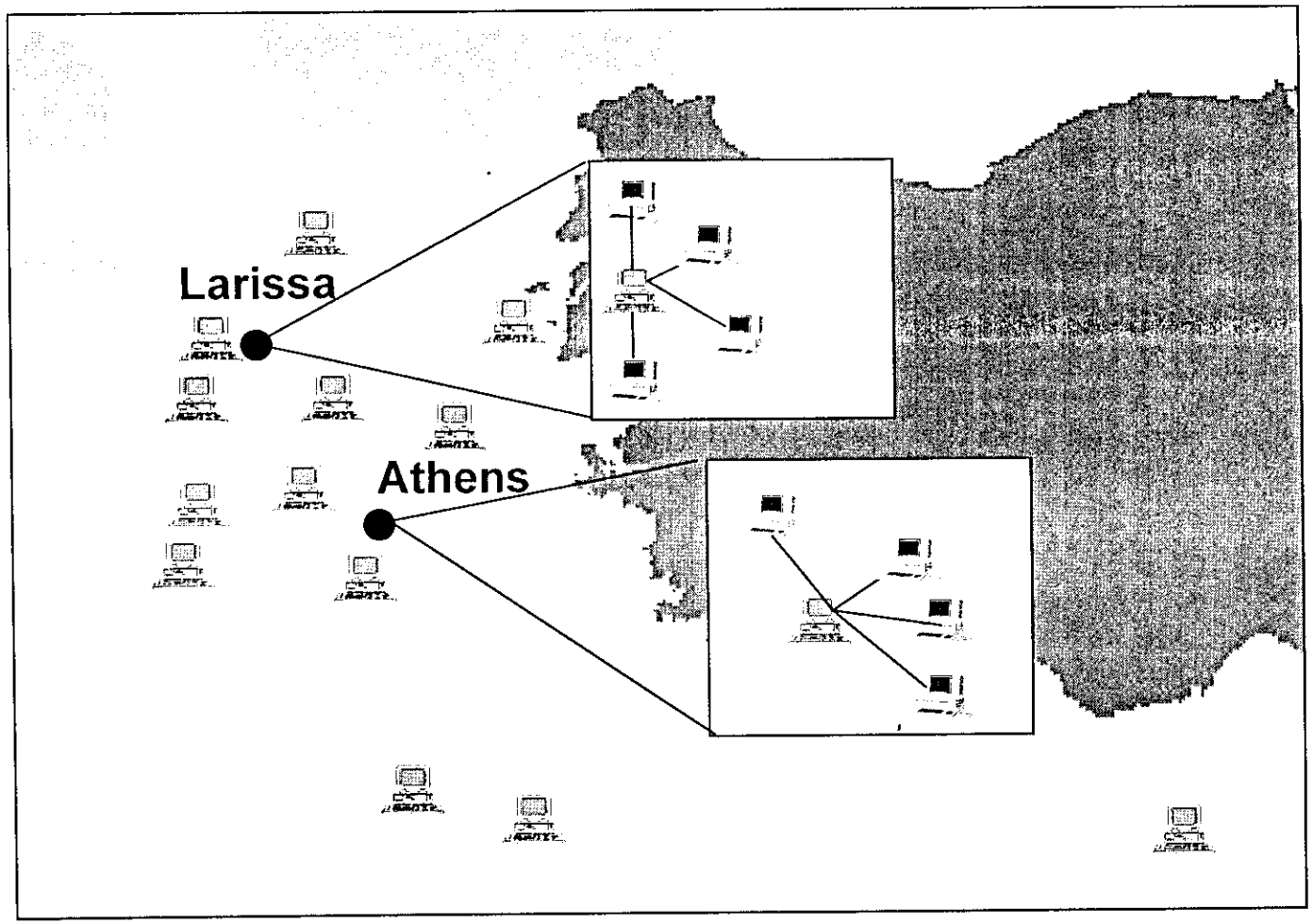
- General Aspects of the Project
- Organization of the Met. Support Team.
- Installation Status.
- System Architecture & Functionality's.
- Future Planes.

Organization of the Project



Operation Group

Current Installations



Hardware

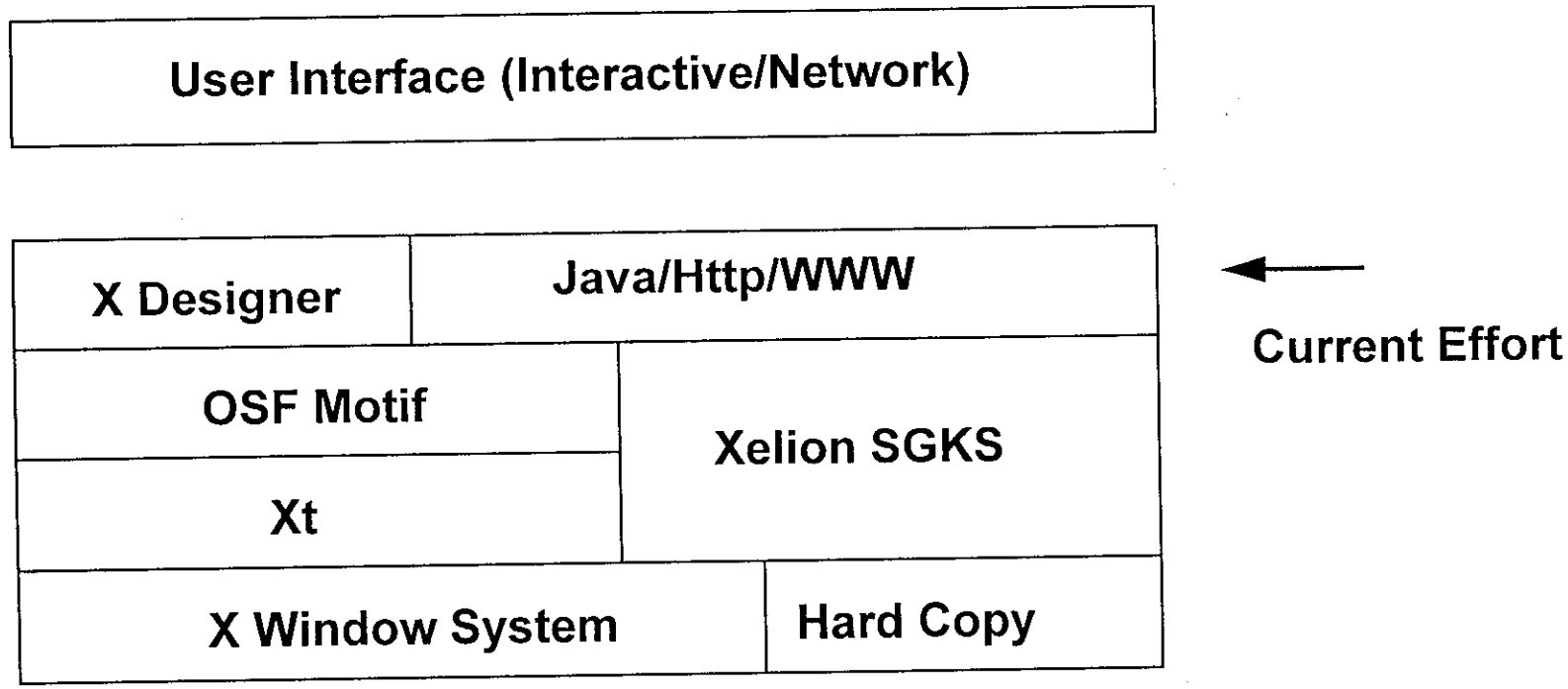
DEDALOUS WS.
INDY - INDIGO
ULTRA 1

DEDALOUS PC.

Communications

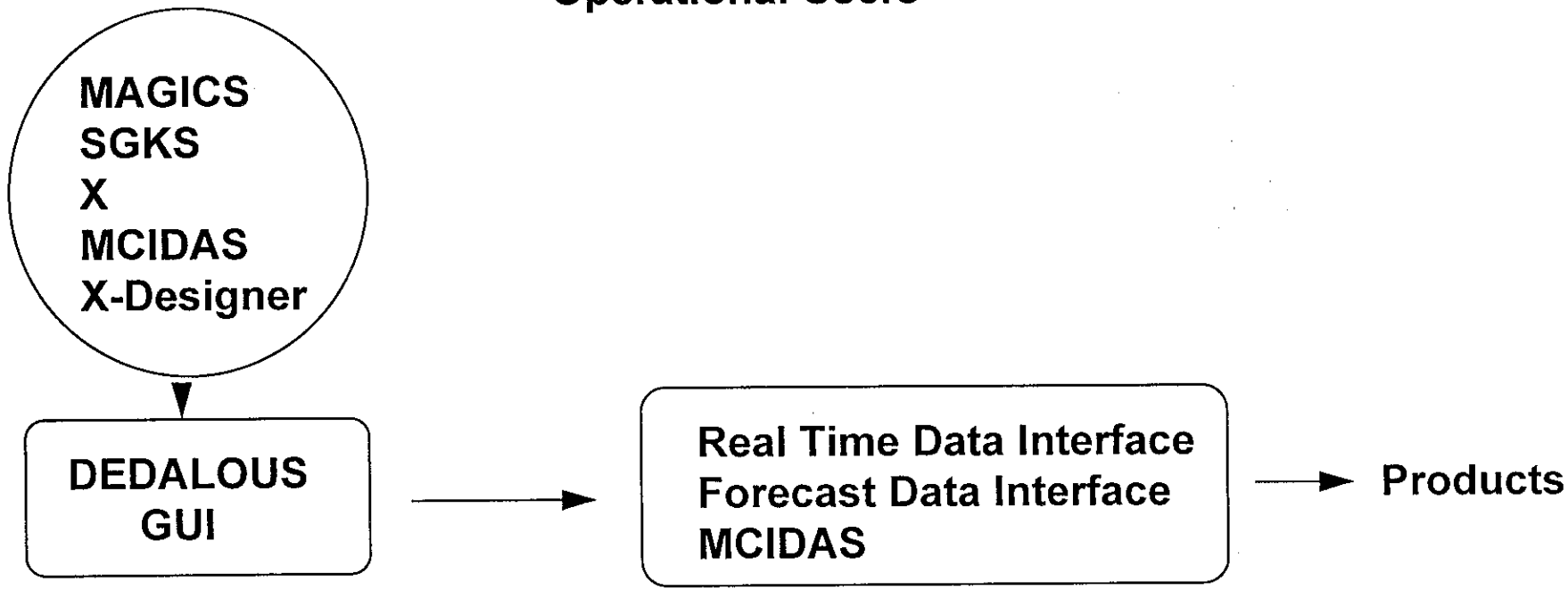
64 Kbytes
>19200 bps

DEDALOUS ver.1 Interface



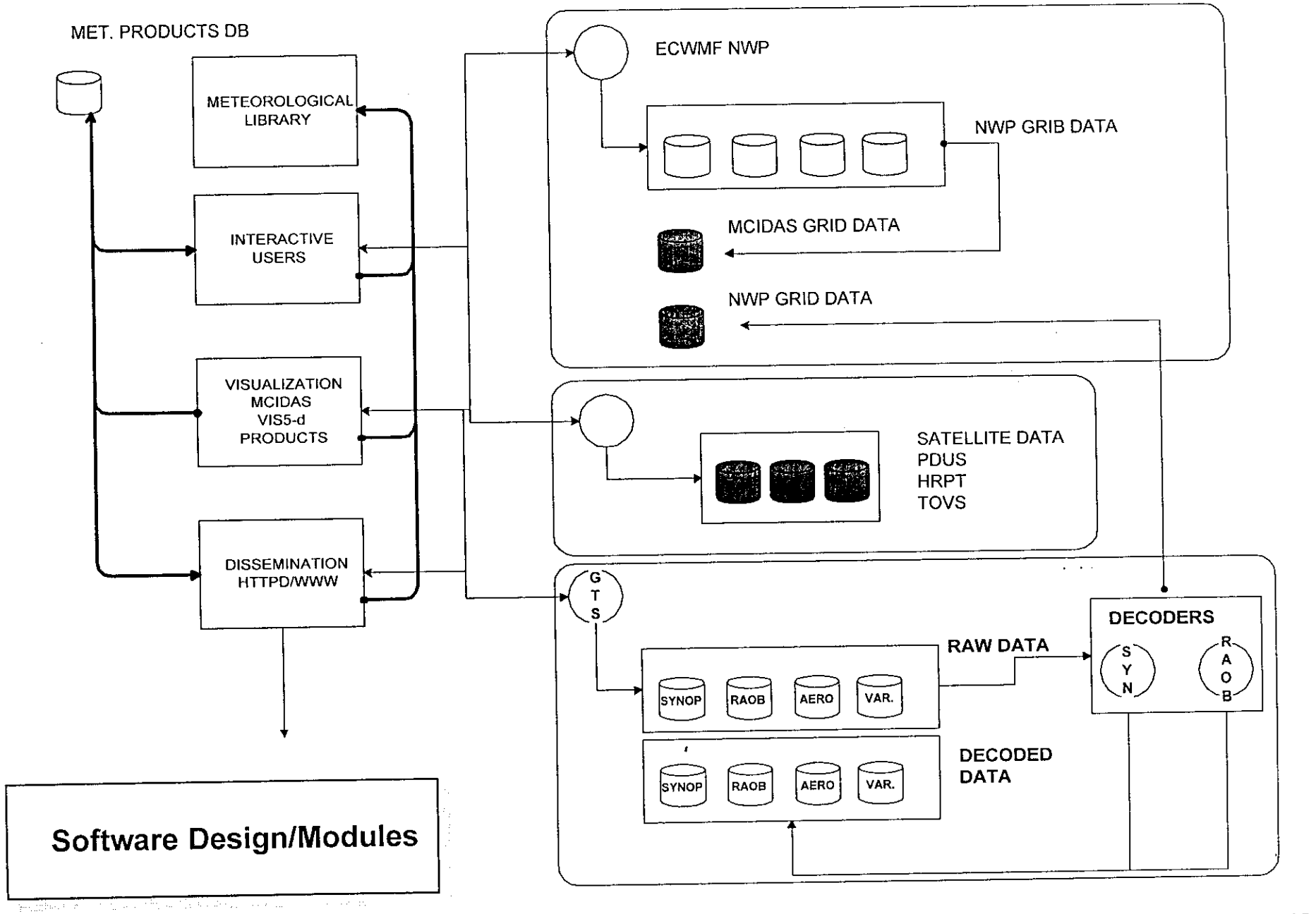
DEDALOUS ver.1 Interface

Operational Users

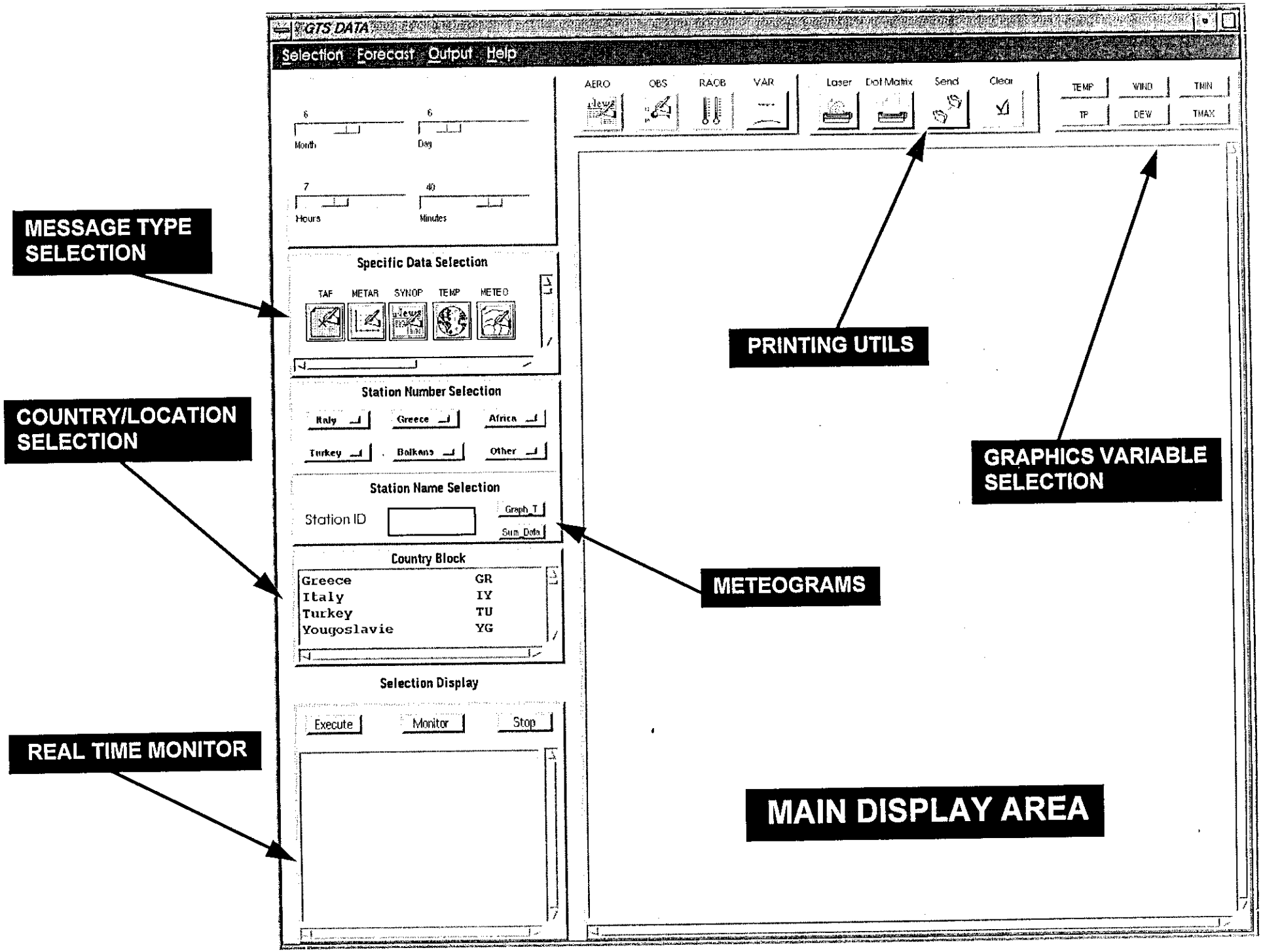


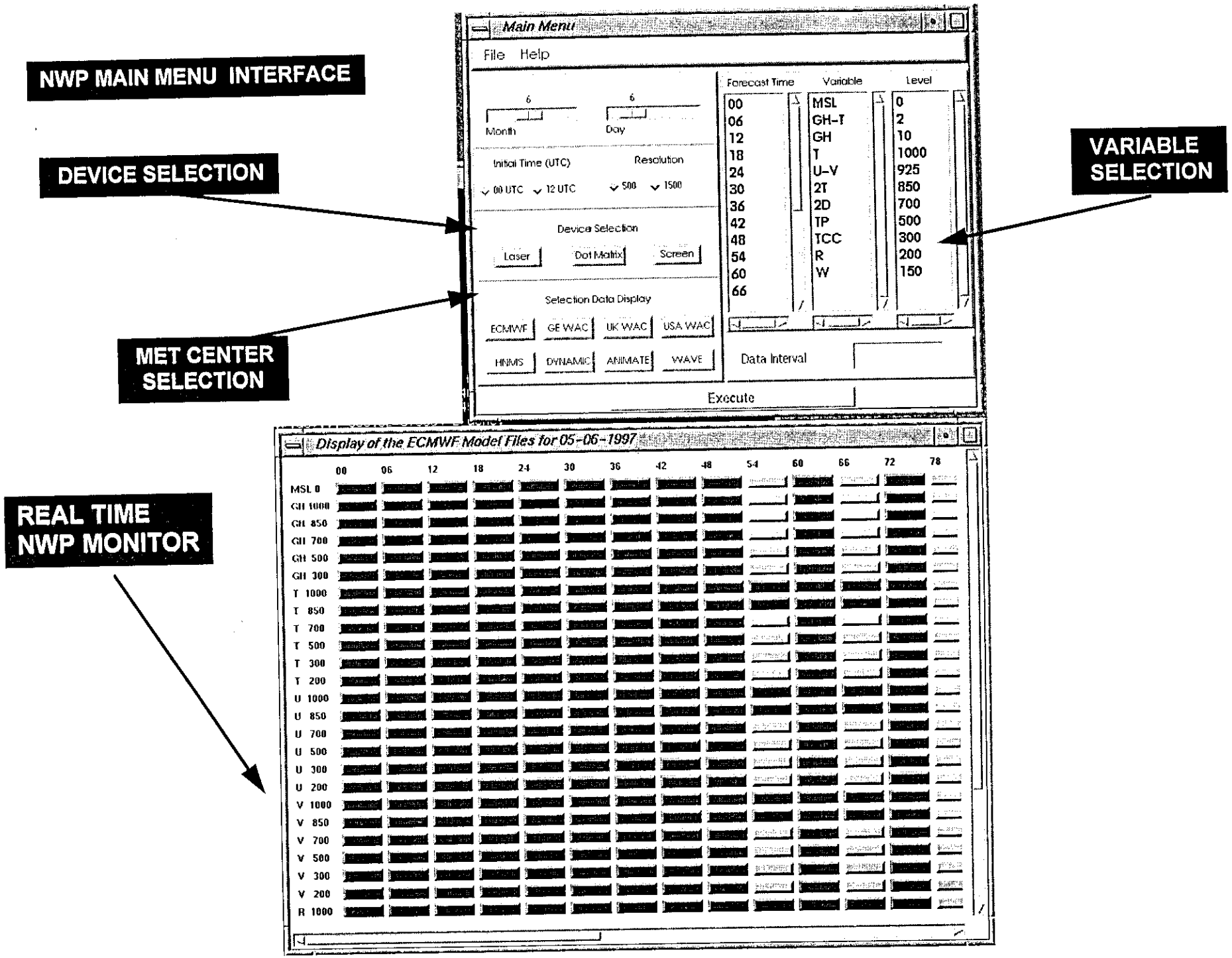
Research Users

METVIEW



Software Design/Modules


GTS DATA
Selection Forecast Output Help
AERO
OBS
RAOB
VAR
Laser
Dot Matrix
Send
Clear
TEMP
WIND
TMIN
TP
DEW
TMAX
Month
Day
Hours
Minutes
Specific Data Selection
TAF
METAR
SYNOP
TEMP
METEO
Station Number Selection
Italy
Greece
Africa
Turkey
Balkans
Other
Station Name Selection
Station ID
Graph_T
Sum_Data
Country Block
Greece GR
Italy IY
Turkey TU
Yougoslavie YG
Selection Display
Execute
Monitor
Stop
MESSAGE TYPE SELECTION
COUNTRY/LOCATION SELECTION
REAL TIME MONITOR
PRINTING UTILS
GRAPHICS VARIABLE SELECTION
METEOGRAMS
MAIN DISPLAY AREA


NWP MAIN MENU INTERFACE
DEVICE SELECTION
MET CENTER SELECTION
REAL TIME NWP MONITOR
VARIABLE SELECTION
Main Menu
File Help
Month
Day
Initial Time (UTC)
00 UTC
12 UTC
Resolution
500
1500
Device Selection
Laser
Dot Matrix
Screen
Selection Data Display
ECMWF
GE WAC
UK WAC
USA WAC
HNMS
DYNAMIC
ANIMATE
WAVE
Forecast Time
00
06
12
18
24
30
36
42
48
54
60
66
Variable
MSL
GH-T
GH
T
U-V
2T
2D
TP
TCC
R
W
Level
0
2
10
1000
925
850
700
500
300
200
150
Data Interval
Execute
Display of the ECMWF Model Files for 05-06-1997
00 06 12 18 24 30 36 42 48 54 60 66 72 78
MSL 0
GH 1000
GH 850
GH 700
GH 500
GH 300
T 1000
T 850
T 700
T 500
T 300
T 200
U 1000
U 850
U 700
U 500
U 300
U 200
V 1000
V 850
V 700
V 500
V 300
V 200
R 1000

Sub-Projects for DEDALOUS ver.2

- Nowcasting Techniques
- RDBMS
- MCIDAS
- Improvement of PC GUI
- Interface for Operators

Kari Niemelä, FMI, 02.06.1997

EGOWS VIII Toulouse 9...12 June 1997

A small look back

A bit more than a week ago there was 10 years from the day our first installation of a meteorological workstation took place. In my calendar of 1987 I found a short note stating that 25th of May I drove to our institute's first regional office in Turku with a red Lada station wagon, that was packed full of all kinds of stuff the office, just being born, would need in a first beginning. One of the items was a Digital Equipment Corporation's microVAX GPX with a large display. It cost so much that with the same amount of money one could nowadays buy maybe 5 decent Silicon Graphics Indy workstations or 15 PCs.

It was, though, exaggeration to speak about a MWS at that time. All one could do with it was plotting of observation charts and viewing satellite images and plotted observations on the screen. Developing of the MWS-software basically started at that point, though ideas of what we should do had been in the air for long. A decent version of the software was accomplished a couple of years later.

I have to confess a little contribution from my part to the birth of EGOWS, or maybe it was more like acting as a catalyst. In December 1989 I was at ECMWF to give a presentation of our workstation in a workshop. It was my first conference trip, but I had of course prepared my words and slides carefully. Live demos were not possible at that time. I was surprised of the reaction of my presentation. The French and Norwegian delegates surrounded me and they wanted to come to our institute to search our work to be able to build their own one. Maybe they even wanted to buy our software. I had to throw cold water on the hot stones. I could not promise anything to them. It was a completely strange idea, that we could have made something someone would like to buy. Instead I urged them to contact our director-general to be able to sort out some cooperation.

I'm not full aware of what happened in the meantime, but next June there was a meeting held on meteorological workstations in Oslo. I don't know whether there were other participants than France, Norway and us, but it was the first meeting of the EGOWS. More participants came to the following EGOWS-meeting held in June 1991 in Paris and since then the size of the meeting has grown firmly.

If we think of what EGOWS has accomplished so far, we find that in the form of publications there are seven reports published of presentations given in each meeting. After this meeting there will be eight of them. But is there anything more concrete, cooperation between two or more countries or so? None that I am aware of. France and Brazil have been cooperating in the production of ECMWF:s Metview, but that was outside EGOWS. Of course information and ideas have spread between software developers, and that is not to be overlooked, but every meteorological service is working on it's own application. So one could easily interpret the name EGOWS also otherwise than European Group on Operational WorkStations, namely EGO-WS – own workstation. I'm fully aware of that one can't force cooperation. Maybe the way things are presented at each institute are a bit delicate. Also the different infrastructures give their own limitations.

I would also like to take a look back in the sense of how the platforms and other hardware have developed during these 10 years. Our selection at that time was Digital Equipment and VMS operating system. Now one could say we went into a wrong direction. In our time we made a fully conscious choice. VMS was a relatively easy way to make and manage a whole system of workstations spread all over the country knowing that our financial and human resources were limited. Also the solution was cost-effective, though not very powerful.

What we could have done otherwise would have been the programming technique. Separating the code taking care of display from other code would have meant a bit slower time to develop, but more of the code could have been recycled. That is not a thing to worry any more. Our workstation is still going strong. In spite of it's limitations it is still being used by our forecasters as their main tool. And it will be that for a number of years that can't be predicted yet.

The difficulties we have met and maybe will meet even more strongly in the future are the problems with hard copy devices. The printers handling the native sixel-code of the VAX-UIS-software are not manufactured any more. Our workstations are capable to produce postscript but it demands so much resources, that it produces difficulties to other functions. This is probably something we have to work out in the near future.

But to be more universal, I would like to say that the number of possibilities in choosing the platform has both decreased and increased. Is it any easier to pick up the right choice? If you select a larger platform, you must take Unix. If you think of a smaller one, you take a PC. But which Unix? Every make has its own version of it. They have resemblances, and the source code is mostly portable, but the surroundings, makefiles, have to be at least edited, maybe even rewritten. And as to the PC, do you run it with Windows95 or NT, OS/2, maybe Linux?

Happily we don't have to worry any more about how to get enough central memory or disk space, though there is never too much of them. Anyway the prize of them is on a sensible level.

The processor capacity has also emerged into new levels, but on the other hand, the operating systems with their graphical interfaces also demand a big slice of the processing power.

Communication between different systems has become quite easy now that TCP/IP has taken over the lead. Transferring files between different systems is easier, but not without problems. There still rest the questions of how to convert big- and little-endian words, different word lengths and different floating point presentations.

The Future

A politician once said, that predicting is always difficult, but especially difficult it is to predict the future. Once we freezed the development of our workstation, or maybe even before that, there has been a question of the new workstation. During the last couple of years we have been very careful in using the words "new workstation" and making any promises about such a thing. Instead we have been talking about Weather Tools. What are Weather Tools? Well, also in the future the forecaster will need a total view of the weather situation, but after having made himself familiar with it, he will not start typing text on a text editor. No, he will start to edit graphically forecasts raw-produced by different systems, that are based on numerical models. If there is a situation, he thinks the models are wrong, he can radically modify the forecasts.

This is also a question of productivity. After there has started to be pressure on gaining money with weather instead of just making forecasts to everyone for nothing, a question has arised of producing the forecasts as easily as possible. Now that the competition is free also on this sector, the pressure has risen to produce the forecasts also as cheaply as possible.

The basis of such systems is a well working, reliable real-time database and an easy, object oriented access to the data. On such basis it is possible to build different types of forecasts with

same or alike software "bricks". With these tools it should also be possible to produce different kinds of displays, that can be called a meteorological workstation. So the meteorological workstation is a combination of weather tools.

During the last few years we have spent our main effort on the basis, though some steps are made also on the field of presentation. A first bigger one is a tool, that could be called TAF-editor. It came to the beta-testing phase so recently, that I had no courage to present it here. But as a repetition I show you the model of our database idea based on layered design.

Real Time Data Base Model

The idea of such a layered data base model is to have clear interfaces between the different layers and so make it easier to change parts of the data base without being forced to modify all software using the data base.

The most inner part, the heart of the data base is the commercial product. We, at the present, use Oracle. It is accessed by a layer called Neons. Neons is a philosophy and software package developed originally by US Navy, but strongly modified by Météo France. It gives many aids to the data base manager to maintain the real time meteorological data base. The software contains basically ProC-functions. In this model it is divided into two layers separating the original Météo France Neons and the minor extensions made by us.

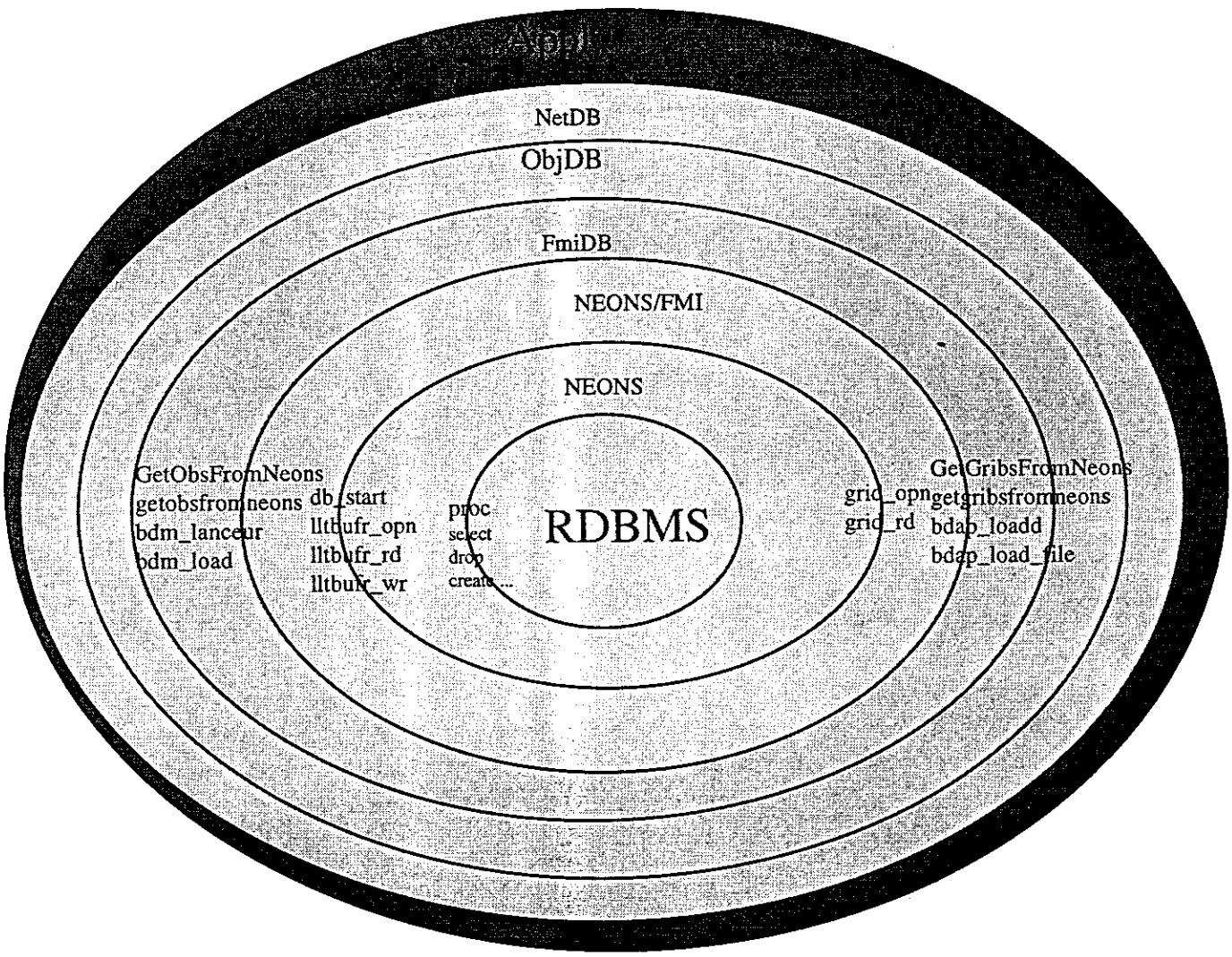
The next layer, called FmiDB, is a thinner layer containing C-functions and commands to access data in the database. Its basic function is to serve as an interface between Neons layer and the upper layer.

The following layer, ObjDB (for Object Data Base) is meant to be the main end user interface to the data. In a common case, an extra layer NetDB is still needed for a user through the net. This NetDB should be transparent and actually part of the ObjDB. ObjDB is, of course, not a real object data base, but an object oriented language interface to the data. It is programmed in C++ and works both in PC- and unix-environments.

Some Final Words

Our old workstation was one of the first in the branch. There were some previous concurrents like McIdas, but these systems were so huge and expensive, that using them was impossible for such small institutes that we are. That is why we once started making our own software. The birth of the workstation was related to the development of our regional offices. It remains to be seen, when it will be completely replaced by new generation tools.

Weather Tools
Layered design



1997 EGOWS Meeting at
METEO FRANCE
9 - 12 June 1997

Session 2 : Visualisation / Operational Implementation :

Meteo France - *Patrick Benichou*

Slovak Hydrometeorological Institute - *Oldrich Spaniel*

Italian Air Force Meteo Service -*Giovanni Maresca*

Danish Meteorological Institute - *Jacob Brock*

Meteo France - *Yves Bidet*

EGOWS 97, Toulouse, France, june 09-12, 1997

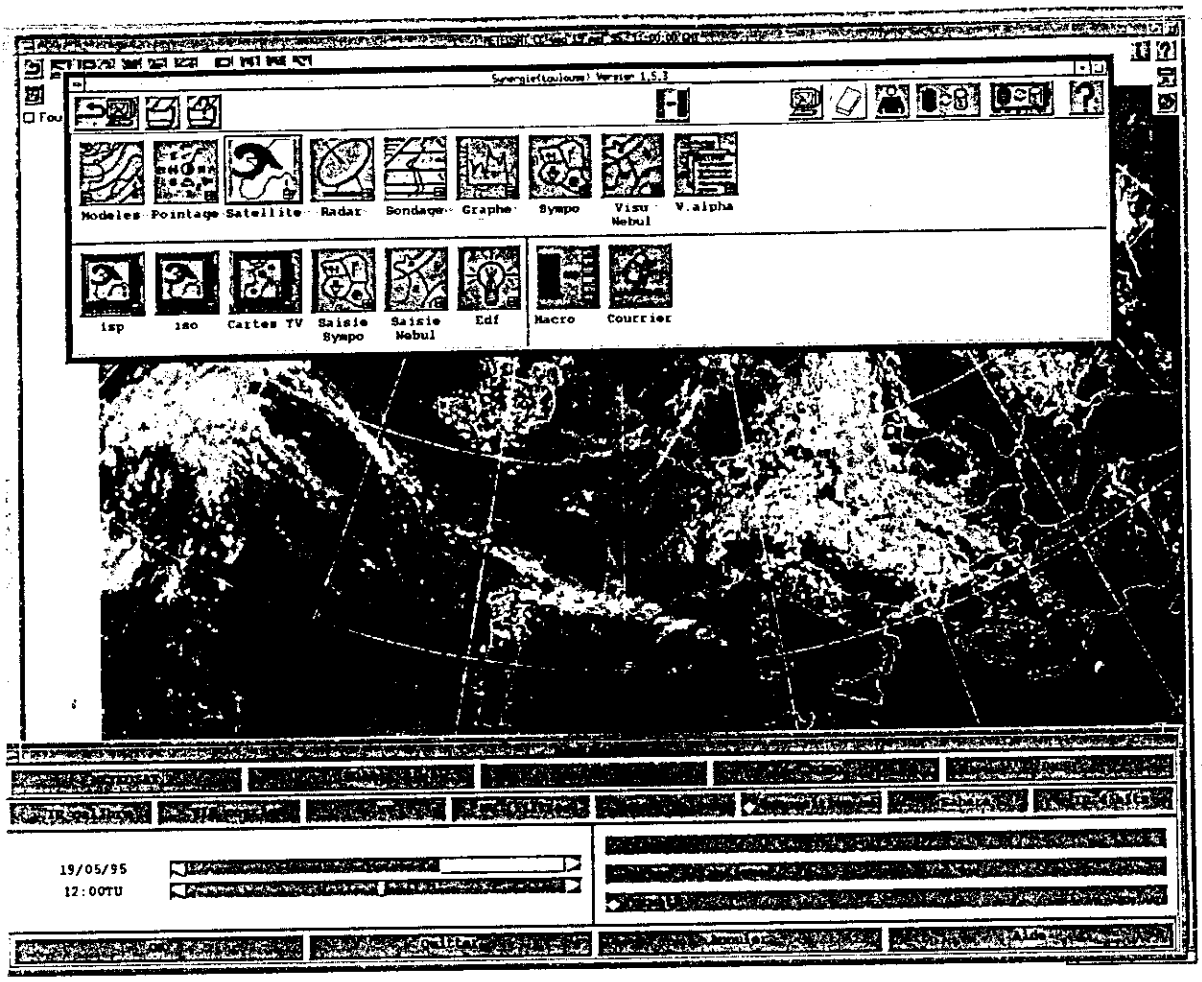
Météo-France's
Synergie Program

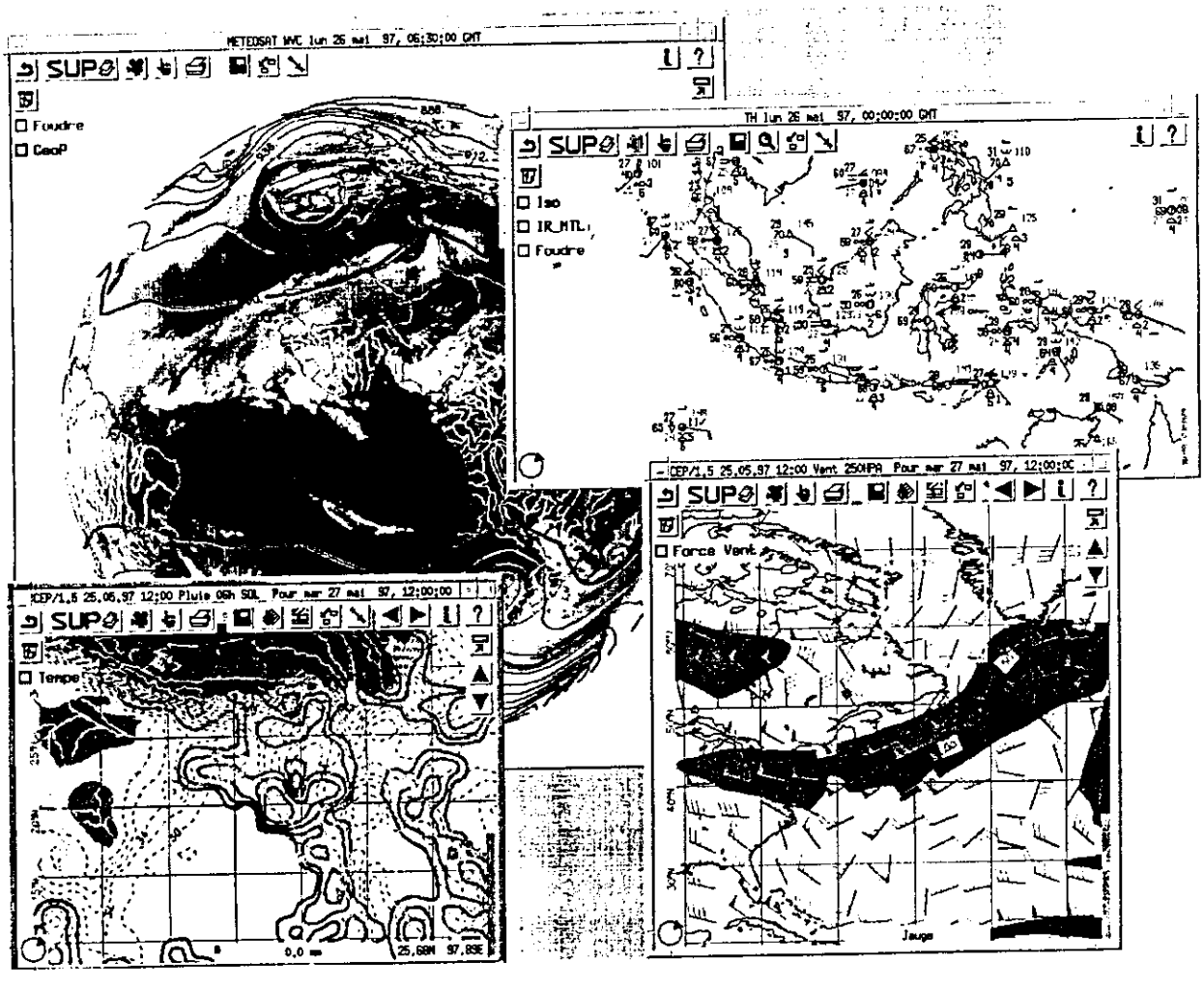
Patrick Bénichou

METEO FRANCE

EGOWS97 Synergie

1. Synergie Program
2. Current developments : Synergie_3.0
3. Synergie and meteorological production
4. Synergie out of Météo-France
5. Forthcoming issues (1998-1999)


Modèles
Pointage
Satellite
Radar
Sondage
Graphe
Sympo
Visu Nebul
V.alpha
isp
iso
Cartes TV
Saisie Sympo
Saisie Nebul
Edf
Macro
Courrier
19/05/95
12:00TU


METEOSAT WVC Jun 26 mai 97, 06:30:00 GMT
SUPO
Foudre
CapP
TH Jun 26 mai 97, 00:00:00 GMT
Iso
IR_MTL
Foudre
CEP/1,5 25.05.97 12:00 Vent 250HPA Pour mar 27 mai 97, 12:00:00
Force Vent
CEP/1,5 25.05.97 12:00 Pluie 06h SOL Pour mar 27 mai 97, 12:00:00
Temps

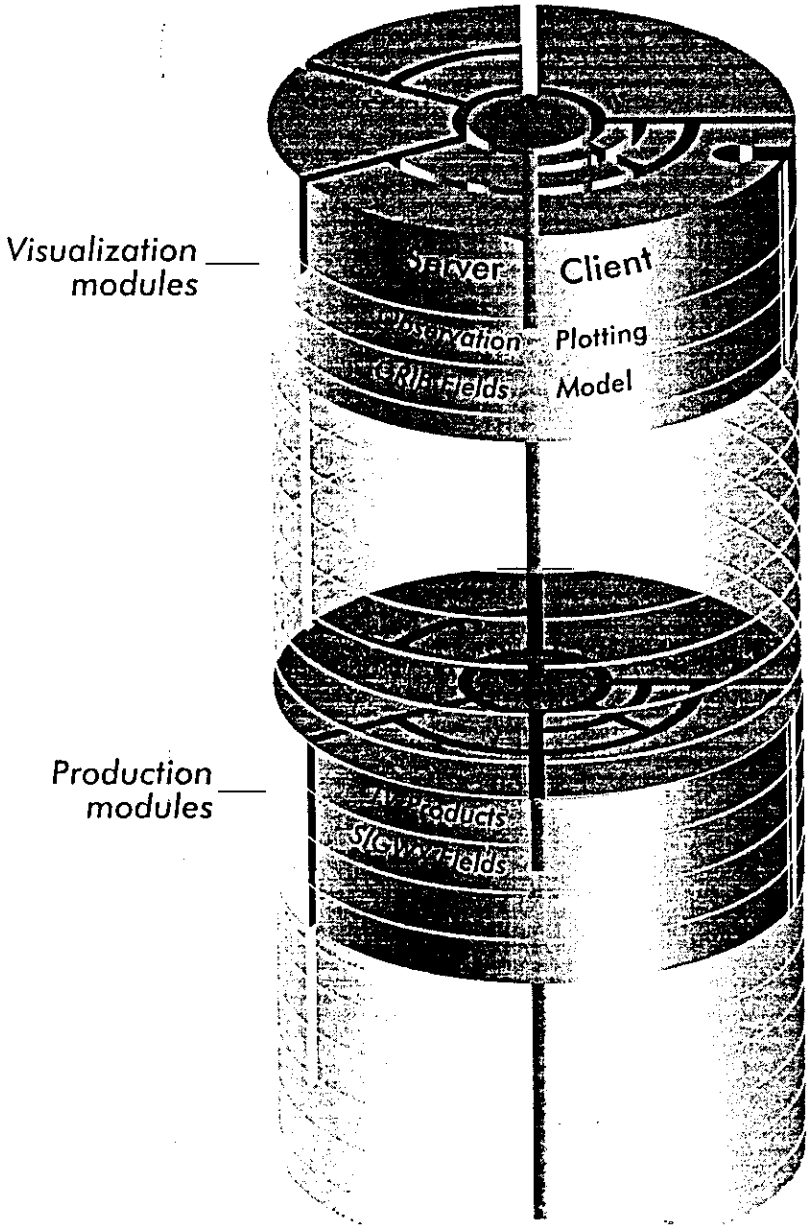
1. Synergie Program

- Objectives
  - Decision helping in weather forecasting
  - «Expertise» work & forecasting organisation
  - Appropriate DB for «expertise» data
  - National & regional & specific MF sites
- Organisation
  - Program launched in sept.96
  - Human ressources
  - Key program

2. Synergie_3.0 : DB & Kernel

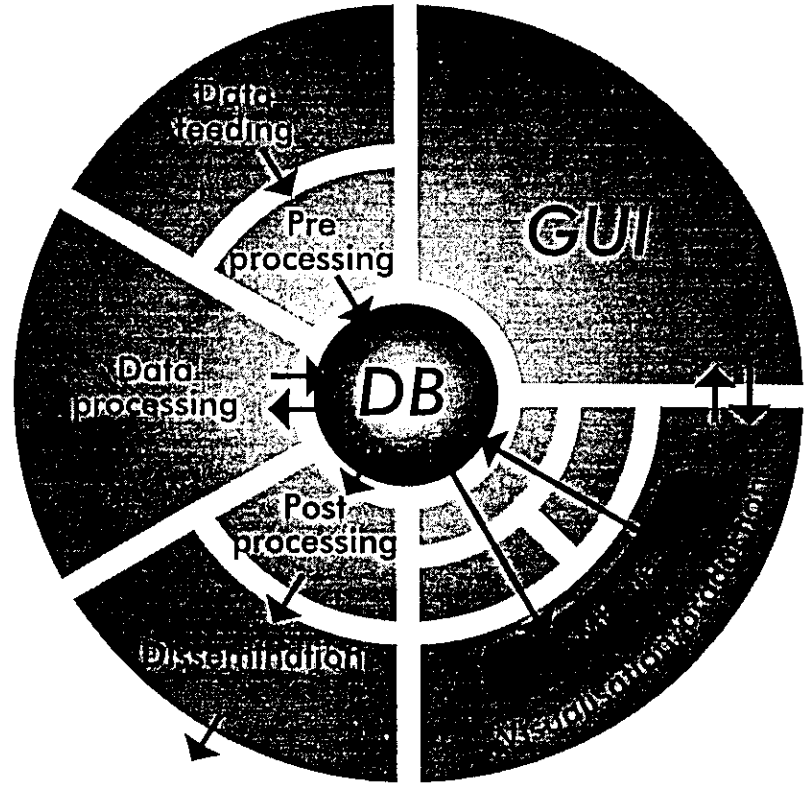
- Towards «Neons_MF» data organization
  - Data Preprocessing
  - Data storing
  - Synergie modules involved (6/97): plotting
- Synergie kernel reorganization
  - Performance improvement (overlaying, ...)
  - Standardization (< & >)
  - Macros management & execution
- New common tools
  - Zoom
  - Annotations in any visualisation window

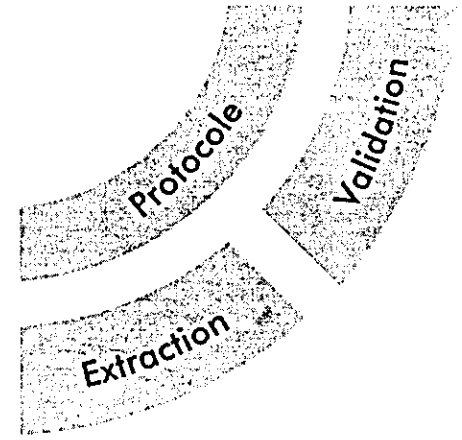
Synergie **concept : the pineapple**



METEO FRANCE

Synergie-2 : **global architecture**





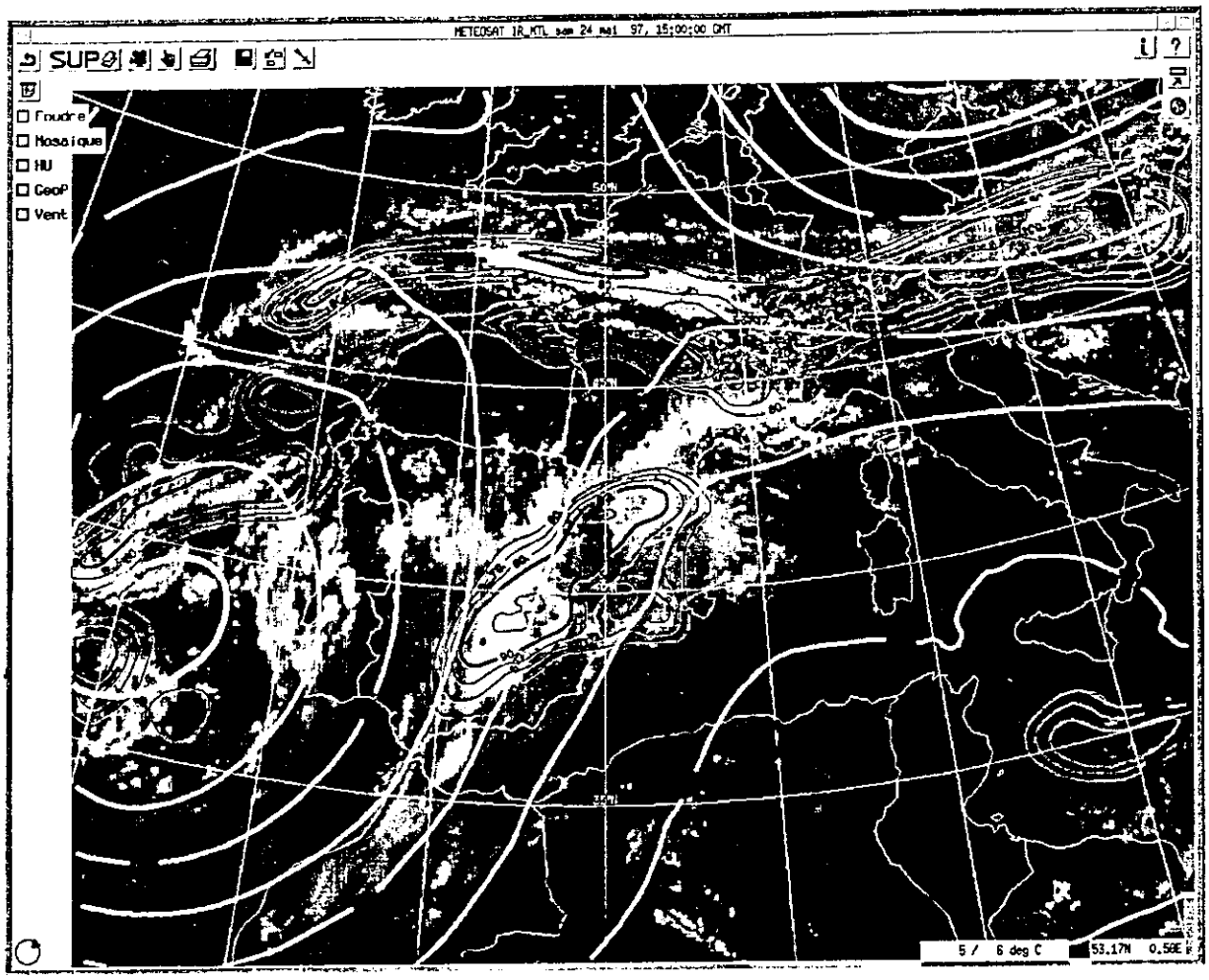
METEO FRANCE

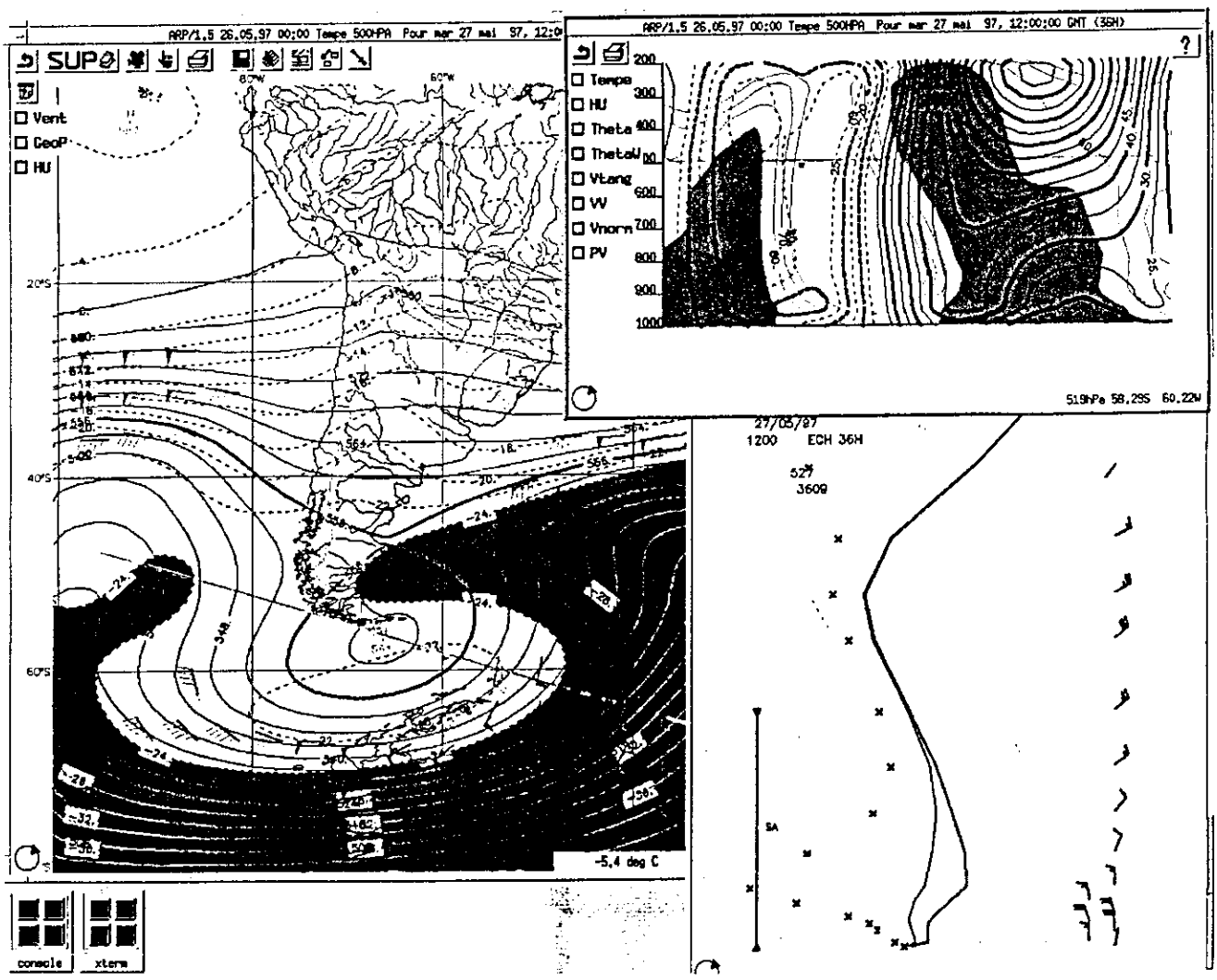
2'. Synergie_3.0 : data & visu

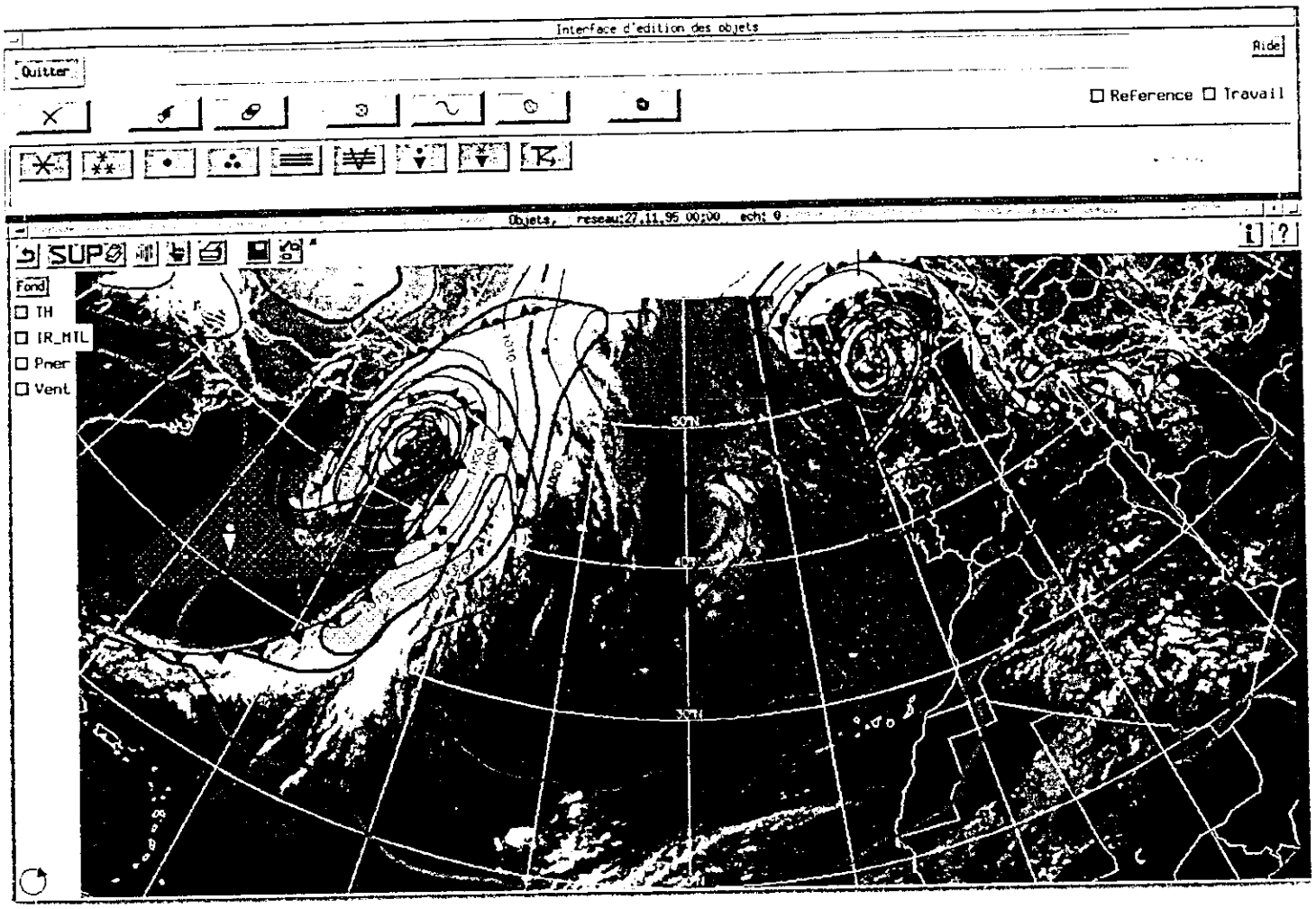
- New data
  - ACARS data from Air France -> «soundings»
  - Rainfall accumulation from MF network
  - Précip. estimation from radar imagery
  - New backgrounds
- New visualisation features
  - Plotting module interfaced with Neons DB
  - Concept of weather watch on specific points
  - Wave models
  - Vertical profile
  - Fax and message visualiser

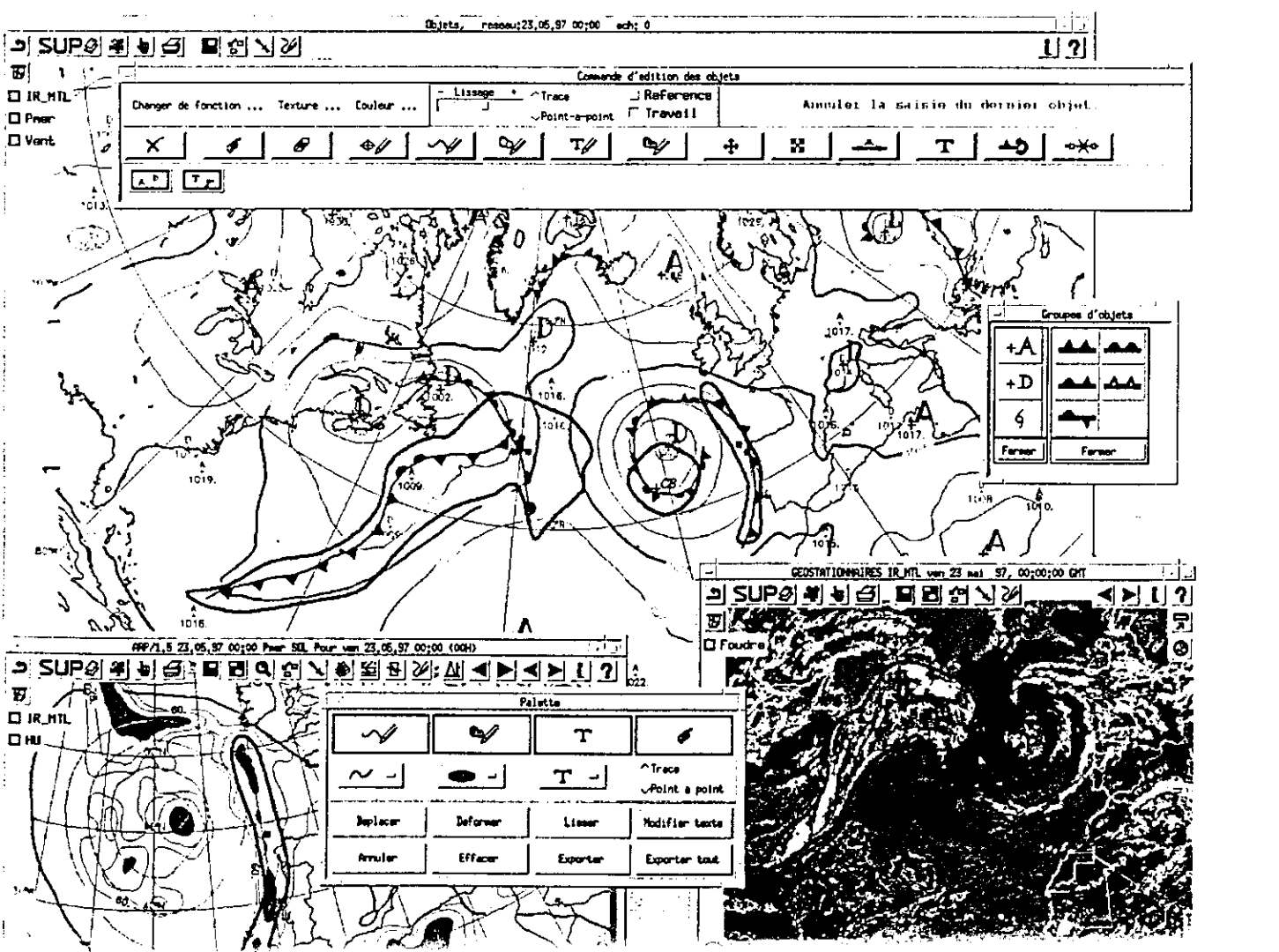
2''. Synergie_3.0 graphical interaction

- «Expertise» features
  - consolidation
- New interactive production features
  - Significant Weather charts
    - marine
    - aviation
    - general forecasting
  - to be implemented in Toulouse : early 98


METEOSAT IR_KTL sam 24 mai 97, 15:00:00 GMT
SUP
Foudre
Mosaique
HU
GeoP
Vent
5 / 6 deg C


ARP/1,5 26.05.97 00:00 Tempe 500HPA Pour mar 27 mai 97, 12:0
SUP
Vent
GeoP
HU
-5,4 deg C
ARP/1.5 26.05.97 00:00 Tempe 500HPA Pour mar 27 mai 97, 12:00:00 GMT (36H)
Tempe
HU
Theta
ThetaW
Vtang
VV
Vnorm
PV
519hPa 58.29S 60.22W
27/05/97
1200 ECH 36H
529
3609
console
xterm


Interface d'edition des objets
Quitter
Aide
Reference
Travail
Objets, reseau:27.11.96 00:00 ech: 0
SUP
Fond
TH
IR_MTL
Pmer
Vent


Objets, reseau:23.05.97 00:00 ech: 0
SUP
IR_MTL
Pmer
Vent
Commande d'edition des objets
Changer de fonction ...
Texture ...
Couleur ...
Lissage
Trace
Point-a-point
Reference
Travail
Annuler la saisie du dernier objet
Groupes d'objets
+A
+D
Fermer
Fermer
GEOSTATIONNAIRES IR_MTL ven 23 mai 97, 00:00:00 GMT
Foudre
APP/1,5 23,05,97 00:00 Pmer SOL Pour ven 23,05,97 00:00 (00H)
IR_MTL
HU
Palette
Trace
Point a point
Deplacer
Deformer
Lisser
Modifier texte
Annuler
Effacer
Exporter
Exporter tout

3. Meteorological production

❶ Decision helping
- Data access, visualisation, management
- Alarm generation

❷ «Expertise» work *(see S.Desbios)*
- Algorithms
- Expertise data initialisation / exchange
- **Graphical interaction** (objects management, field modification 2D,...)
- Expertise data storing -> specific DB

❸ End-Product generation from DB
- To be dealt with by a specific NT development
- Applix-based solution to be maintained

4. Synergie out of Meteo-France

■ Military sites
- Aviation
- Marine (ground + 2 aircrafts carriers)

■ Export sites
- Indonesia
- Niger
- Marocco
- Kourou Space Center
- Honduras
-
- *Mauritius (tbd)*
- *Philippins (tbd)*
- *Lebanon (tbd)*

5. Forthcoming issues (1)

- Hardware
  - ~100 machines at MF (30 servers + 70 WS)
  - **to be replaced on the 98 & 99 FY**
  - The servers need to be more powerful: alarms, real-time processing, algorithms, data services
  - Unix
- Data management
  - Neons to be interfaced with all Synergie modules
  - Alarm generation : devt to be launched end 97

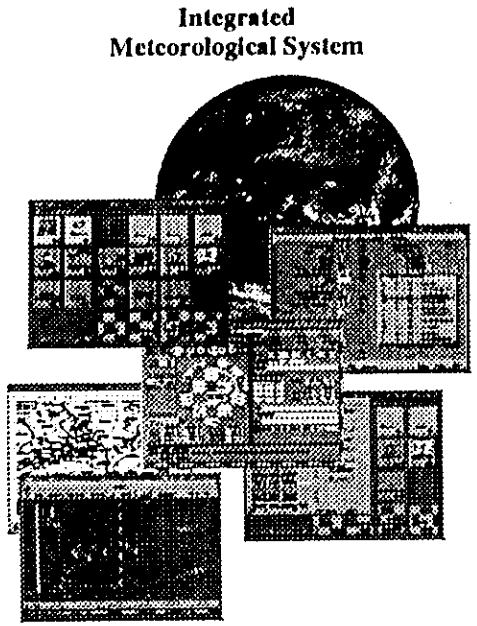
5. Forthcoming issues (2)

- Software
  - 24 bits
    - Ergonomy and performance improvement
  - Visualisation
    - Nowcasting (advection, object generation)
    - Weather watch
  - Expertise work & graphical interaction
    - Grids modification and consistency contraints
    - New MF project «Dialogue» for general forecasting in relation to forecasting organisation (3 levels)
    - Consistent devt environment for GI modules

Synergie Summary

- Synergie is a major tool in duty forecasting at Météo-France
- Météo-France ready for a 2nd hardware generation (1998-2004)
- Synergie «expertise» features to fit with Météo-France forecasting organisation
- Synergie gets prepared for future of human intervention in the forecasting process

Integrated meteorological system
&
WWW technology



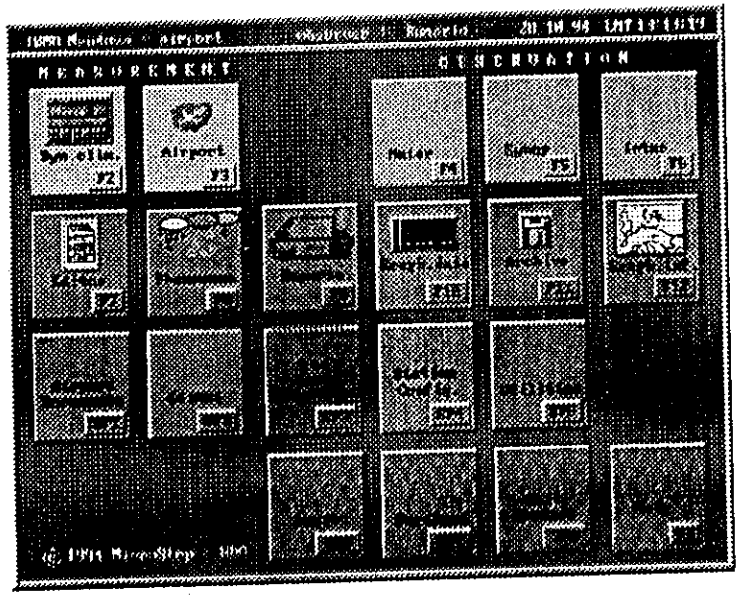
IMS - EGOWS 6

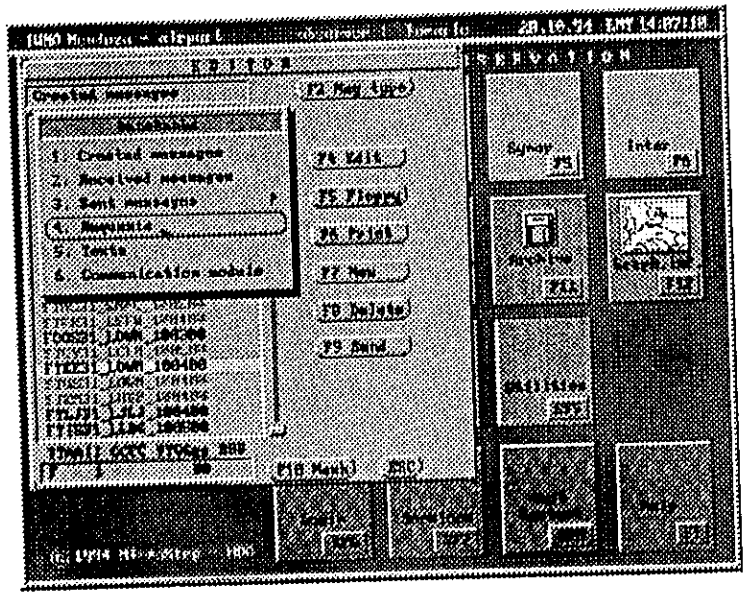
- first development step - the end of 1993
- to the operational praxis - beginning of 1995

This software is build to be useful mainly at meteorological stations.

- transmit bulletins to NTC
- request information from NTC

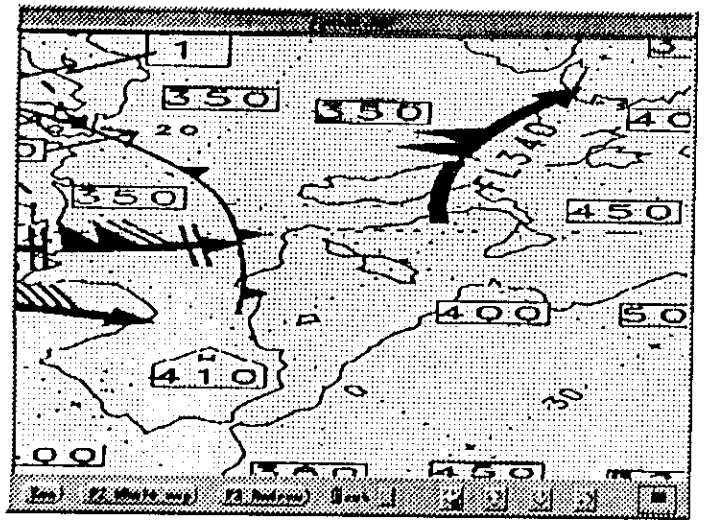
Oldřich Španiel
Slovak Hydrometeorological Institute





The main functions of IMS

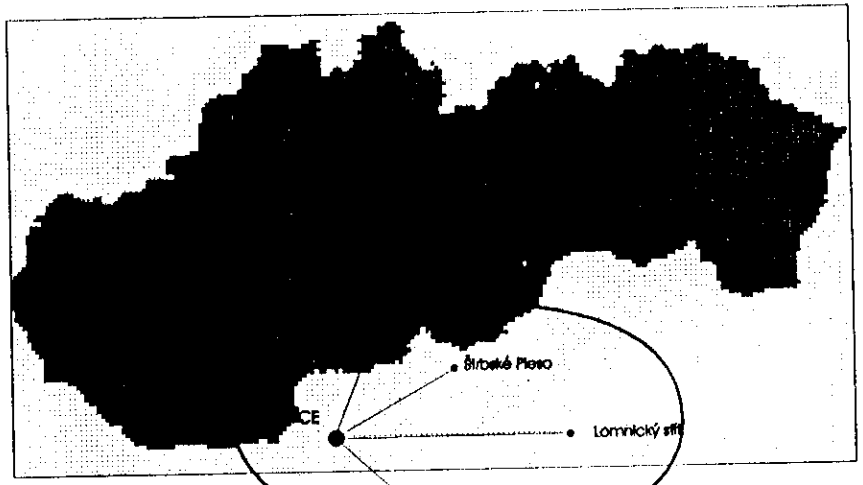
1. Data collecting
2. Organization of the database of measured and observed data
3. Data presentation
4. Creation of meteorological messages
5. Communication with NTC
6. Meteorological message management
7. Distribution station
8. Presentation station
9. Airport station
10. Education and training station
11. Module for updating the IMS
12. Forms and reports
13. Data maintaining
14. Station configuration
15. Checking of privileges
16. System of protocols



- the same software for various meteorological stations
- minimize of errors in created messages
- easy and cheap connection of existing software system to NTC
- utilization of all existing hardware devices which are able to communicate with computer
- high ratio performance/price

PC, QNX 4.21 operating system

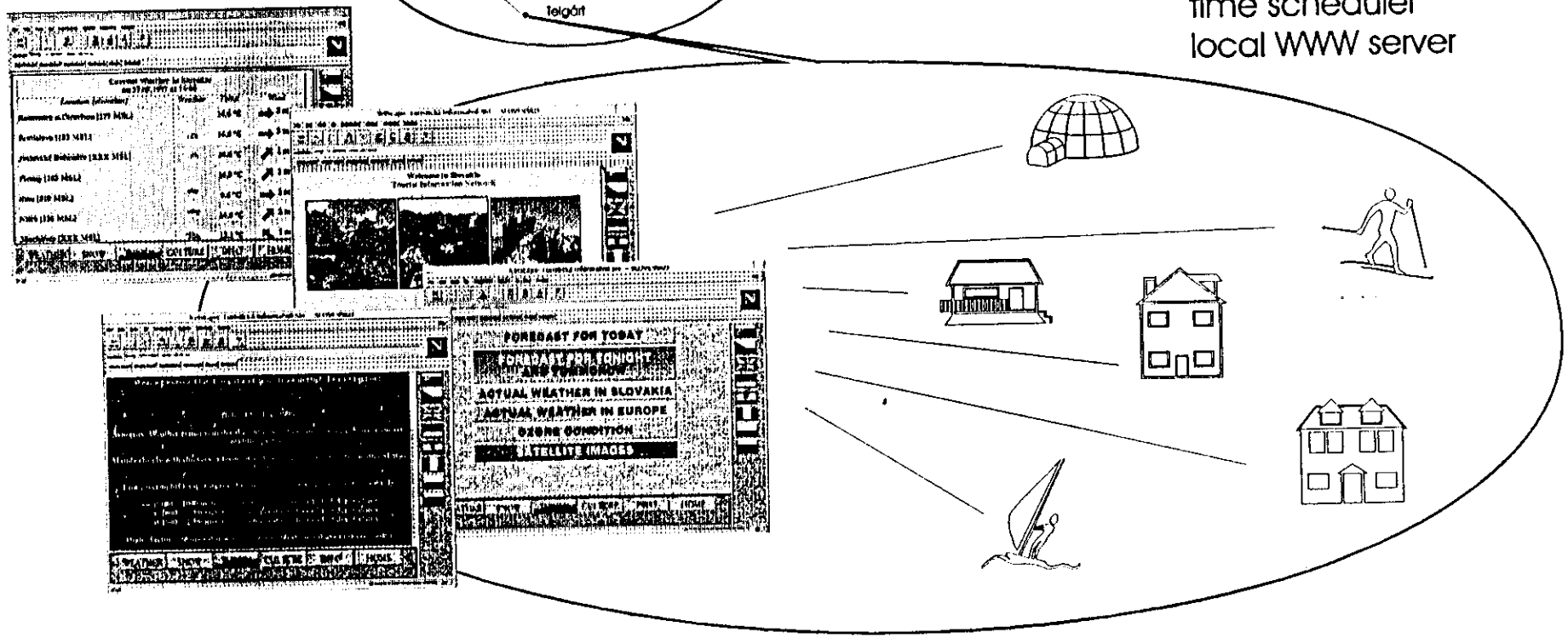
SHMI network - 25 professional meteorological stations with IMS



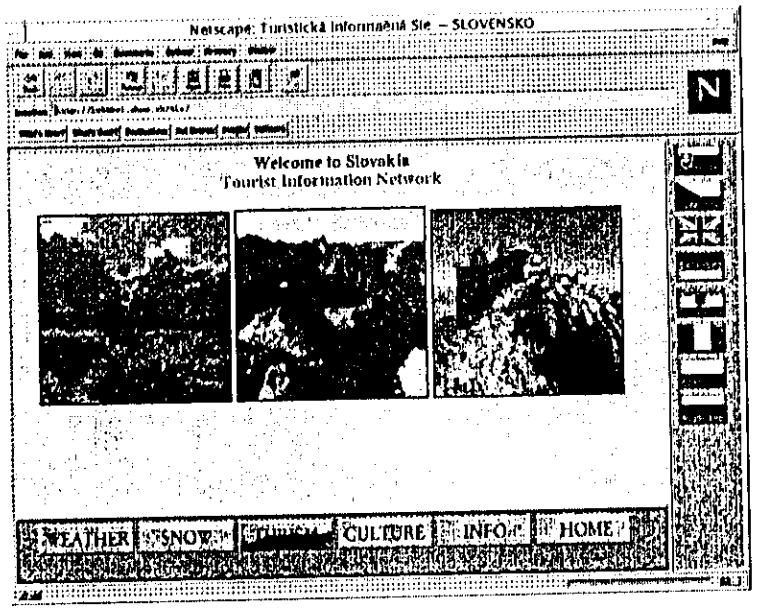
IMS WWW server
data from automatic met. station
meteorological bulletins
data from met. satellite and radars
data from another IMS

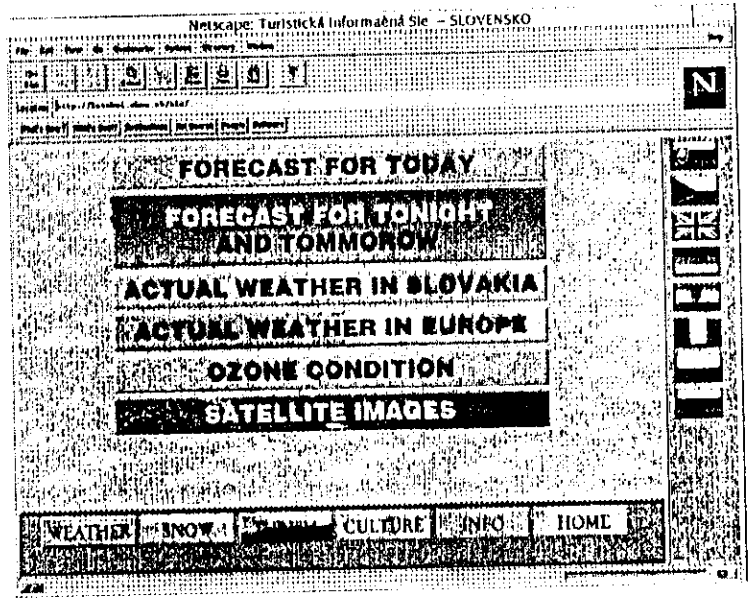
Client side
On-line access TCP/IP

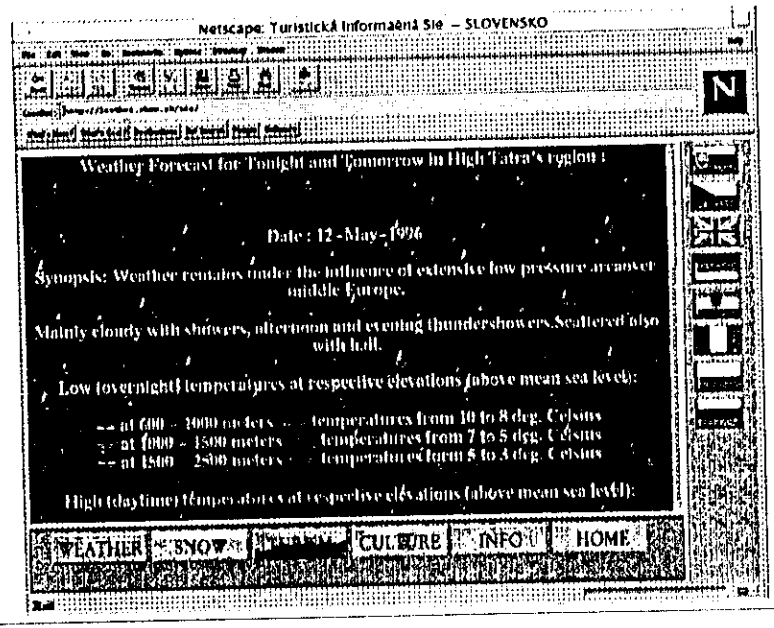
Off-line access dial-up
time scheduler
local WWW server

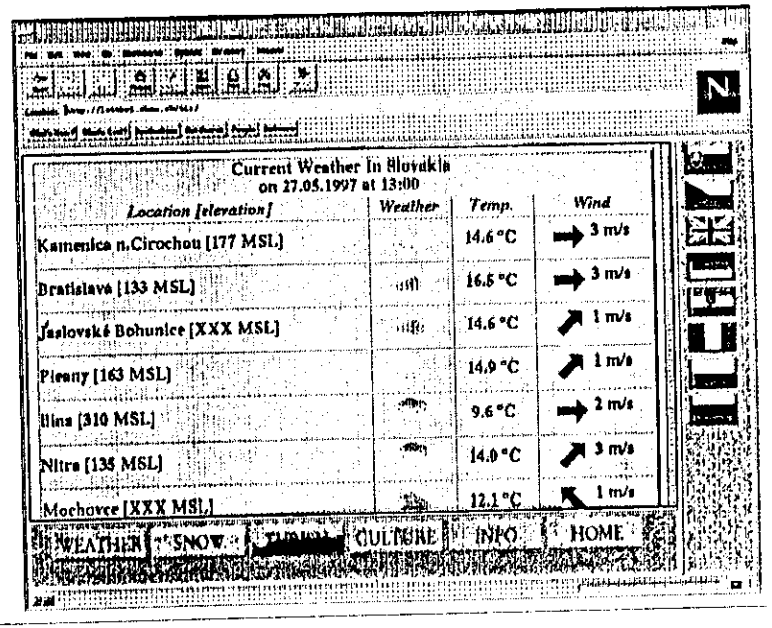


Tourist Information System





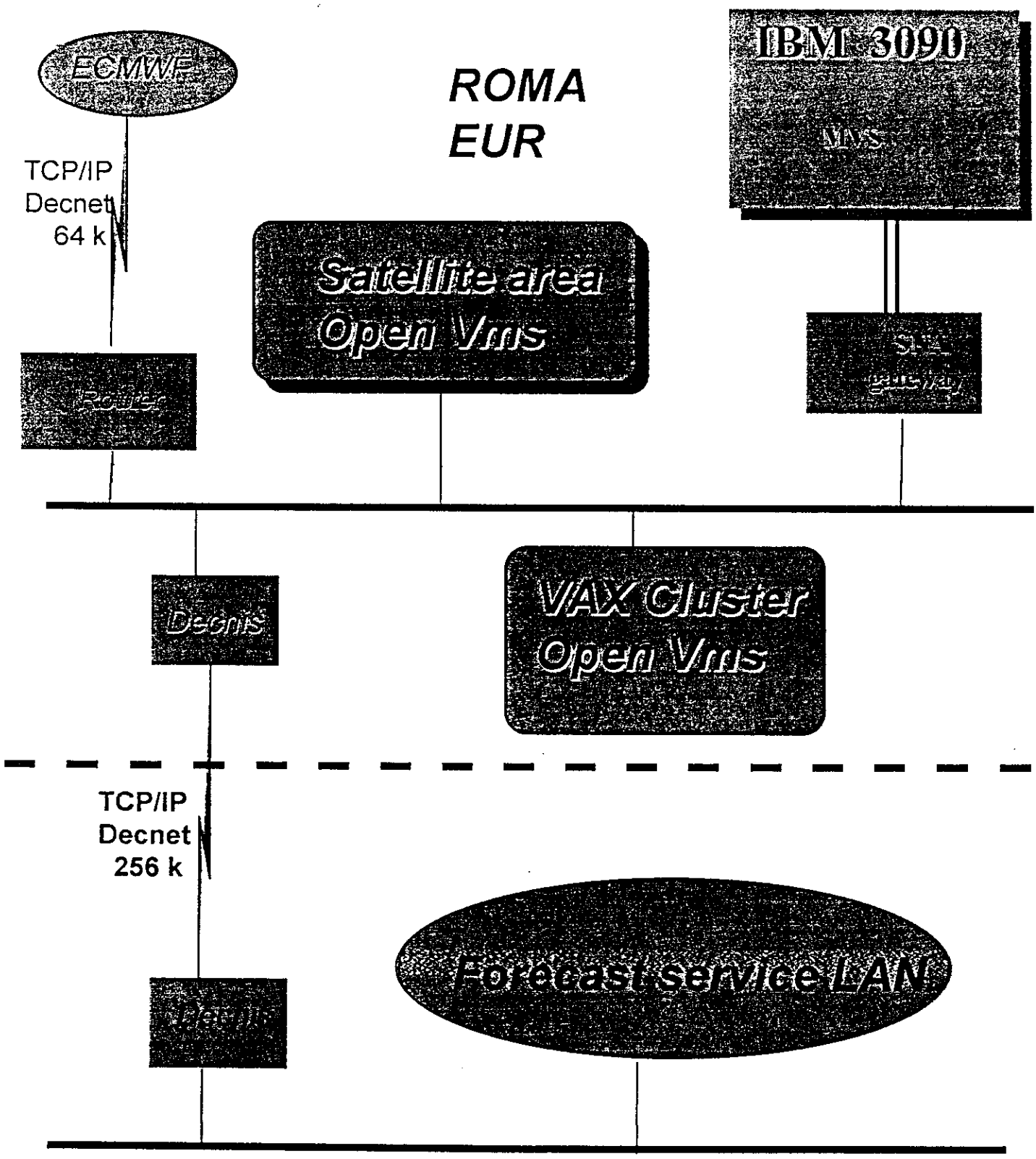




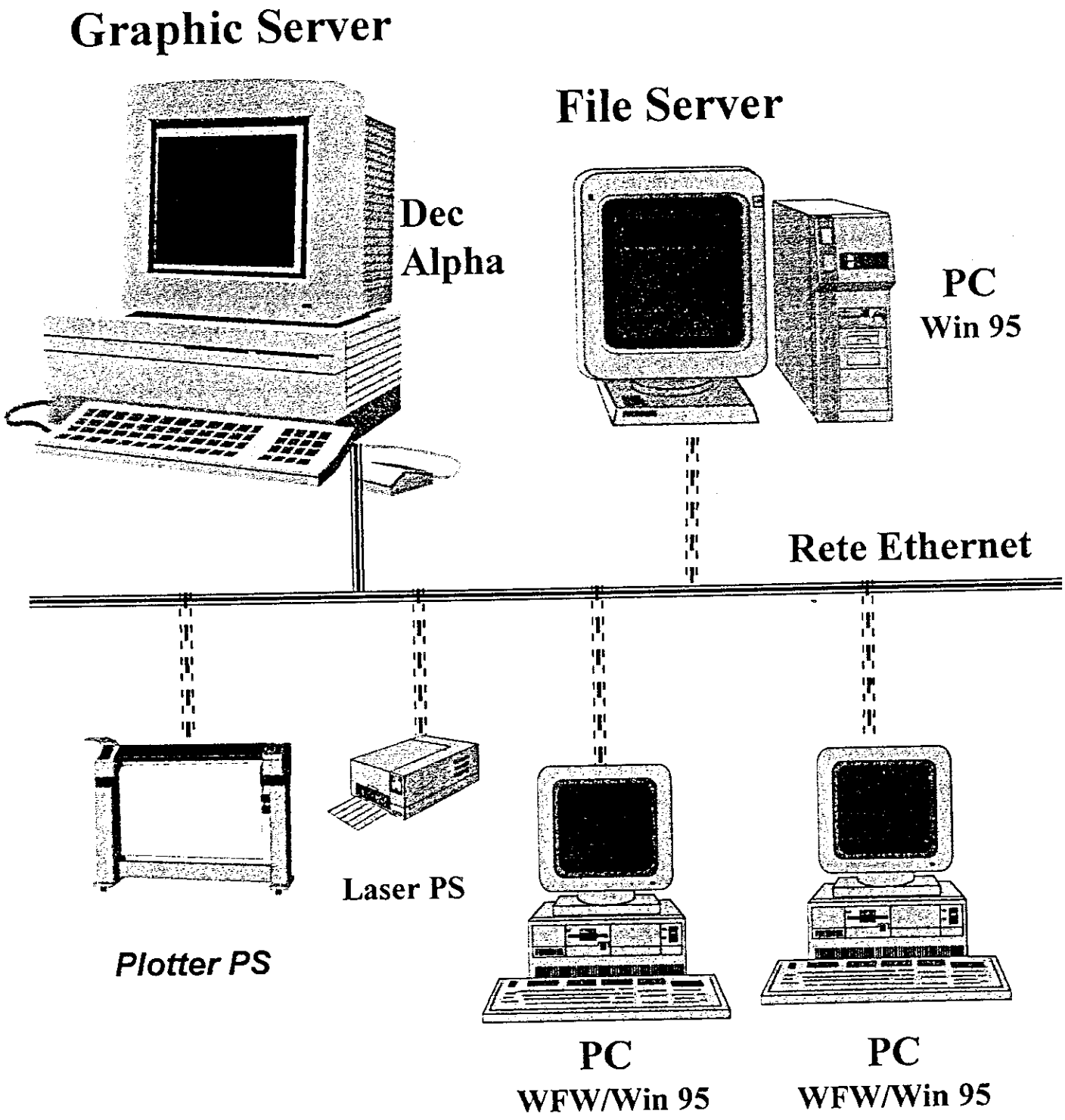
Graphical production and visualization in the CNMCA local area network

OUTLINE

- LAN architecture
- Production of graphic files
- Visualization
- Future developments



"Pratica di mare" Airport


Graphic Server
File Server
Dec
Alpha
PC
Win 95
Rete Ethernet
Plotter PS
Laser PS
PC
WFW/Win 95
PC
WFW/Win 95

GRAPHIC SERVER

Workstation DEC/ALPHA

- OSF/1 Operating system
- Dec GKS
- Emoslib
- MAGICS
- Interface software ("Elaboral") to MAGICS:
  - read a parameter file;
  - call Magics routine according to the instructions in the parameter file
  - generate a ps file
- conversion format (ps to bmp,ps to gif,ps to jpeg)

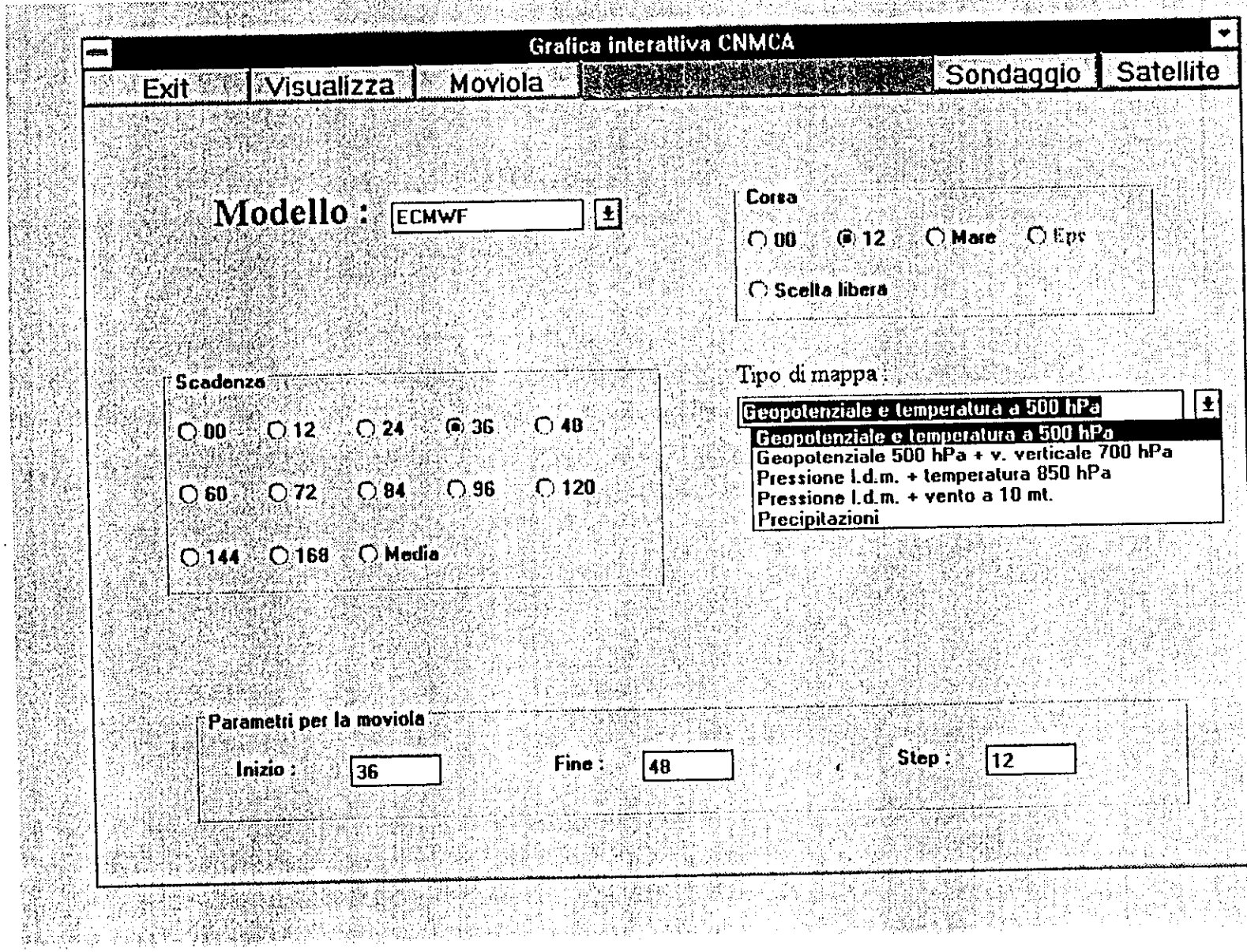
Satellite graphic files

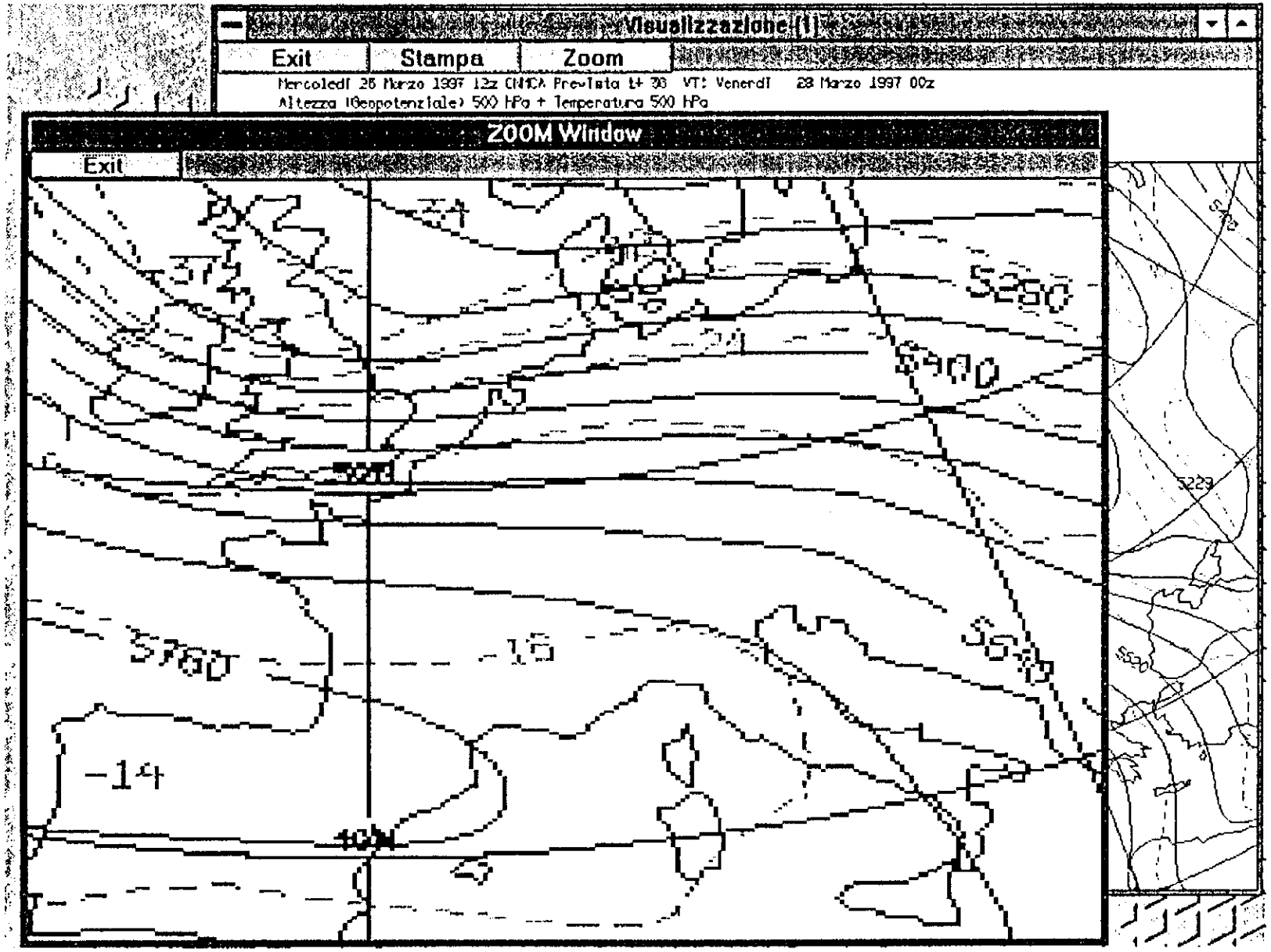
- FEM
- FET
- DEC Alpha (Open Vms)
  - generation of a compressed (4 bit) image
  - Cloud top height
  - Sea temperature
  - Conversion of raster file in **GIF** format

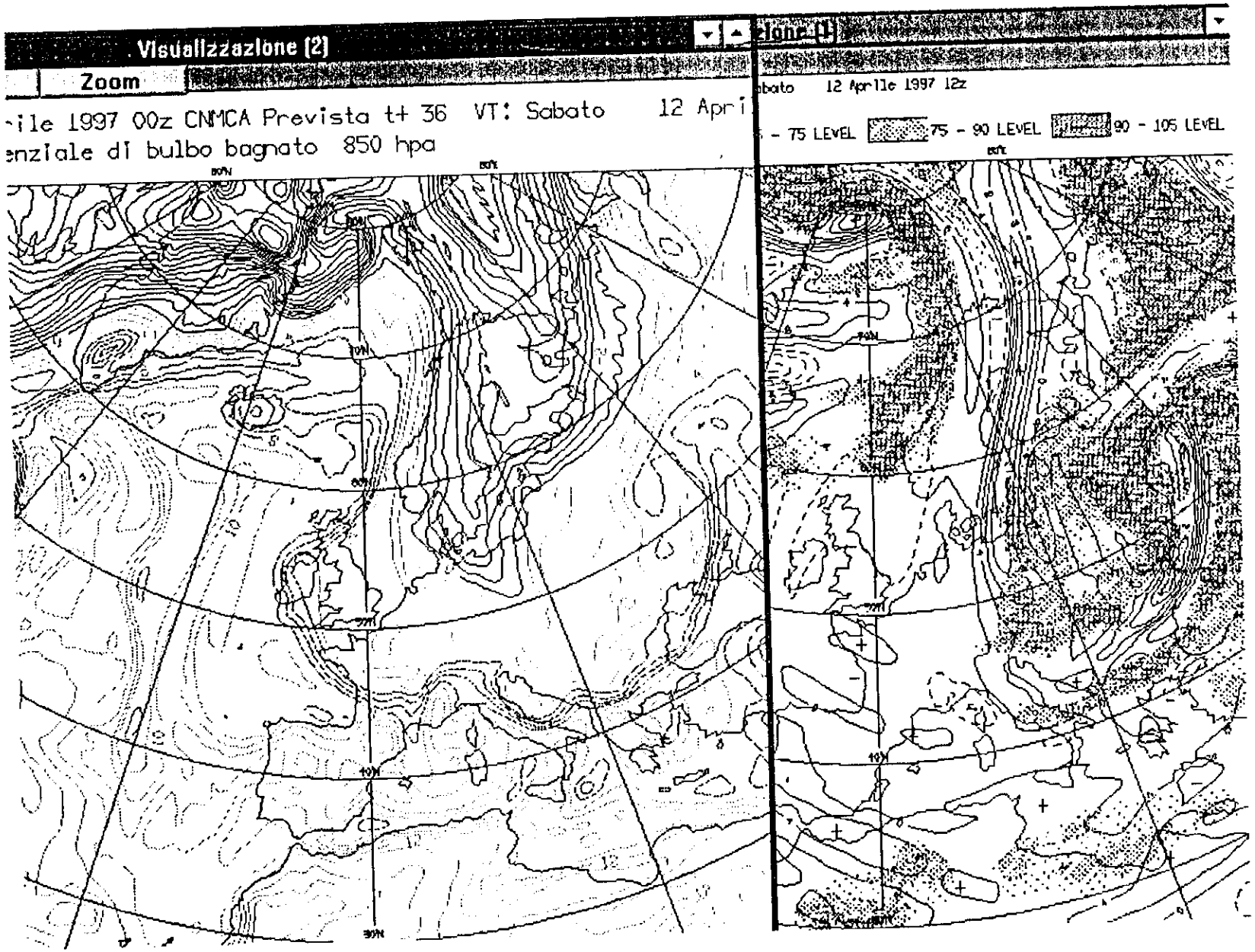
Visualization

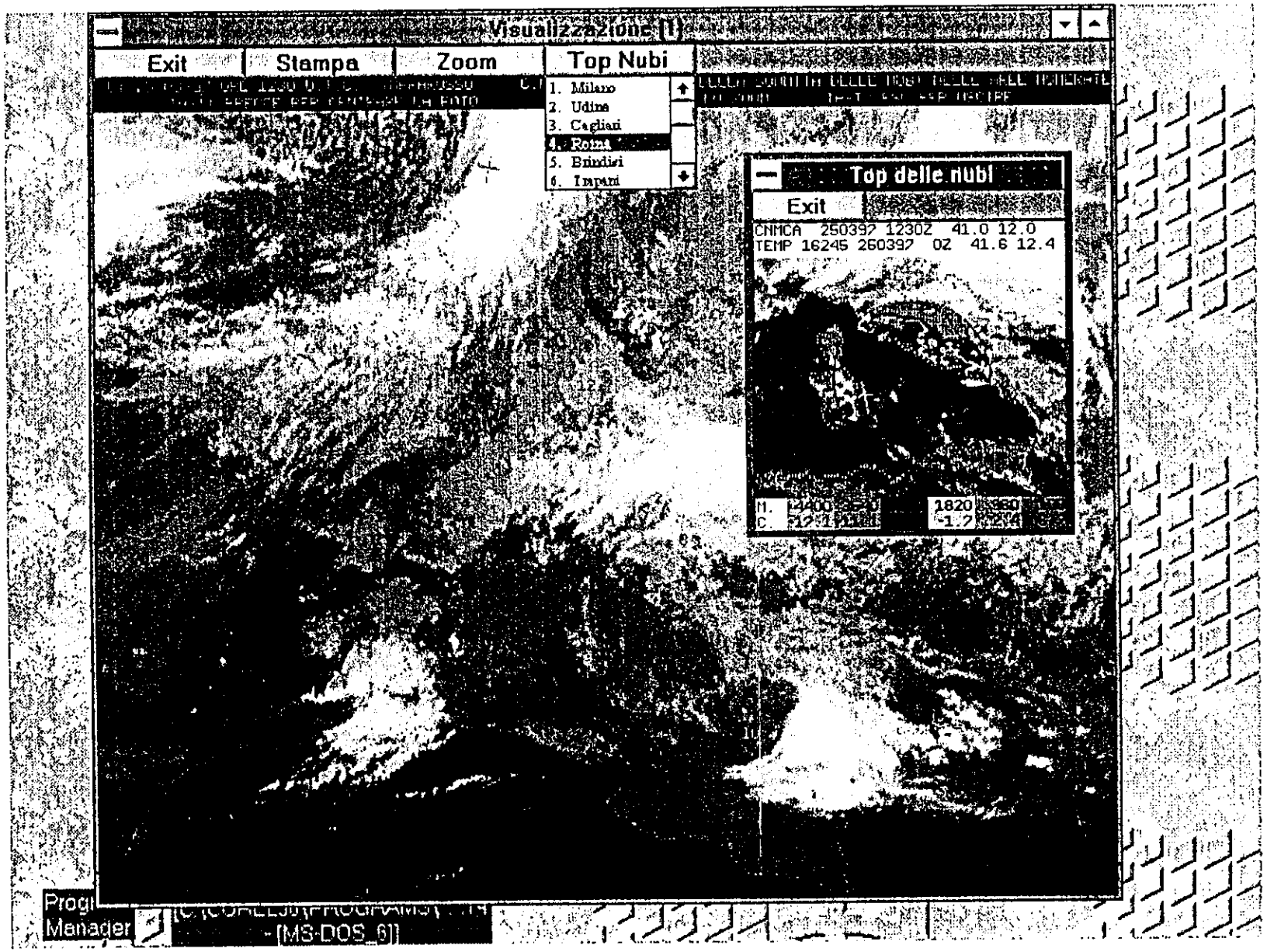
All graphic files are archived in a file server (pc pentium win95 , 2 Gb)

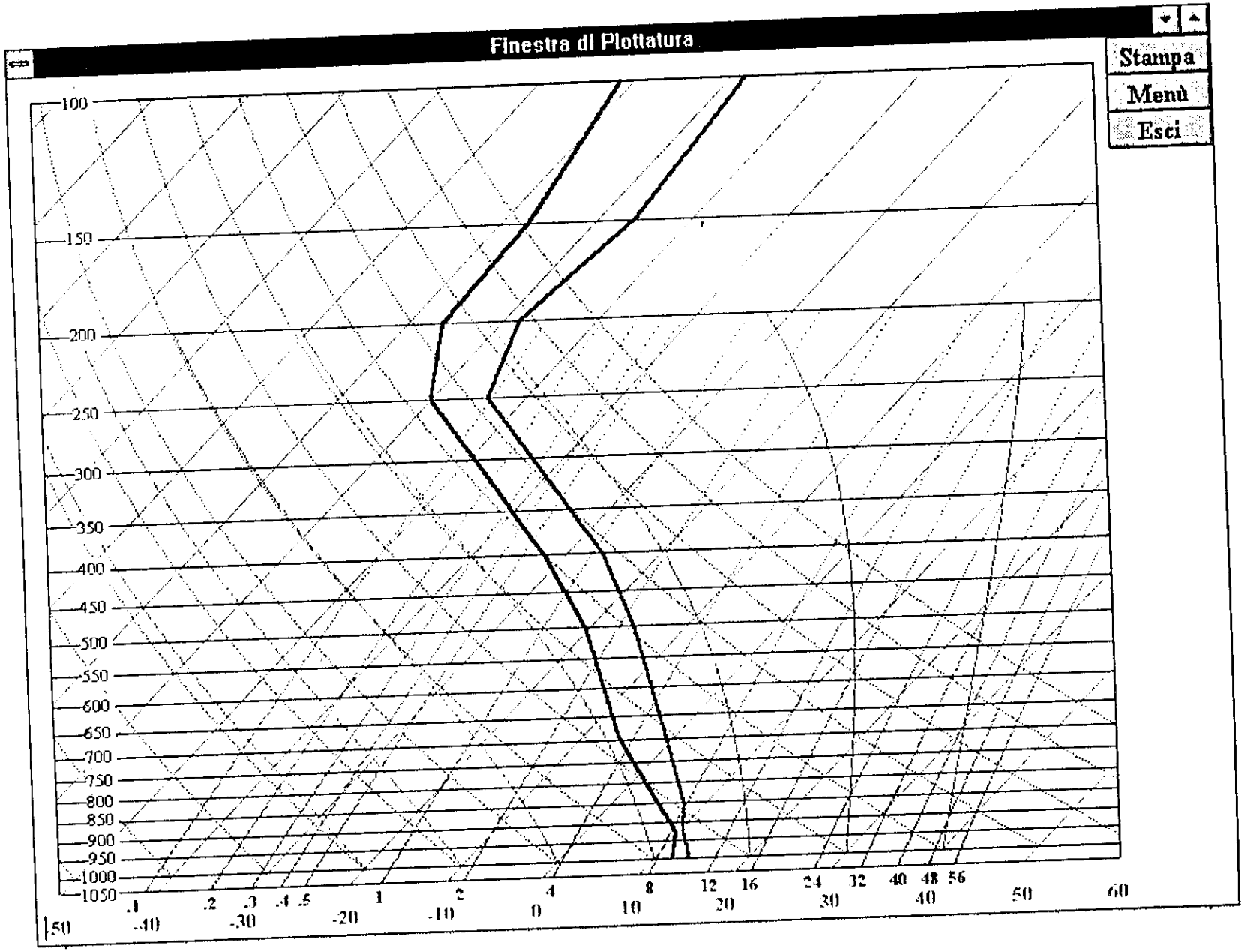
- Software:
  - GUI in Window 95 enviroment
  - multiwindow, zoom, animation
  - plot of thermodinamics diagram


Grafica interattiva CNMCA
Exit
Visualizza
Moviola
Sondaggio
Satellite
Modello :
ECMWF
Corsa
00
12
Mare
Eps
Scelta libera
Scadenza
00
12
24
36
48
60
72
84
96
120
144
168
Media
Tipo di mappa :
Geopotenziale e temperatura a 500 hPa
Geopotenziale e temperatura a 500 hPa
Geopotenziale 500 hPa + v. verticale 700 hPa
Pressione l.d.m. + temperatura 850 hPa
Pressione l.d.m. + vento a 10 mt.
Precipitazioni
Parametri per la moviola
Inizio :
36
Fine :
48
Step :
12


Visualizzazione (1)
Exit
Stampa
Zoom
Mercoledì 26 Marzo 1997 12z CNMCA Previsto t+ 36 VT: Venerdì 28 Marzo 1997 00z
Altezza (Geopotenziale) 500 hPa + Temperatura 500 hPa
ZOOM Window
Exit
5250
5280
5160
-14
-16


Visualizzazione [2]
Zoom
-ile 1997 00z CNMCA Prevista t+ 36 VT: Sabato 12 Apri
enziale di bulbo bagnato 850 hpa
bato 12 Aprile 1997 12z
- 75 LEVEL
75 - 90 LEVEL
90 - 105 LEVEL


Visualizzazione [1]
Exit
Stampa
Zoom
Top Nubi
1. Milano
2. Udine
3. Cagliari
4. Roma
5. Brindisi
6. Trapani
Top delle nubi
Exit
CNMCA 250392 1230Z 41.0 12.0
TEMP 16245 260397 0Z 41.6 12.4
1820
-1.7
Progr
Manager
-[MS-DOS_6]


Finestra di Plottatura
Stampa
Menù
Esci
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
1050
.1
.2
.3
.4
.5
1
2
4
8
12
16
24
32
40
48
56
-50
-40
-30
-20
-10
0
10
20
30
40
50
60

FUTURE DEVELOPMENTS

- New features of the graphic server :
  - METVIEW :
    - routine to access the RDBMS of the new Front End;
    - use of macro language to define new operative productions;
    - routine to generate aeronautical maps:
- Dissemination of the graphic files to remote users using INTRANET

Common Desktop Environment and Intel based workstations

Jacob Brock
Danish Meteorological Institute

Experiences on using the Common Desktop Environment (CDE)

HP, Sun and DEC, and some other workstation vendors as well, have agreed upon using the same graphical interface and layout for the desktop; the graphical interface you meet, when you log onto the workstation console. It is called the Common Desktop Environment or CDE for short.

We have used the CDE in the development team for about a year by now. In that time we have only experienced one major drawback: We are using a central mail server, which we NFS mount. If the mail server goes down, the whole desktop will lock within a few minutes. Apparently, the desktop has the mail tool as an integrated part, which does active polling, hence no response means everything locks up - except the window in which you are working when the polling starts.

Although not as severe as the problem just explained, two other errors have been noticed: One is that when you do a selection of text with the mouse, text in a number of columns in another text window may disappear. It can be brought back by iconifying the window and opening it again or by scrolling away and back, but it is annoying. The other error is in the standard text editor. If you are using a number of them and do not open and close them in strict stack order, all of them may suddenly fall over if you close one of them. The contents and changes are not lost, as the editors will save their current contents on the way down, but it is disruptive in doing development.

One of the things that should be nice in the CDE is the possibility to do localization. Localization is a feature which allows you to choose language specific resource files for your applications at login time. It works partially, but unfortunately not on the user level. It is not possible for the user to have localized resources, or anyway, we can not get it to work.

In the operational environment, these errors (except the localization problem) are of no importance as mail, text windows and text editors are not used. The main advantage of the CDE so far has been the ability to have numerous workspaces or virtual screens between which you can switch quickly. No iconification and deiconification, just a click at a button on the front panel - or even just the press of a function key - and the system will switch to another virtual screen with other applications running. Furthermore we have enabled the users to configure their workspace with colour, fontsizes and the like, which they are quite happy to be able to.

Another feature of the CDE is the ability to save the current session, as it is termed. That is, when you log off, the window manager will record where the applications windows are displayed. The next time you log in, the application windows will be placed just the same way as when you logged off.

Our applications have been integrated into the desktop. They can be started from the main control panel, and from a background menu anywhere on the screen(s).

Until now, all operational users have used the same login, and hence the same configuration of the desktop. With the introduction of CDE, we are going to experiment with personal logins for the operational users. It will probably turn out to be a necessity in order to avoid too much reconfiguration, as the likes and dislikes are quite different from one person to another.

Having numerous users, each with their own configuration, it can be a hard task to maintain the systems from a system administrators point of view, releasing new versions of applications and so on. But with the use of the application packaging system of System V UNIX, and a well defined placement of resource and configuration files, the task of installing a new or updating an old version of an application has been fully automated. As well as installing the new (version of) the application, and making it available for the users, the desktop description files for all users are updated automatically as well.

The CDE has been used operationally for nearly two months by now, and the users are quite happy about it.

Running Solaris UNIX on an Intel platform

Until recently, we have only used SUN Sparc workstations for the use of the forecasters. But just after the last meeting at EGOWS in Reading, we decided to have a closer look at high end PCs. Keeping in mind that the operating system for the SUNs, Solaris 2.5, had been released in an Intel version, we bought a 200 MHz Pentium Pro based PC with 2 Gb of disk and 128 Mb RAM, and put a high quality graphics card into it. Then we started off to get Solaris onto the system.

The Intel version of Solaris comes with a few boot diskettes, but pretty soon we realized that they were completely outdated. Instead we downloaded the latest version from SUNs homepage, and using these, we managed to get Solaris installed and running. Common Desktop Environment (CDE) software was installed as well, and put to work. It worked and it was fast! Coming from an 85 MHz SparcStation 5, the speed was amazing.

Next step was to get our own software running on this new platform. Of course we had to get a new compiler, and for a start, we downloaded a demo licensed version of SUNs compilers. Later on we have bought it, and we have gcc running as well.

Compiling the programs did not bring any major surprises - apart from the fact that the compiler runs about 10 times faster on the Intel platform. But running the programs gave some surprises. Some programs had no problems, others just garbled up. The solution to this problem was to be found in hardware and the way binary data is handled by the different CPUs: Intel based machines are LSB (Least Significant Byte first) where as RISC processors are MSB (Most Significant Byte first). This difference is only a problem in programs, which read binary data files containing entities of more than one byte, typically integers and reals, and if the file has been written on a machine of the opposite type.

Once we had realized the problem, it was fairly easy to rewrite the input library of the relevant programs to do byte swapping when reading data. And then they worked too.

Within approximately two weeks, we had all major programs ported and running in a test version on the Intel platform.

Next step was to find out how the Intel platform performed compared to a baseline SUN workstation. We got the possibility to test it against a 167 MHz Sparc Ultra 1 with the same amount of disk and memory, and with TGX graphics.

We tested it with 5 different types of programs, three of them based on graphics, two on calculation.

In the graphics test Display PostScript (DPS) was tested displaying a file containing 100.000 vectors, 10.000 circles and 10.000 filled circles. Pure X was tested by drawing a map of the northern hemisphere 10 times in a row. Images were tested by loading and displaying 24 infrared satellite images.

In the calculation test, a program for interpolating satellite images for a 24 hour period was run. This program has a lot of I/O and a lot of calculations with floating point and complex

numbers. The other program is for geometric reprojection of satellite images, a raw image containing 6.25 Mbyte of data. There is not much I/O, but a lot of trigonometric calculations.

The running time of the programs (the source code of which were identical for the two platforms) was measured a number of times, mainly using the "time" command, but for graphics also using a stopwatch. The average running time measured in seconds were as follows:

The machines in the test were as follows:
SPARC Ultra: 167 MHz SPARC Ultra, TGX graphics (1152 x 900)
Pentium: 200 MHz Pentium Pro, "Number Nine" graphics board (1280 x 1024)
Both platforms equipped with 128 Mb RAM, 2.1 Gb SCSI disk, 20" colour screen.

Program	SPARC Ultra	Pentium	Ratio
DPS	34.5	23.0	0.67
X	9.0	8.9	0.99
Images	48.1	41.8	0.87
Interpolation	1074	886	0.83
Reprojection	38	44	1.16

"Ratio" is running time on the Pentium relative to the running time on the Sparc.

As can be seen from the figures the Pentium is at least as fast as the Spare for graphics. In calculation, Pentium is faster when there is a lot of I/O, but slower when is comes to pure number crunching.

Taking into account that at the time of this small comparison we could buy three Pentium based machines for the price of one Sparc Ultra, the Intel platform had by far the best price/performance ratio.

Next step was to get the Intel running with two screens. On a Sparc this is no problem, just plug in another graphics board, reboot and the X-server is ready to use the new graphics board as well. Not so with the X-server, shipped with the Intel Solaris. It can only manage one screen!

Well, we had to call the hardware vendor, and to have a look around on the net. We found another X-server, named "Xaccel", and had it put in place. A few configurational things and it was running. Great, let's test our programs. All were running - that is except the two based on Display PostScript. Xaccel does not come with DPS!

Fortunately this was not the first time we would have to manage without DPS. At some stage we had the same experience with at few releases of SunOS's, and then we turned to using GhostScript. A quick search in old versions of our software, a new version of GhostScript from the net, and a couple of days programming was the cocktail to cure the problem.

And finally, we actually had a full Solaris and CDE environment, supporting two screens, up and running on the Intel platform. This effort brought along the decision that future upgrades of equipment would be based on the Intel platform.

A hard time followed constructing a development environment in which it is possible to develop to both platforms, using the same source files, makefiles and so on. It is not straight forward, but it has been done.

In the middle of April this year we had the first batch consisting of 8 Intel workstations ready for operational use. They were "only" 180 MHz versions, as this was the fastest availa-

ble at the time of purchase. They were put in service at the meteorological services at airfields and minor airports to replace 5 year old SUN IPC's. The Intel workstation has meant a major boost of the computing power in these places. A number of applications, particularly the ones loading a number of images at start-up, are running up to 10 times faster than on the old machines, and has turned the meteorological workstation into an efficient tool.

From a technical point of view, there is a big difference in getting a traditional workstation up and running and doing the same with an Intel based one. First of all: you do not just buy a PC, you buy all the different parts to go into it and has it assembled. And in choosing the different parts for the computer, it is crucial to consult the Hardware Compatibility List, which is available on Sun's homepage. It describes in detail which disk controllers, graphics cards and so on is supported by Solaris.

Having put together the hardware, numerous drivers have to be installed. Much of this has been automated, but you may end up having conflicting devices where manual interception is required.

You can hardly buy any standard software which will be running on Solaris on Intel. We do not require that as most of our applications are written by ourselves, but when we first started out we could not even get a NetScape for the Intel platform. It did not turn up until around March this year. And do not expect very much support on drivers. The very first operational Intel workstation we put together is being used for blue screen imaging at a television station, and we needed information on drivers for the graphics board. Everyone was very helpful until they realized that we were running Solaris on the Intel. Never heard of it!

In short, we have had to do quite some pioneering work ourselves, but the result has been a fast and cheap alternative to traditional workstations. It has been built from well-known modules, which should be fairly easy and relatively cheap to replace and upgrade.

We still have to solve a small peculiarity when booting the machines. It is necessary to bring up the machine with the standard SUN X-server to activate the mouse cursor. Then we can change to the Xaccel X-server, which drives two screens. Starting the Xaccel X-server just after a boot leaves us with a dead mouse...

GOP : SYNERGIE's users group experience

Yves BIDET
METEO-FRANCE
DIRSE/BED

0- Introduction

As you probably all know, SYNERGIE has been implemented at METEO-France in both National and Regional Forecast Services, thus involving over 70 forecasters. Shortly after Synergie's installation a user's group was established. It was named GOP (standing for the french "Groupe des Outils de la Prevision", "Forecast's tools Group" in english).

My talk simply describes this user's group experience, giving some answers to questions that you might have been eager to ask about it. I shall start with the "Why?", detailling the reasons which laid to the GOP's creation. I shall go on with the "When?", giving some dates about the group's creation and making clear the context in which it took place. I shall next say some words about the "Who?", the people whom the GOP is composed of. Then will come the" How?", which I consider to be the most proeminent subject, and I shall illustrate it by giving some examples that shows the way the group works, how this work leads to improvements which themselves make new questions arise, and so on. Finally, I will say a few words about the "What's next?", giving some views about the group's future activities.

1- The Group's purpose

The first group's purpose is merely to ease dialog between forecasters and developpers. In fact the group acts as a link between those two separate worlds, which might without it not always manage to understand each other. Between those two, languages and viewpoints are sometimes a bit different.

Therefore, the group must be both sides directed, from forecasters to project and from project to forecasters. From forecasters to project, it carries such things as bugs reports, modifications requests and new functionnalities needs. From project to forecasters, it conveys the project's questions about data content's specification, successive validation of software versions and functionnalities specifications.

In fact, the need for a user's group became obvious at the very beginning of SYNERGIE's use, when the project wanted to know which numerical fields were to be sent to Regional Forecast Services through the 9600 bits/s transmission lines. This rather simple question could not find a simple answer, each service asked giving its own, which was of course different from the previous ones. As the choice was to be done quickly, it was the project which made it, which did not sound satisfying to the project's chief and made him think of a user's group.

But beyond this major communication function, the GOP's second function is to imagine new forecasting methods. SYNERGIE's arrival in the forecast services brought new opportunities, due to the great increase of information sources. But this information quantity's rising was also a potential risk, as shown in this diagram drawn after the results of a study conducted in the US Weather Service. According to theory (Green curve), one will expect forecast's skill to be improved whenever you add information. The slope of the curve will just gradually reduce, each new information being more and more superfluous with the others. In reality (red curve), the skill improves up to a certain amount. Past a threshold, it then decreases, as each new information was bringing more confusion than help.

This fact, and the limited time provided to the forecaster to do produce his forecast, clearly emphasizes the need for adaptative information selection, depending on weather conditions.

New ways of handling information have to be determined and this is a real challenging work for the group to build a new relashionship between the forecaster and his work station.

2- The Group's history

Let's now compare some dates between SYNERGIE's project schedule and the user's group launching.

SYNERGIE' very start is eigthy nine, with a first operationnal pre-version at Regional forecast services in ninety two and full installation in June ninety four. Altough the user's group's creation was decided just after installation, it took a few months to come to the official creation's decision and to prepare the first GOP's meeting, which was held in Aix en Provence in March ninety five.

One remarquable point about the GOP's official purpose is that it is beyond SYNERGIE. It comprises reflexions on existing forecaster's tools at Regional forecast services (Synergie obviously being the most important) as well as reflexions of future tools.

3- The Group's composition

The group was designed in order to represent in the most comprehensive way Synergie's users. *Next slide (composition Synergie au 31/12/94)* shows the geographical location of the group's members compared to that of Synergie's servers at the time of group's creation As you can see, the matching between the two is quite satisfying.

Members come from the different services involved in Synergie's use. Regional and National forecast Services, but also the Meteorological school. Synergie's project chief is a GOP's member, since we wanted to connect the goup's works to the project, so that direct dialog might be possible.

With this present composition, we ensure a good representation of each forecaster, should he work on general forecasts or be specialized in marine or aeronautic forecasts.

4- The Group's ways of working

4.1- Main subjects :

I shall now come to what I consider the central part of my paper : how does the group work, and how does he manage to fit the reasons it was created for?

As for the means of work, the more visible are the 3 to 4 group's meetings a year. This full group's meetings provide occasions for discussing final details and officialy adopting the group's advices.
But of course the greatest part of the work is done outside these meetings. The multiple geographical locations of members have a disadvantage : it brings more difficulties in communicating inside the group. The post mail rapidly proved to be inadequate, leading to unbeareable delays, and the installation of electronic mail was decided, which was a new thing at least for those members being forecasters.This greatly increased exchange's speed and enabled us to work on a "version after version" mode (one member submitting a proposal, another correcting it and submitting the result, and so on).

As the questions coming to the group became more precise and numerous, we had to change our initial working's way. We used to submit all subjects to every group member, we now have to designate sub groups in charge of specific subjects. The sub groups must prepare documents and propositions on these subjects (they would possibly seek help from other GOP's members or any forcasters they know), and their advices are presented to the GOP for final approval

But what are these subjects the group is involved in? The first one is the sorting of individual requests about the GUI's interface, functionnalities modification or addition. Before the GOP's creation, forecasters were asked to express their requests or complains by filling a form which was sent to the project. This method proved to be efficent to detect bugs, but when it came to modifications suggestions, there were often alternative or even contradictory requests for the same functionnality. So the first group's job was to gather 109 user's requests, and to ask the greatest number of forecasters which were the most important. As a result, 34 of the above mentionned requests were selected as high priority requests. These requests concerned functionnalities processing speed, data archives, nedd for new fields ans new imageries functionnalities, improvement of observed and forecast precipitations, and some others

Synergie's improvement and new functionnalities development gradualy making some of these requests meaningless and bringing the emergence of new requests, the list was revised a few months ago. Out of 64 old or new remaining requests, 15 were selected as being high priority ones.

Another big work for the GOP is the cross examination of specifications. there are currently five or six different specifications that are being examined by the user's group.

4.2- Examples :

My first example will be on toggle for superimposition. *This slide(fig vv 850)* shows a model field displaid in a Synergie's window . As Synergie possesses the ability to superimpose any other desired field or image, the first idea was to foresee which other data the forecaster would need after drawing the initial field . This work was done for each type of numerical model field and the additional data were automatically brought for the server to the work station whenever the main data was called. In the window, a little toggle is set. By clicking it, the forecaster can make the data visible or erased. *In that example(fig vv 850)*, the wind field is drawn when the toggle is clicked.
After a time of use, the forecasters asked for more toggles in their windows. This matched the working method of superimposing and removing diferents kind of fields or images. Synergie's windows now tend te ressemble *this one(fig vv 850 avec superposition).*
But with that way of using the toogles, the need for multiple toggle's selection, which was not initially possible, became strong. With simple selection, it took a few seconds for a field to appear or disapear, and that small amount of time multiplied by four or five was a non neglectable waiting time for the forecaster. In next 3.0 Synergie's version multiple selection would be available through Ctrl+click.

My second example will be on « macros », which is a Synergie functionnality that enable forcasters to select several windows, store them as one entity by giving a name, and then recall these windows with updated data by selecting the name whenever they need.
Initially, macros were considered interesting, but they were not really used by the forecasters. This was mainly due to the lack of fiability. For instance, in Synergie's first versions, macros had to be rebuilt after each system's upgrade. Many requests were made concerning macros, such as to keep all windows settings when calling a macro, to include soundings in macros. A better way of managing macros was also asked.
This is (fig nouveau interface macro) the brand new 3.0 macro's interface. As you can see, forecasters can now store macros in separate files. In each file, they can interactively sort macros after the names, the author or the date of creation.

Macros possibilities could greatly help in establishing new forecasting methods. I shall now show some macro's examples built for a precise purpose. All following examples are taken at South East Regional Forecast at Aix en Provence.

The first macro(4 fenetres avec TA850) is designed to detect predictors of strongly convective events common in the southern part of France. Here are drawn some of the best connected meteorological fields with such events. Potential temperatures at very low levels (850 and 950 hPa), wind convergence and humidity at same levels. I drive your attention to the window to the bottom right, which might seem a bit confusing. It shows the superimposition of absolute vorticity at 850 hPa and 300 hPa. By having the lattest displaid or erased, the forecasters can make appear possible connections between upper and lower levels circulations and detect favorable conditions to strong convection.

Next example(macro petites fenetres) is a macro used by aeronautic forecasters at Aix en Provence. The small windows display winds at different VFR flights levels. The ground level temperature may give some informations about spatial distribution and evolution of convective levels and the time of beginning of convection. These forecasts are usefull for such users as gliders.

Next macro(4 images sat et radar) is used for rainy conditions watching and nowcasting. The visible and infra red satellite images, the local Nimes' radar image and composite of french radars, mix with the red dots showing lightning impacts, enable the forcaster to follow the heaviest precipitating areas and try to predict the next minutes positions.

But new methods may sometimes directly derive from new products. For instance, *this sattelite image(composition coloree)*, which is a composition of measures at different vawe length channels,is operationnaly sent since a few weeks at all forecast services. Its algorithm try to discriminate automatically upper clouds such as cirrus, which are in a light transparent white blue, and lower level clouds such as stratocumulus, which appear in a yellowish color.

As you can see in all these examples, this is only a very beginning in the way of establishing new forecasting methods. Much work is still to be done, but we have great hopes that new possibilities of Synergies work stations, such as those described yesterday by Patrick Benichou (alarms and elaborate diagnostics for instance) would be a strong help towards a bigger change in forecasting methods.

5- Group's future :

As a conclusion, I would now say a few words about the "what's next", and perhaps a proper answer could be : « nothing ». At least nothing else than going on what has been started. We will notheless focus attention on three particular points. First, the customisation of work stations, with specific sets of configuration and macros depending upon the kind of user. Second, as I just said, extending the work on new forecasting methods. Third, taking part along with Synergie's program into a new training. Last forecaster's training was held nearly three years ago, and Synergie has improved and change so much since then that we feel that a new training program is now essential.

GOP (SYNERGIE's Users Group) Paper's plan

- PURPOSE (Why?)
- CREATION (When?)
- COMPOSITION (Who?)
- WORKS (How?)
- FUTURE (What's next?)

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GOP (SYNERGIE's Users Group) WHY ?

- Make dialog easier
  - from forecasters to project
    - » bugs reports
    - » GUI's modifications requests
    - » needs for new functionnalities
  - from project to forecasters
    - » data content's specification
    - » validation
    - » fonctionnalities specification
- Building up new forecasting methods

METEO FRANCE

GOP (SYNERGIE's Users Group) WHO ?

- Members
  - one from each Regional Forecast Services (DIR)
  - two from the National Forecast Service (SCEM)
  - one from the National Meteorological School (ENM)
  - two chiefs of forecast-related projects
- Mix of forecasters / others users
- Direct relation with each kind of users
  - General
  - Marine
  - Aeronautic

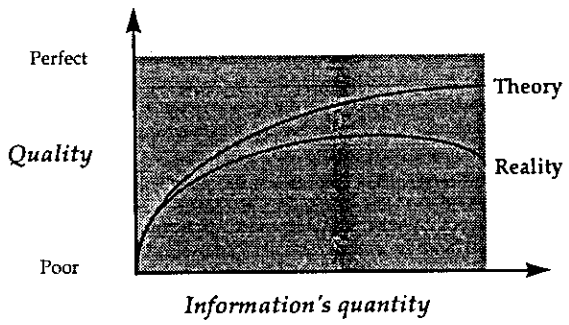
METEO FRANCE

GOP (SYNERGIE's Users Group) HOW ?

- Means of work
  - full group's meetings 3 or 4 times a year
  - Information's exchange (e-mail dissemination list)
  - Informal sub groups in charge of specific subjects
- Main subjects
  - Sorting of major requests
    - » *July 95 : 34 high priority requests out of 109*
  - Realease of requests
    - » *February 97 : 15 high priority requests out of 64*
  - Specification of new functionnalities

METEO FRANCE

GOP (SYNERGIE's Users Group)
WHY ? - Building up new methods -



→ Information's quantity must be reduced to the most significant elements

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GOP (SYNERGIE's Users Group)
WHEN ?

- *Beginning Project SYNERGIE : Year 89*
- *First pre-version (Synergie0) : July 92*
- *Synergie's operationnal installation : June 94*
- GOP's creation : December 94
- First GOP's meeting : March 95
- GOP's purpose : forecaster's tools
  - existing
  - future

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GOP (SYNERGIE's Users Group) HOW ? (Examples)

- Toggles for superimposition
- "Macros" interface
- New methods

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GOP (SYNERGIE's Users Group) WHAT'S NEXT?

- Continuing, with an enhanced focus on :
  - Improving the customisation of work stations
  - Extending the works on new methods
  - Taking part into a new forecaster's training program

METEO FRANCE

1997 EGOWS Meeting at
METEO FRANCE
9 - 12 June 1997

Session 3 : Interactive Production :

Swiss Meteorological Institute-*Paolo Ambrosetti*

UK Met office - *Phil Dominy*

Jersey Meteorological Department - *Antony Pallot*

Meteo France - *Stephanie Desbios*

Swiss Meteorological Istitute

METEOROLOGICAL WORKSTATION PROJECT

8th EGOWS Meeting

Toulouse, 9 - 12 June 1997

Interactive Production:

Forecast Product Editor

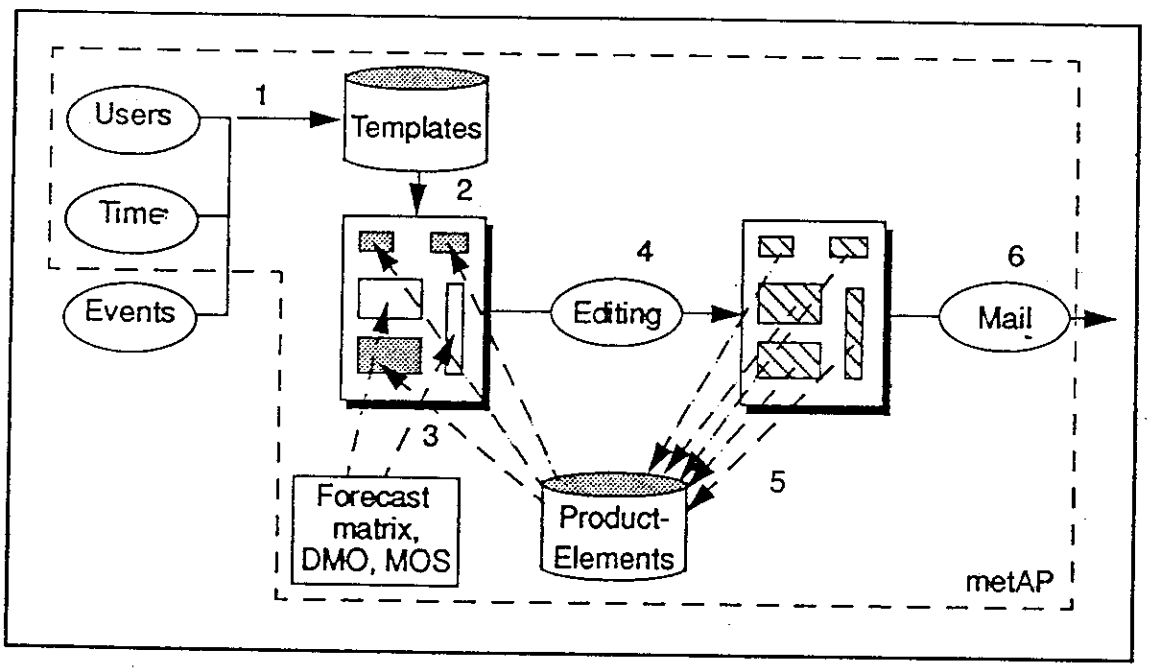
P. Ambrosetti
Swiss Meteorological Institute
Locarno-Monti, Switzerland

FORECAST PRODUCT EDITOR

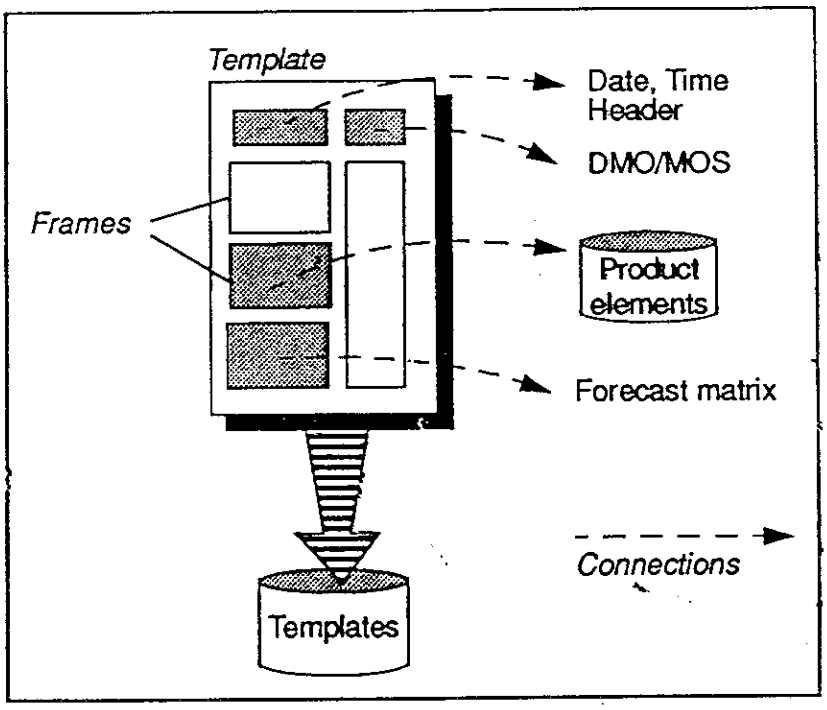
Requirements:

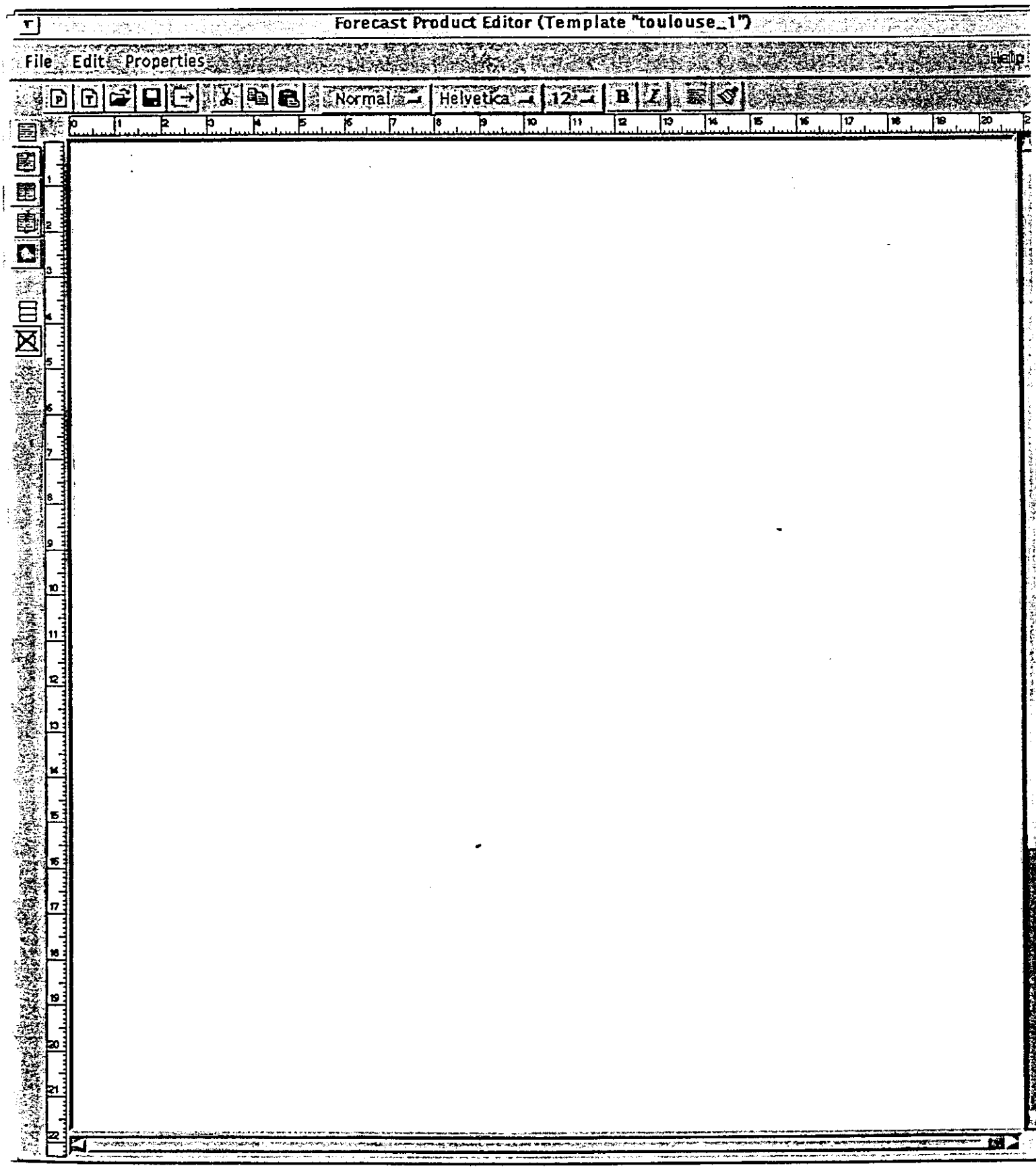
- Workplan (direct choice of products)
- Template Editor
- Product Editor
- Text, Table and Graphics Editor
- "Re-usability" of forecast components
- Direct link to a Forecast DB
- Choice of Output Formats
- Automatic Distribution

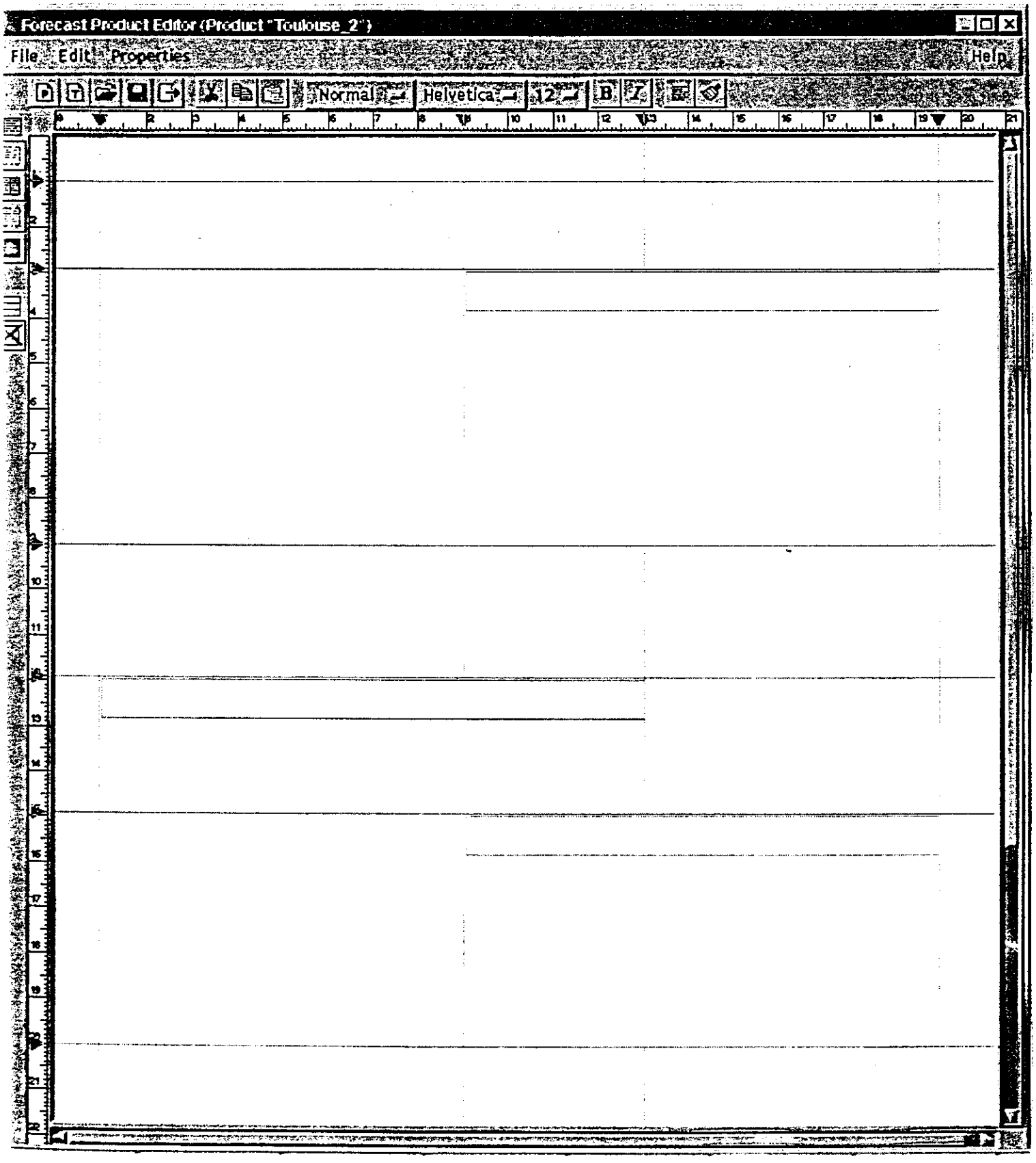
Subproject 4: Forecast Product Editor



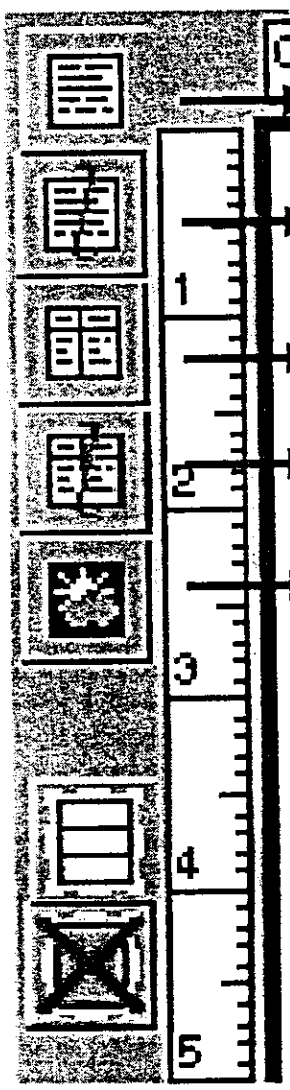
Subproject 4: Templates




Forecast Product Editor (Template "toulouse_1")
File
Edit
Properties
Help
Normal
Helvetica
12
B
I


Forecast Product Editor (Product "Toulouse_2")
File
Edit
Properties
Help
Normal
Helvetica
12
B
I

FORECAST PRODUCT EDITOR



Define an editable text element

Define a link to a text block

Define an editable table

Define a link to an existing table

Define an editable graphical element

Forecast Product Editor (Template "Toulouse_2")

File Edit Properties Help

Normal Helvetica 12 B

Text <Toulouse_1/text10>

Table <Toulouse_1/table0>

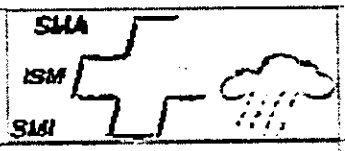
Text <Toulouse_1/text14>

Table <Toulouse_1/table0>

Forecast Product Editor (Product "paolo_1")

File Edit Properties Help

Header_6 Helvetica 16 B I



Header

Nuovo test

Normal

Header 1

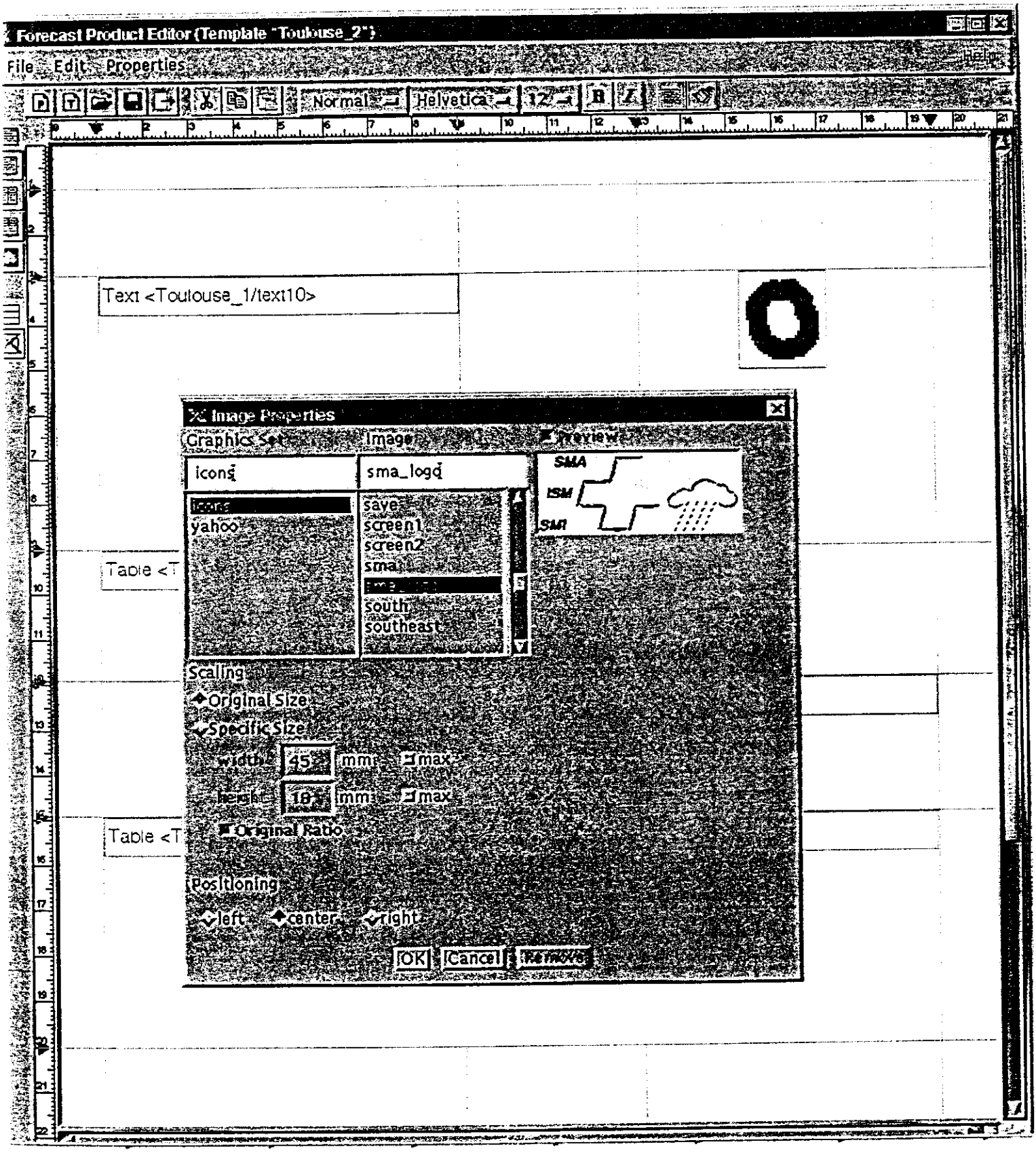
Header 2

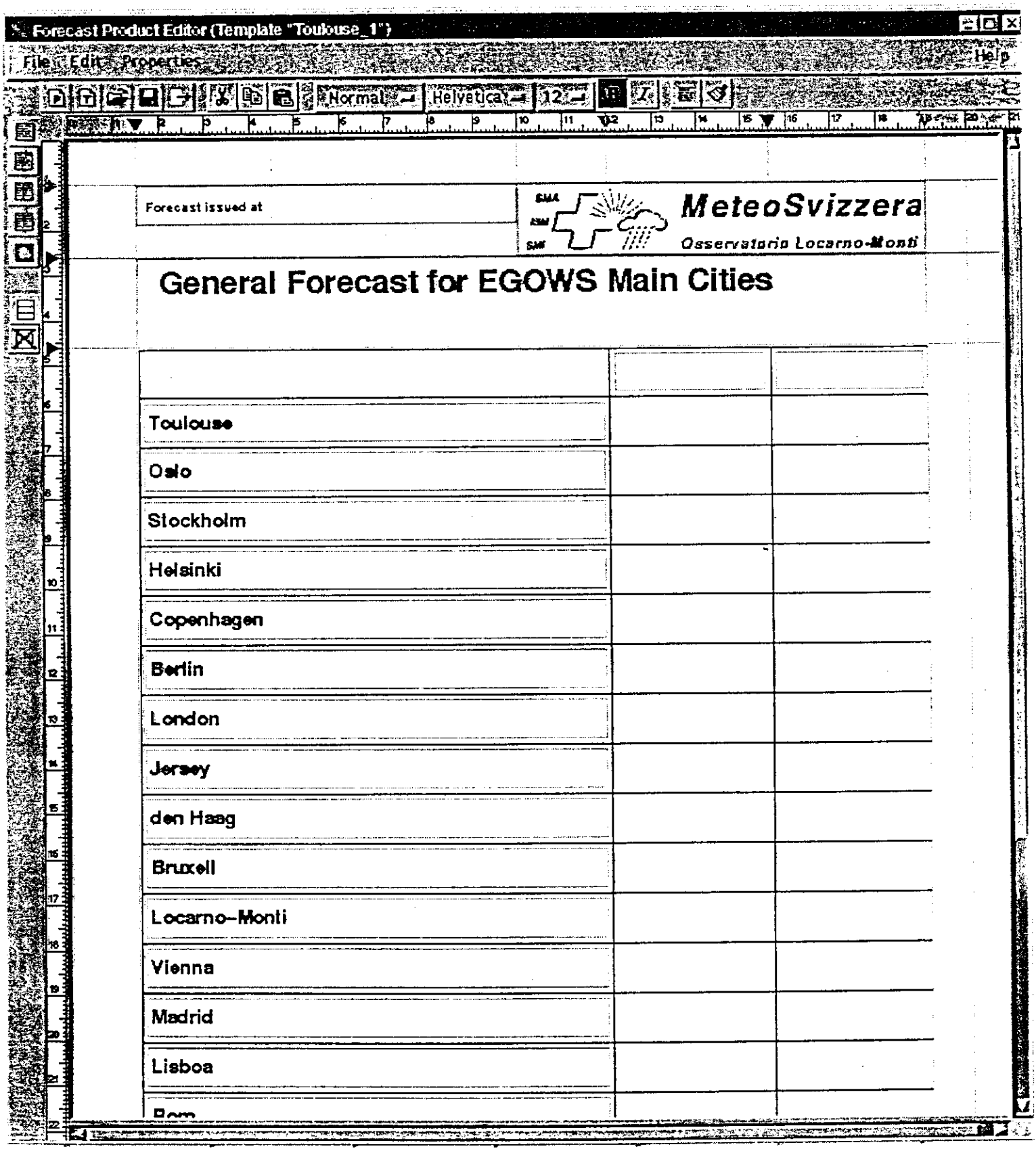
Header 3

Header 4

Header 5

Header 6


Forecast Product Editor (Template "Toulouse_2")
File Edit Properties
Normal
Helvetica
12
Text <Toulouse_1/text10>
Table <T
Table <T
Image Properties
Graphics Set
Image
Preview
icons
sma_logo
icons
yahoo
save
screen1
screen2
sma
south
southeast
SMA
ISM
SMR
Scaling
Original Size
Specific Size
width
45
mm
max
height
18
mm
max
Original Ratio
Positioning
left
center
right
OK
Cancel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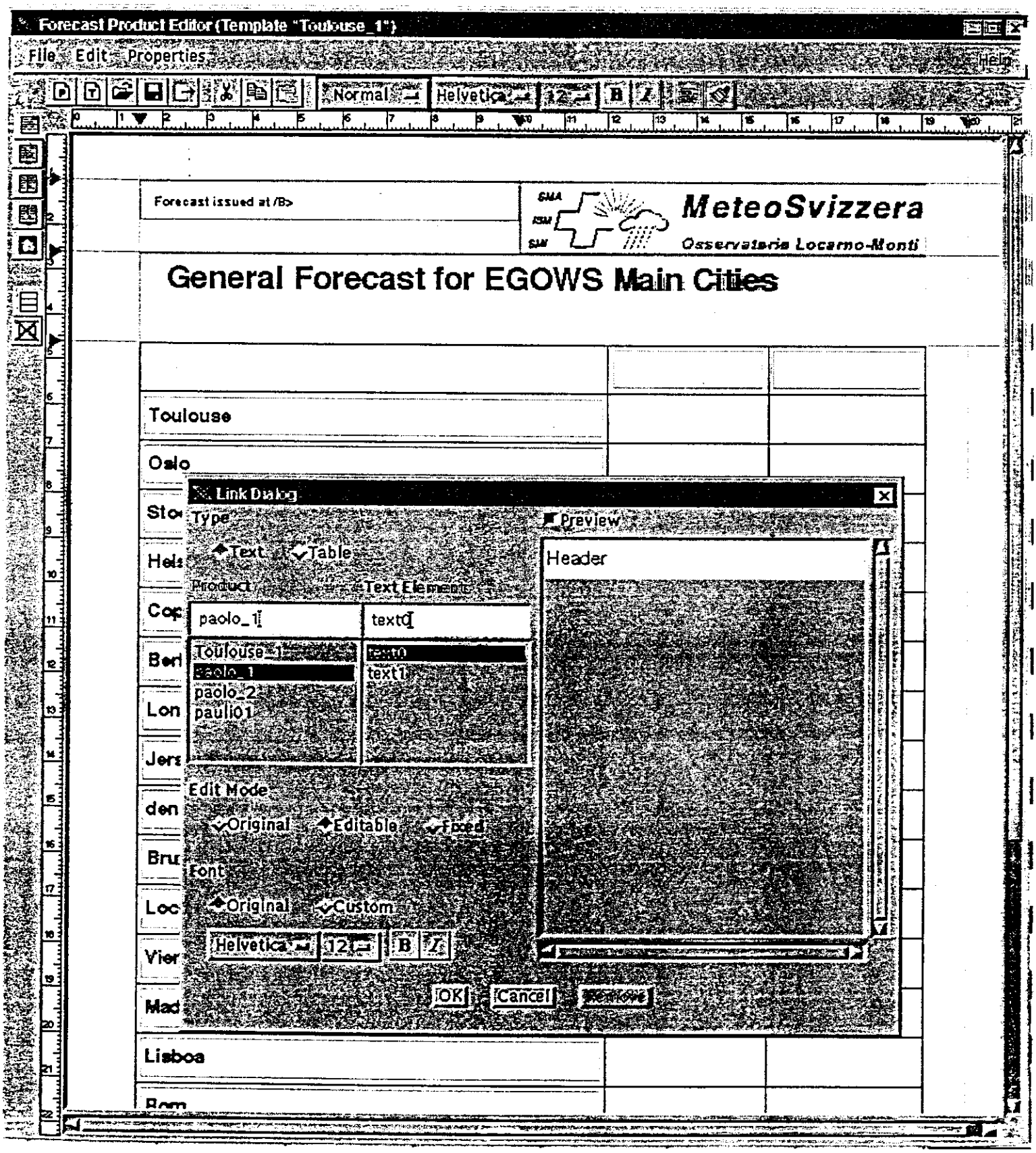
File
Edit
Properties
Help
Normal
Helvetica
12
Forecast issued at
MeteoSvizzera
Osservatorio Locarno-Monti
General Forecast for EGOWS Main Cities
Toulouse
Oslo
Stockholm
Helsinki
Copenhagen
Berlin
London
Jersey
den Haag
Bruxell
Locarno-Monti
Vienna
Madrid
Lisboa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File Edit Properties Help
Normal Helvetica 12
Forecast issued at /B>
MeteoSvizzera
Osservatorio Locarno-Monti
General Forecast for EGOWS Main Cities
Toulouse
Oslo
Lisboa
Link Dialog
Type
Text Table
Product
Text Element
paolo_1
text0
Toulouse_1
paolo_1
paolo_2
paulo1
text0
text1
Edit Mode
Original Editable Fixed
Font
Original Custom
Helvetica 12 B I
OK Cancel Remove
Preview
Header

Forecast Product Editor (Product "toultest_1")

File Edit Properties Help

Normal Helvetica 12 B I

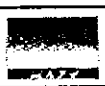
Forecast issued at 09:29, 16 June 1997/B>

SMA ISM SAM

MeteoSvizzera

Osservatorio Locarno-Monti

General Forecast for EGOWS Main Cities

	25 December	26 December
Toulouse		
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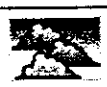
Stockholm		
Helsinki		
Copenhagen		
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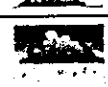
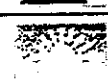
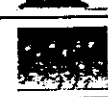
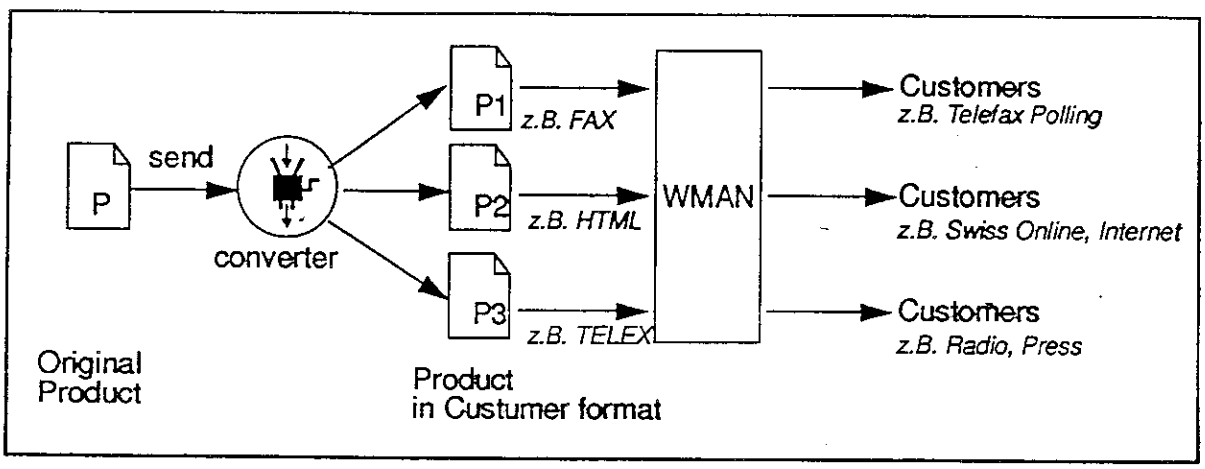
London		
Jersey		
den Haag		
Bruxelle		
Locarno-Monti		
Vienna		
Madrid		

Subproject 4: Distribution



On-Screen Analysis (OSA)

(Developed by Phil Dominy, Eddy Carroll, & Rob Acker (UKMO))

A very important feature of a forecaster's job is to analyse charts of current meteorological data, especially mean sea-level pressure in the mid/upper latitudes and streamlines in the tropics. This gives him/her a feel for the weather at the moment as well as providing an important check on the computer's forecast for that time. At present a lot of the analysis time is spent just drawing the isopleths. A system has been designed within the UK Met Office to contour/streamline charts objectively, using sophisticated algorithms. The computer does the mundane line drawing while the skillful quality control and addition of fronts is left to the forecaster. This interactive approach has been designed to make the most efficient use of both the forecaster and available computer power. The end product is a high quality, fully digitised analysis.

Methods of Objective Analysis

The OSA system can objectively contour quantitative meteorological elements over a chosen map area. The current list of analysable elements is as follows:

Observed Surface Elements: MSLP, 10m wind speed, 3-hourly pressure difference, 1.5m temperature, 1.5m dew point, sea-surface temperature.
Observed Upper Air Elements: geopotential height, wind speed, temperature, dew point.
Derived Elements: relative humidity, dew point depression, wet-bulb potential temperature, thickness.

The scattered observations need to be interpolated onto a regular grid, before contouring can take place. This process can be done via 3 different methods:

1) Univariate Analysis - This fits the contours via a least squares fit of a reduced parabolic surface using an optimum *fixed* search radius.

2) Trivariate Analysis (for MSLP & geopotential height) - This uses a distance weighted average of points in a search circle but also takes into account observations of wind speed and direction. This method improves the analysis, especially over sea areas for MSLP. A *variable* search radius is used, such that it is small for data-dense regions and large for data-sparse regions.

3) Analysis of (Observed-Model) Differences - This can be done using univariate or trivariate techniques. This method improves the analysis especially over data-sparse areas. (Beyond the influence of any observations (say 500 km in any direction), a zero difference is taken. This gives a maximum sphere of influence of any observation.) Unlike a numerical model's assimilation process, there is no weight given to the background model field *at the point* of an observation, and so the analysis is as true to the observations as possible (depending on the grid resolution and the number of conflicting observations). Once the difference grid has been obtained, this is added back on to the model grid to obtain the final grid for contouring.

4) Streamline Analysis - To be able to draw streamlines, *two* grids are required: one for the 'u' component and one for the 'v' component. These 2 grids may be derived with or without a model background (methods 3 or 1 above). The display of streamlines may then be in any of 3 formats:

i) Florida State University Format - this is the most standard way to display streamlines and was developed in 1970. First of all the 'null points' are located. (These are where the speed is zero, due to confluence in one direction and diffluence in the perpendicular direction.) The 'asymptotes' are then drawn away from these points. Next, the 'seed points' for the streamlines are chosen 'intelligently': a streamline is started at any point where there is a lack of other streamlines. The line is then terminated when it gets too close to another line. This method produces charts with the most *uniform* coverage of streamlines.

ii) High Density / Few Steps - A *regular* array of 'seed points' is chosen across the grid, at a *high* density. Each streamline is then drawn for a few steps only, to avoid too much 'clutter'. This method highlights *line* convergence best.

iii) Low Density / Many Steps - A *regular* array of 'seed points' is chosen across the grid, at a *low* density. Each streamline is then drawn for a number of steps. This method highlights *point* convergence best.

(The latter 2 formats are through 'Conpac' software, by Schlumberger GeoQuest. The streamlines may be colour-coded according to speed.)

The Process of On-Screen Analysis

[At present the prototype version is run *independently* of the UKMO 'Horace' system. However from July the OSA application will sit within Horace, as part of the Graphical Visualiser.]

1) The field of *Raw* Observations is contoured - preferably using model difference techniques, and the trivariate scheme if MSLP or geopotential height. (For a complete Northern Hemisphere chart with about 5000 observations, it takes less than 30 sec. to interpolate and contour a 90 km grid.) The user may choose to apply varying degrees of smoothness to the contours.

2) Quality Control

i) 'Automatic' - Consistently unreliable stations are automatically rejected, while stations with a consistent bias are automatically corrected. (These decisions are based on 'black lists' which are compiled monthly for the UKMO models' assimilation system.) These automatic amendments may be 'undone' by the user if necessary. Additionally, Metar QNH MSLP reports are converted to QFF (using the station's height and screen temperature).

ii) 'Manual' - the user can underlay a colour-coded field of the observations' difference from the model background (e.g. MSLP difference or vector wind difference), suspect observations can be seen easily. (Individual 'bull's-eyes' or kinks in the field are good indicators of erroneous observations, whereas larger areas of several observations at variance with the background could indicate a model error. This could be verified using continuity from a previous chart or by underlaying satellite imagery.) Suspect observations are selected and then deleted or changed. (It is often possible to understand the source of the error. e.g. 10mB adrift or 2 consecutive digits have been switched. In which case a change is preferable to a deletion.) All the users' amendments are stored on file, for subsequent use by themselves or other forecasters.

3) Bogussing - There may be some features not captured by the observations or the model, but apparent on imagery or through continuity. In this case it is possible to insert bogus values, simply by clicking on the spot with the mouse and typing in the desired value(s).

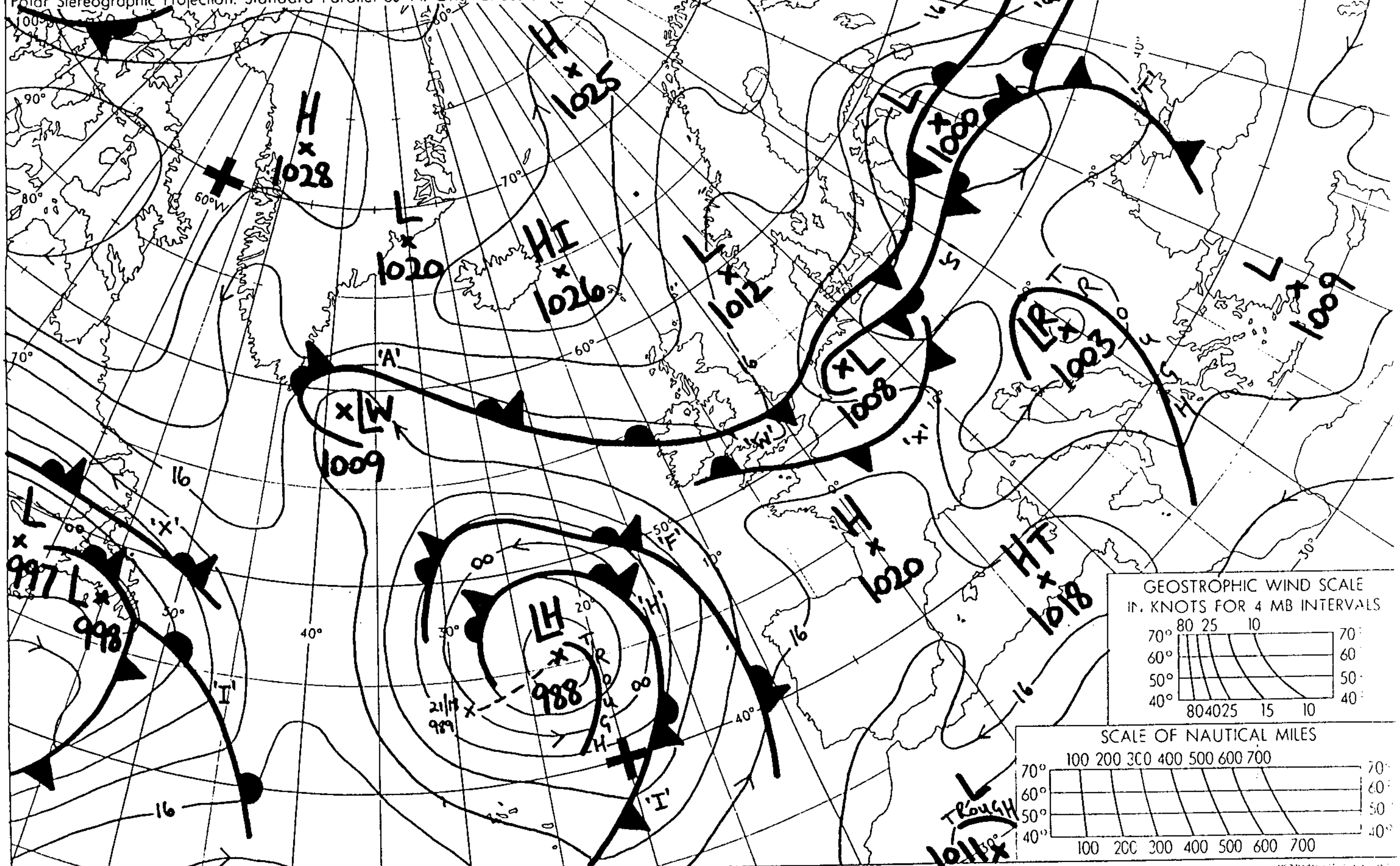
4) Fronts - Using various possible underlays (dewpoint, 850 thetaW, thickness, pressure tendency, objective fronts), the fronts are drawn by the forecaster, using a series of mouse clicks. The isobars are then suitably kinked by the objective contouring process, creating discontinuities at the fronts.

5) Desk-Top Publishing - Labelling of fronts and highs/lows, continuity arrows, etc. will be added using the 'Horace' Graphical Product Editor (a form of DTP). The full template (including date/time titles, geostrophic scales etc.) will then be merged with the analysis using Zeh Graphics CGM Composer 'CGMage'. The final product may then be distributed in digital format or by hardcopy.

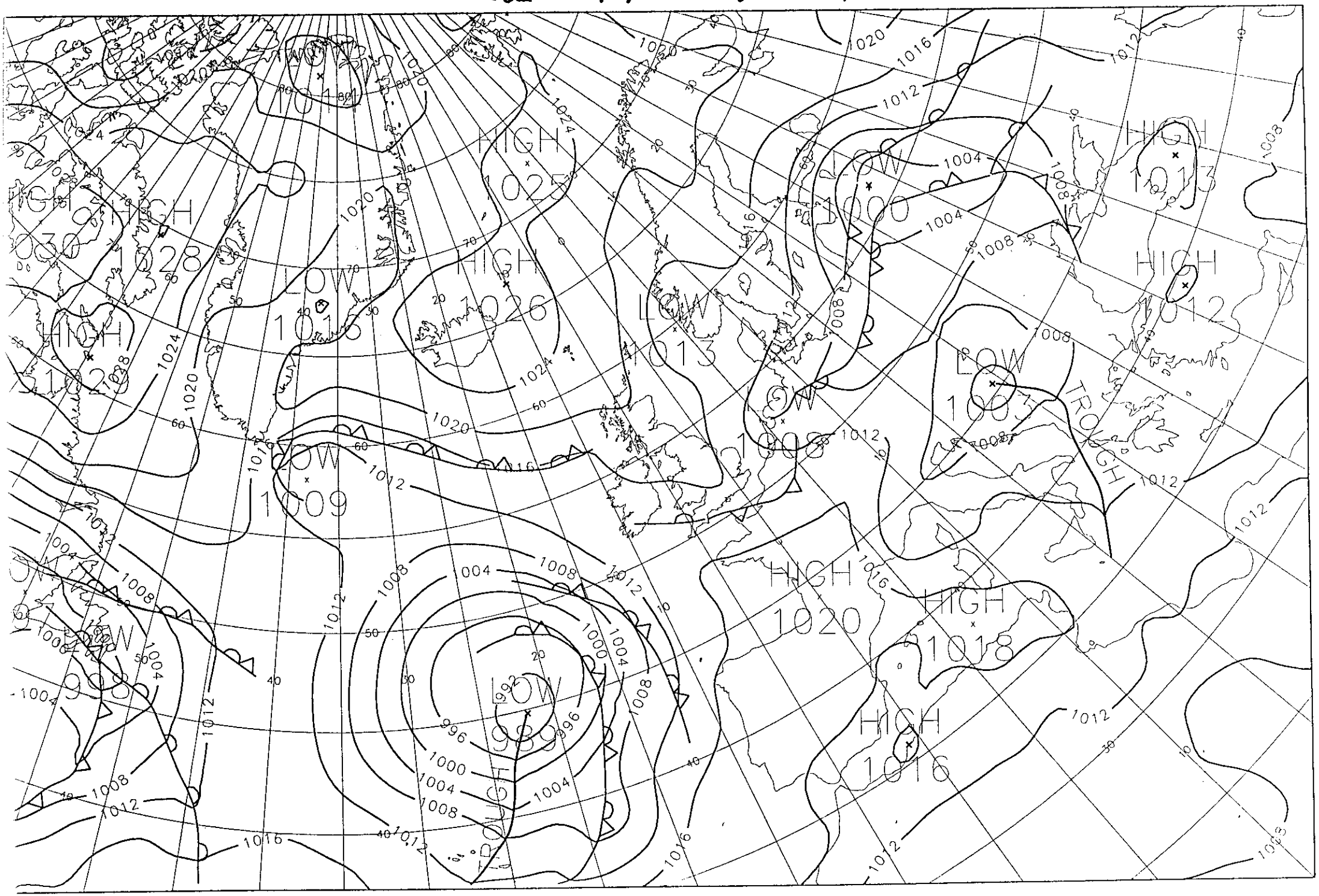
Phil Dominy June 1997

ASXX EGRR MSLP ANALYSIS DT 0600 UTC 22 MAY 1997

Polar Stereographic Projection. Standard Parallel 60°N. Original scale 1:20m

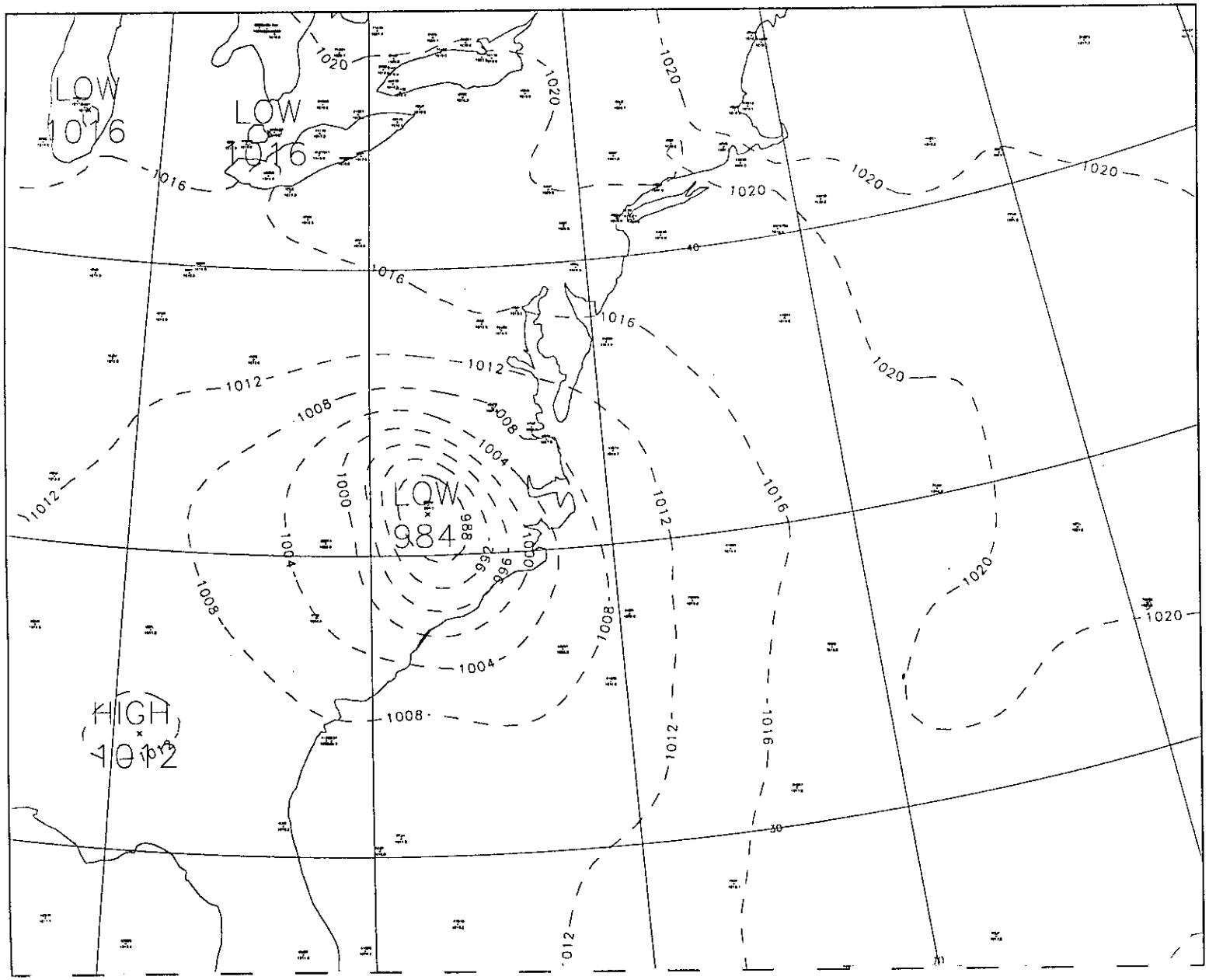


Prepared and drawn in the Cartographic Section, Met.O.18d., Bracknell Met.O. Carto.D.O. Form File:269


06Z 22/3/91 highs/lows, fronts (slight kinking), moderate smoothing
HIGH 1028
LOW 1016
HIGH 1026
LOW 1013
LOW 1000
HIGH 1013
HIGH 1012
LOW 1009
LOW 1008
TROUGH
HIGH 1020
HIGH 1018
HIGH 1016
LOW 989
TROUGH

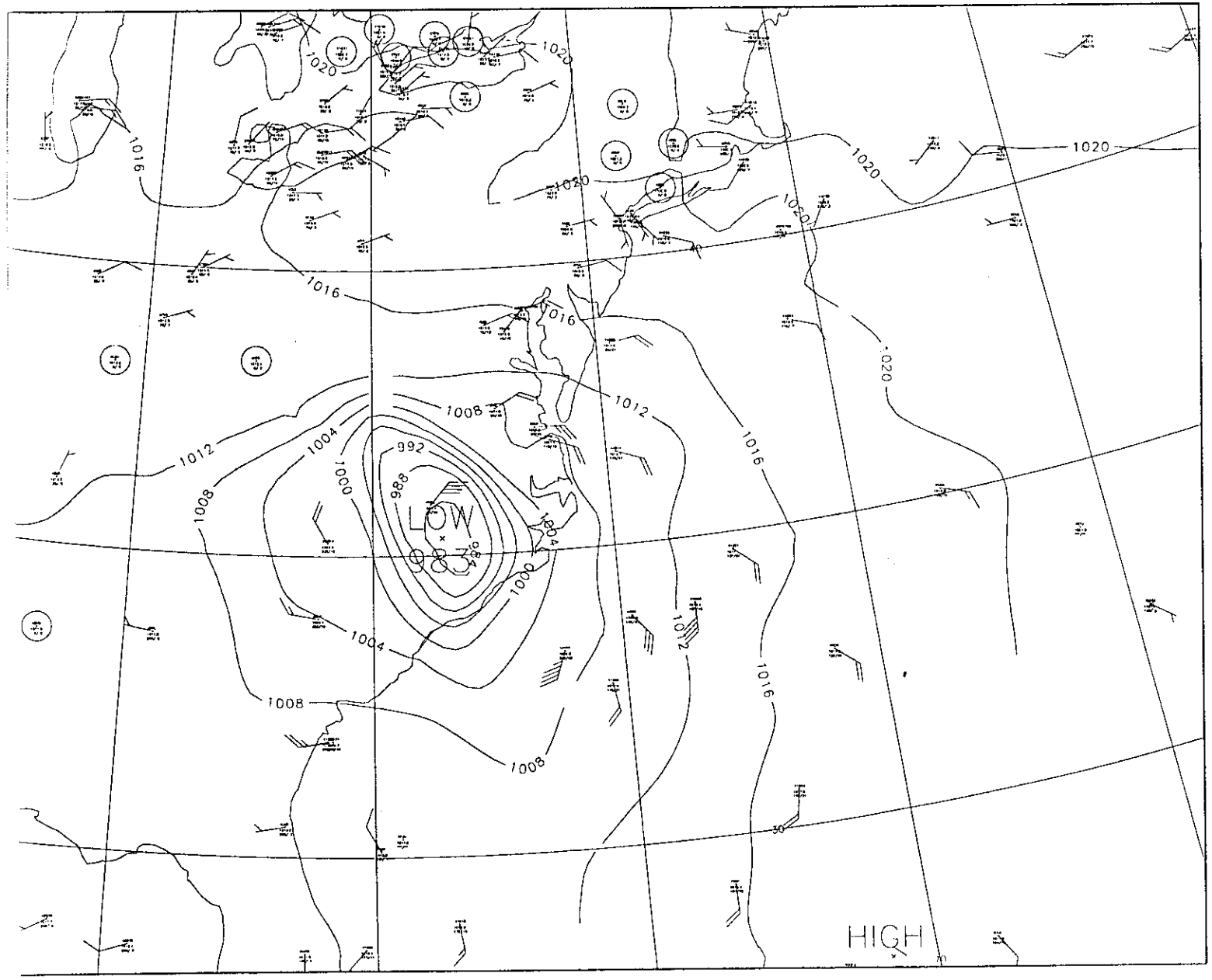
06Z 6/9/96

Univariate (O/C) S.S. 99 (Fixed Search Radius)



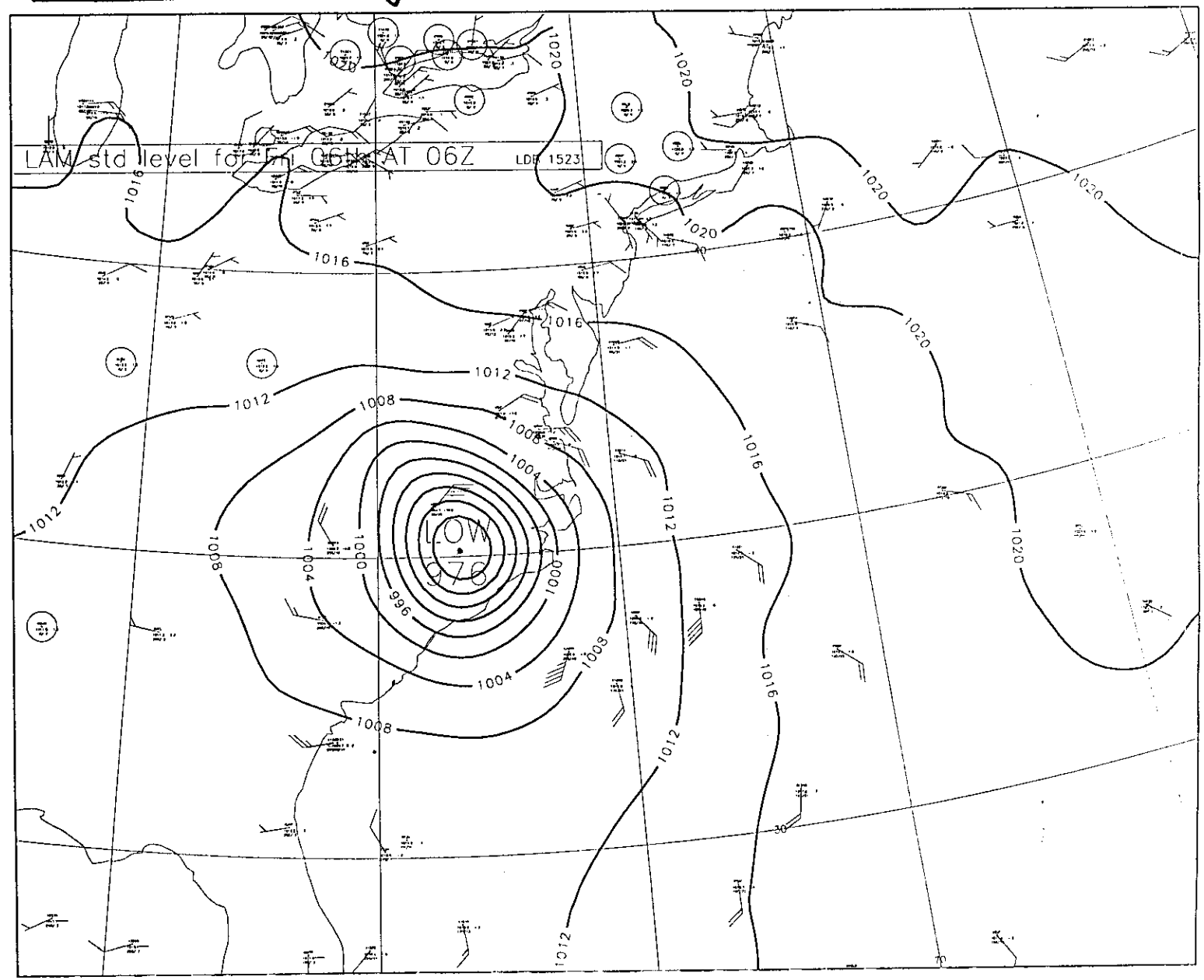
6/9/96

Trivariate (C/C) S.R. -3 (Variable Search Radius)



06Z 6/9/96

Trivariate Model Merge (Q/C) Moderate Smoothing



06Z LAM T+0

Central Pressure = 988mB

Miami Advisories

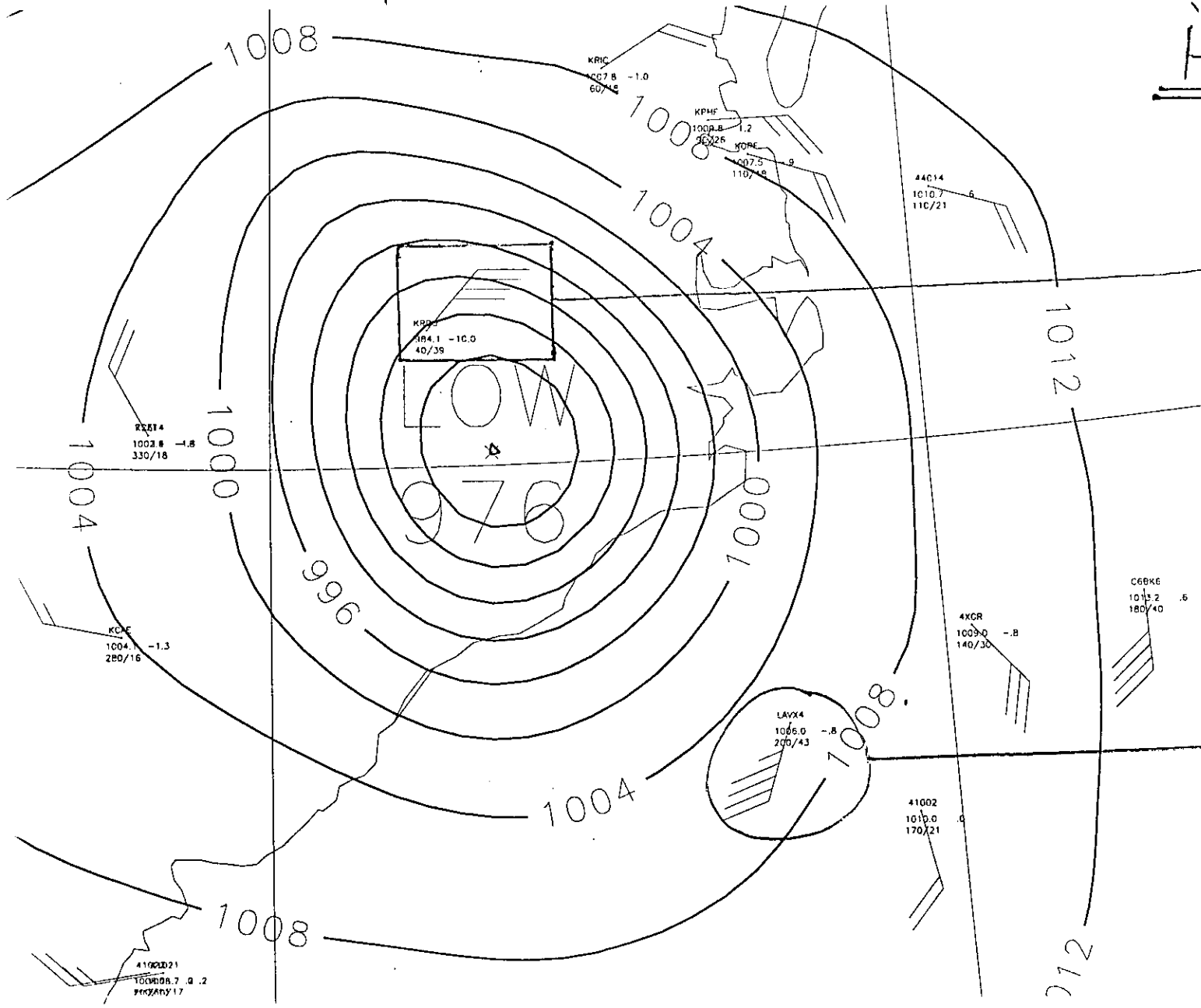
03Z 965 mB , 85 KT

09Z 980 mB , 55 KT

↑ Central Pressure

↑ Maximum Sustained Wind Speed

06Z 6/9/96
Trivariate Model Merge (Q/C) Moderate Smoothing
Zoom)



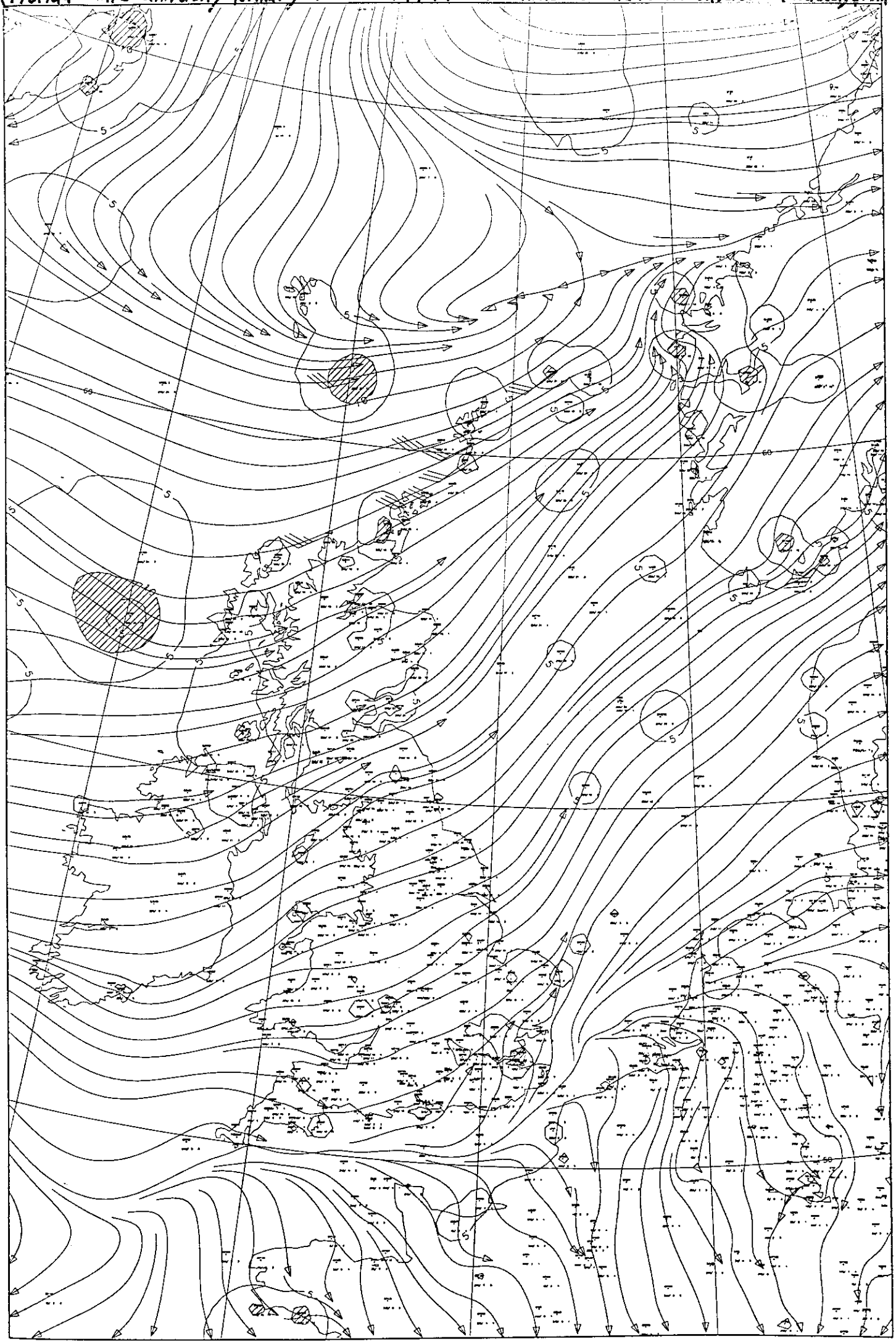
Hurricane "Fran"

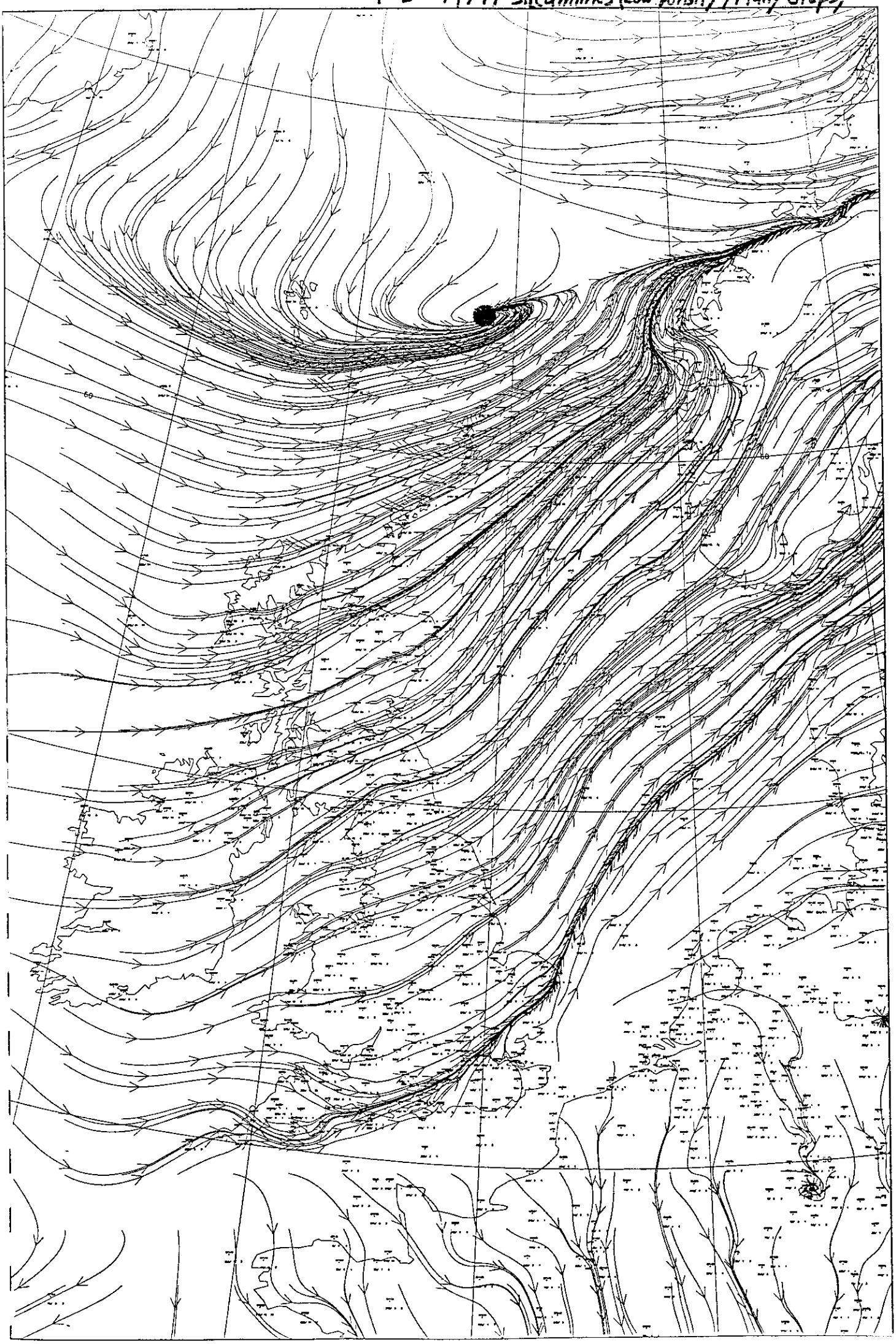
Lowest Ob: 984 mB
KRDU
(Raleigh, N. Carolina)
984.1 -10.0
04C/39

06Z
LAM T+0 : 988 mB
central pressure

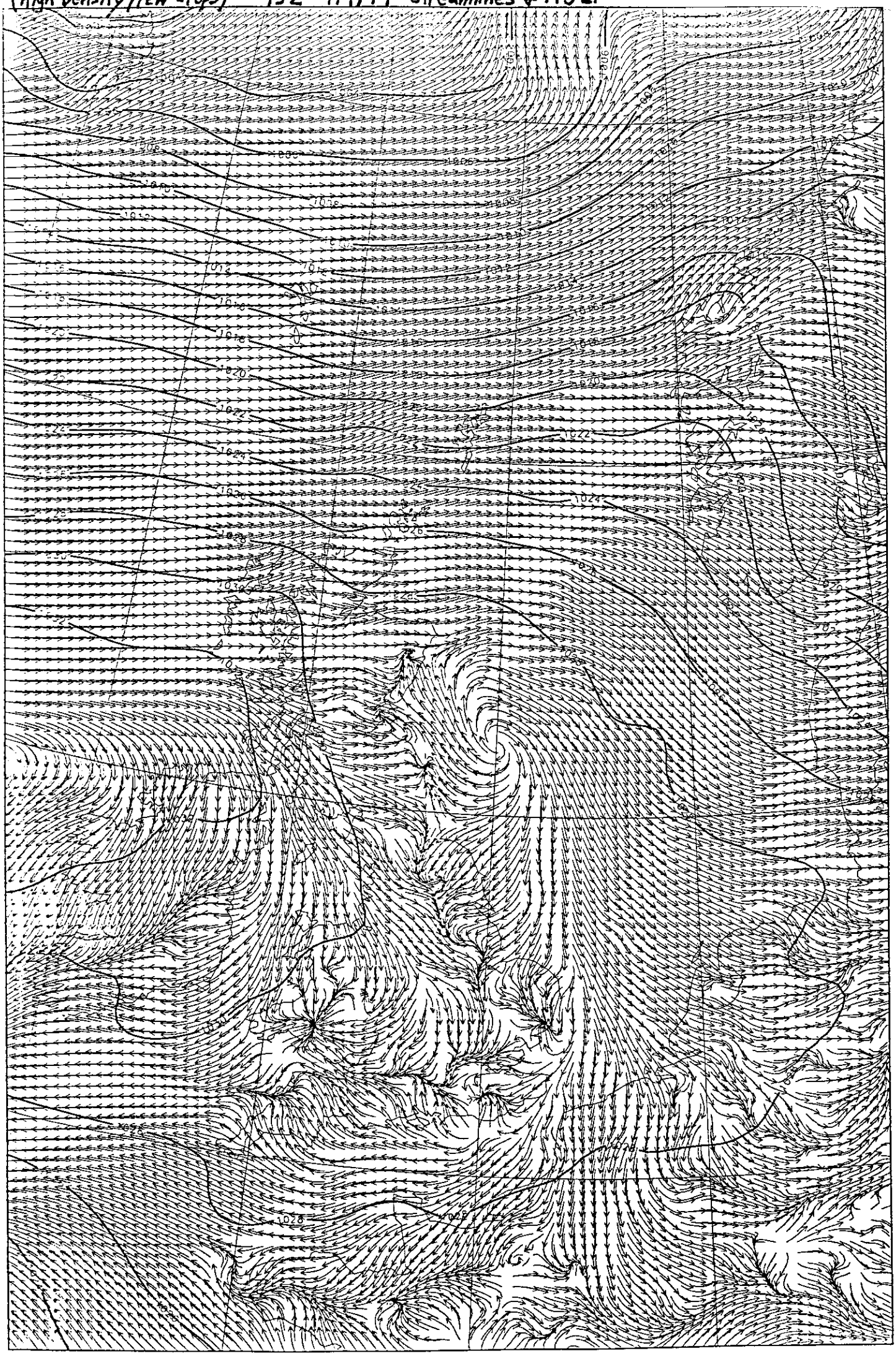
(Severe Gale Force 9)
Strongest Wind: 43 kt
LAVX4
1006.0 -0.8
200/43

Minm. Advisory
03Z 965 mB, 85 KT
09Z 980 mB, 55 KT

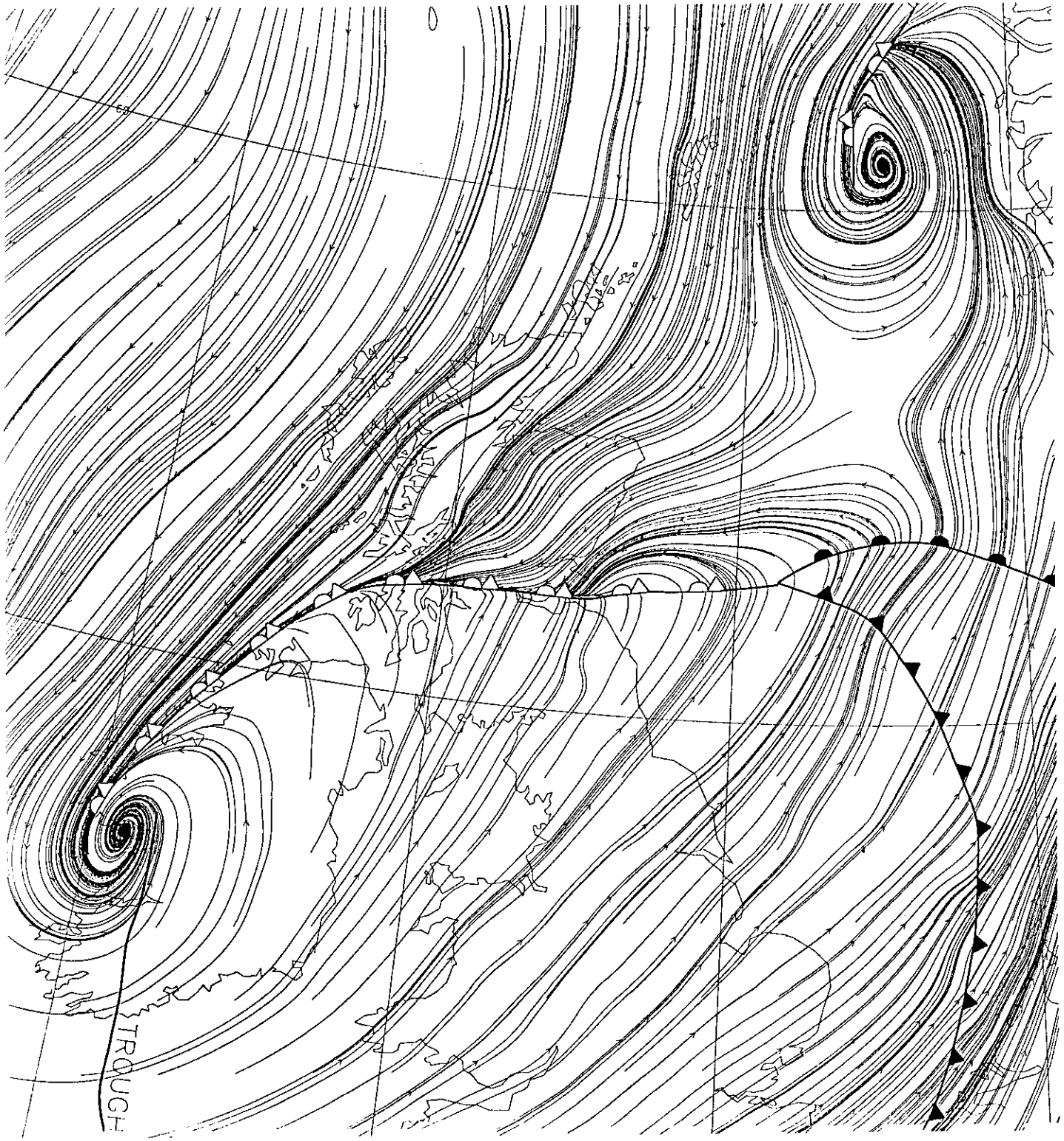

(Florida State University Format) 15Z 2/4/97 Streamlines & Wind Vector Difference (Shaded) (From 15Z
5
60
50


157 2/4/97 Streamlines (Low Density / Many Steps)

(High Density/Few Steps) 15Z 9/4/97 Streamlines + MSLP



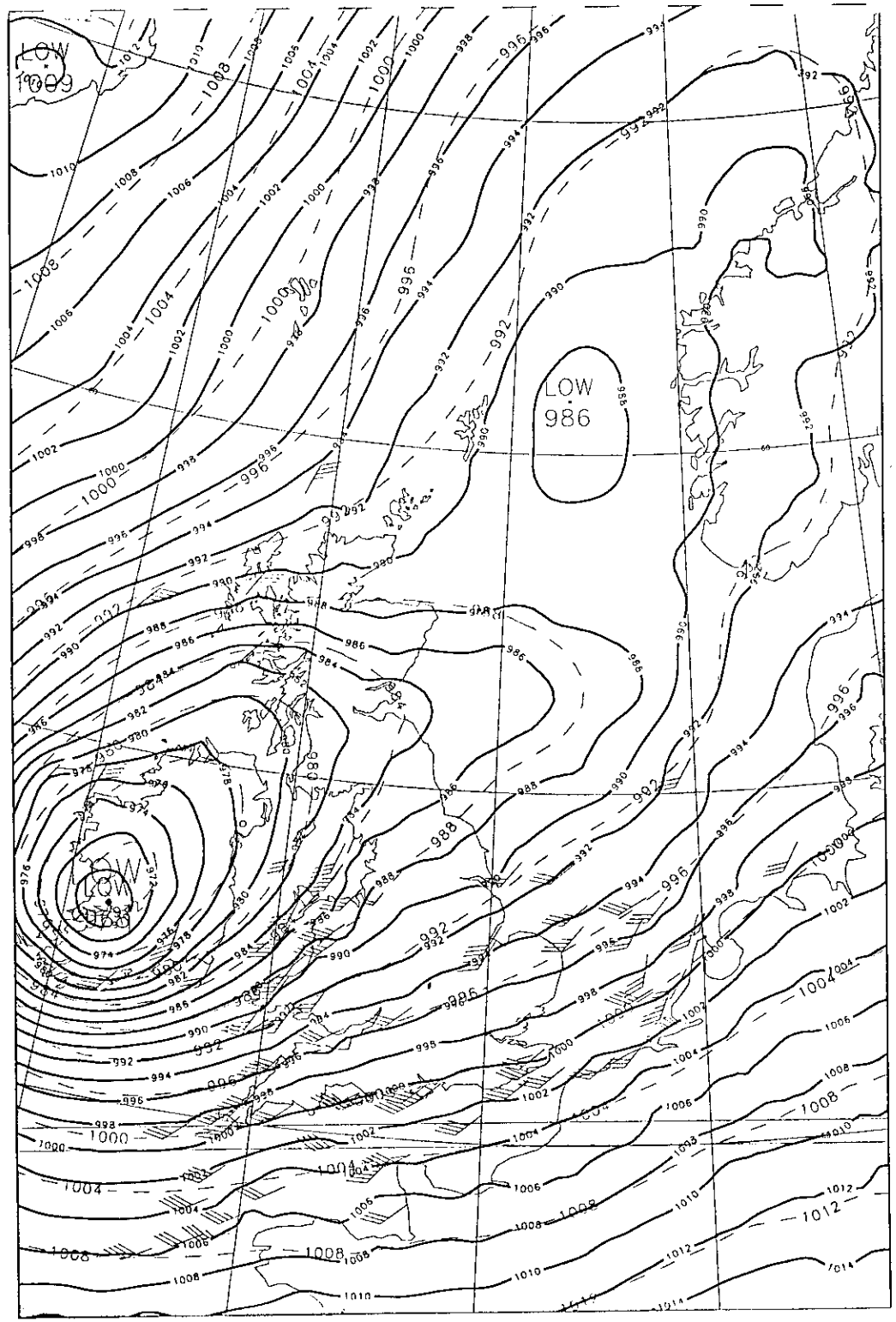
(High Density/Few Steps) 15Z 9/4/97 Streamlines & 1.5m Temperature



12Z

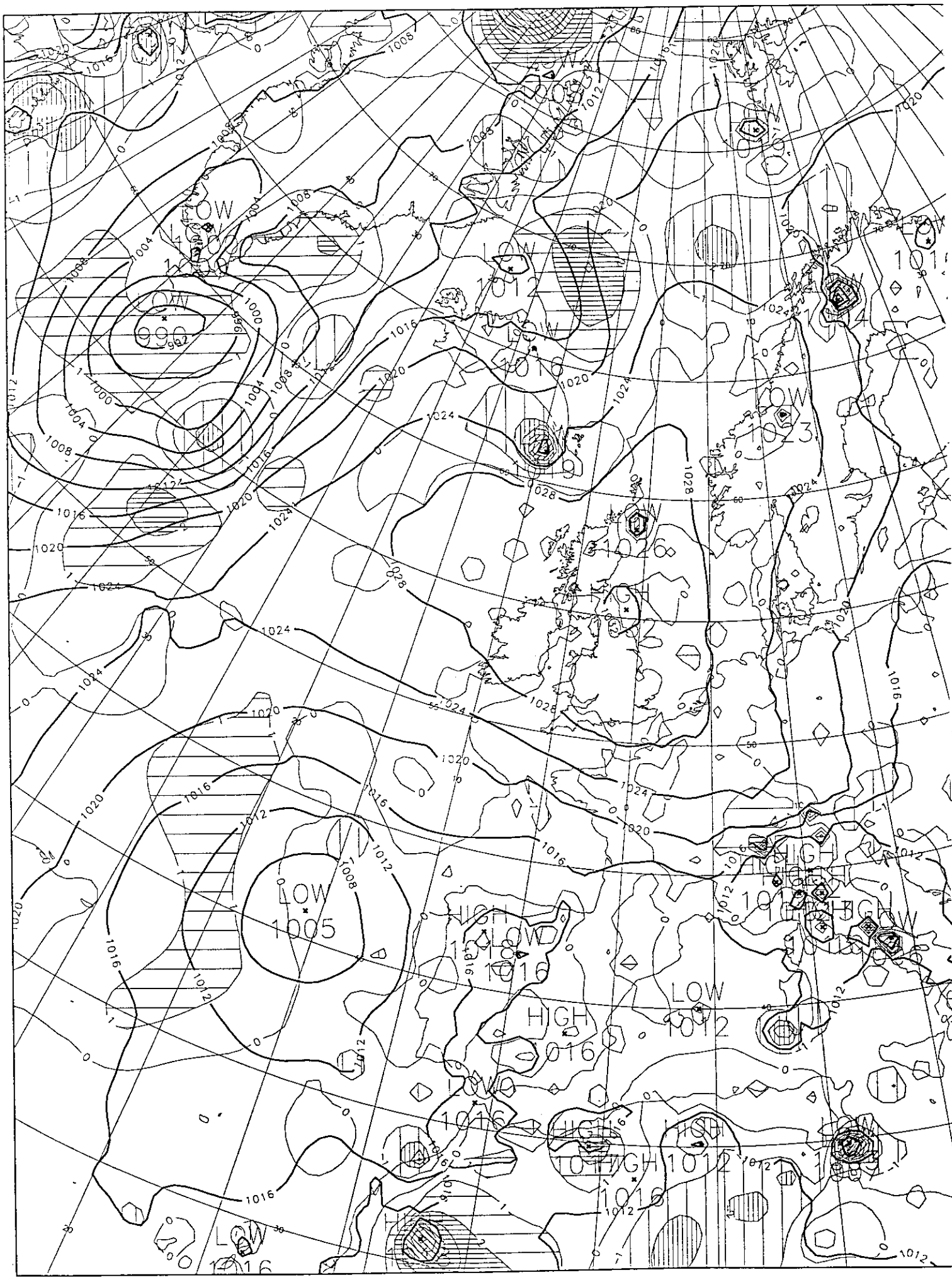
28/10/46

Ex-hurricane Lilly



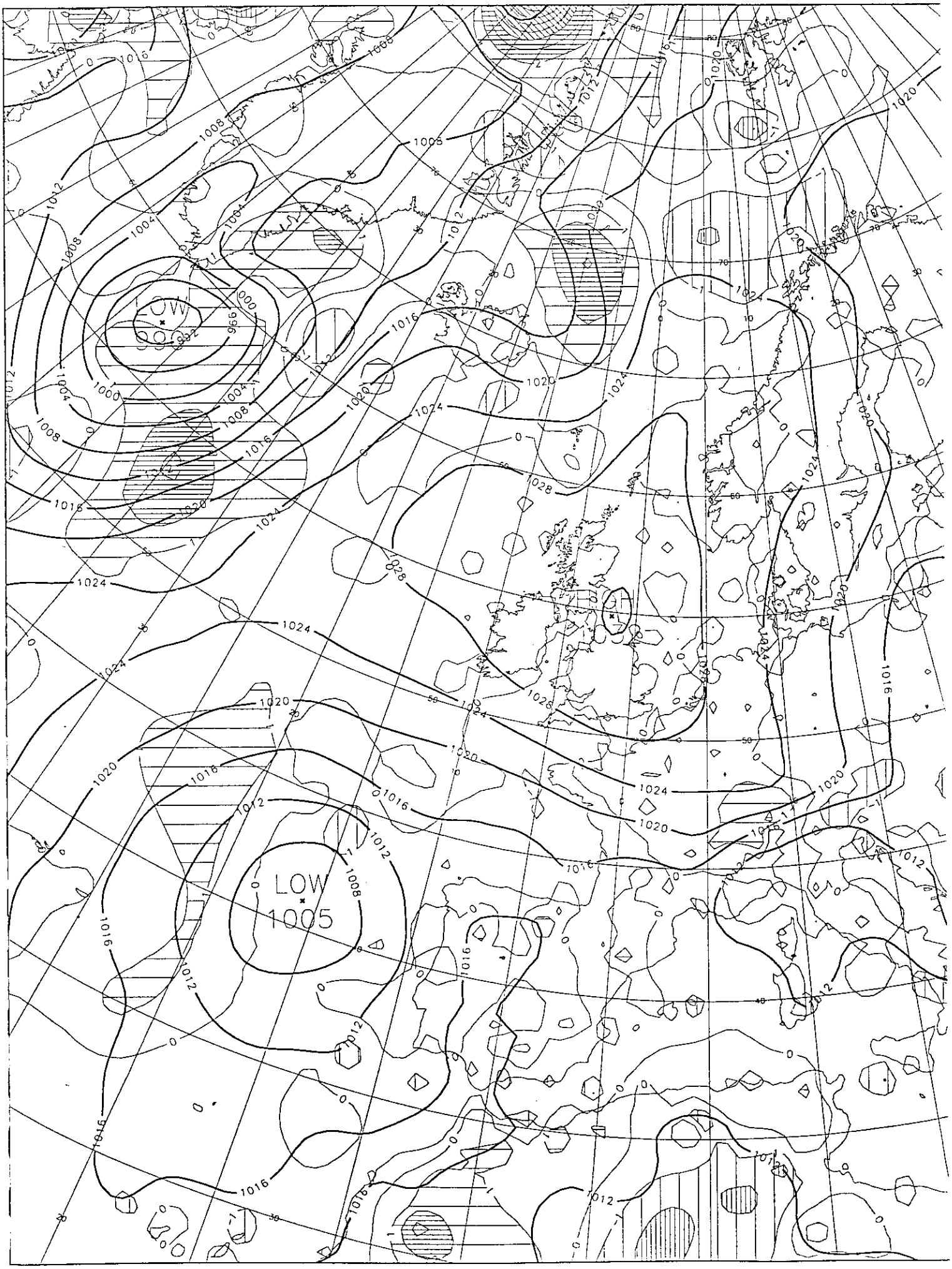
12Z
28/10/96
Ex-hurricane Lilly

C6Z 28/05/97
MSLP + Difference (from C6Z LAM) before Q/C



C62 28/05/97

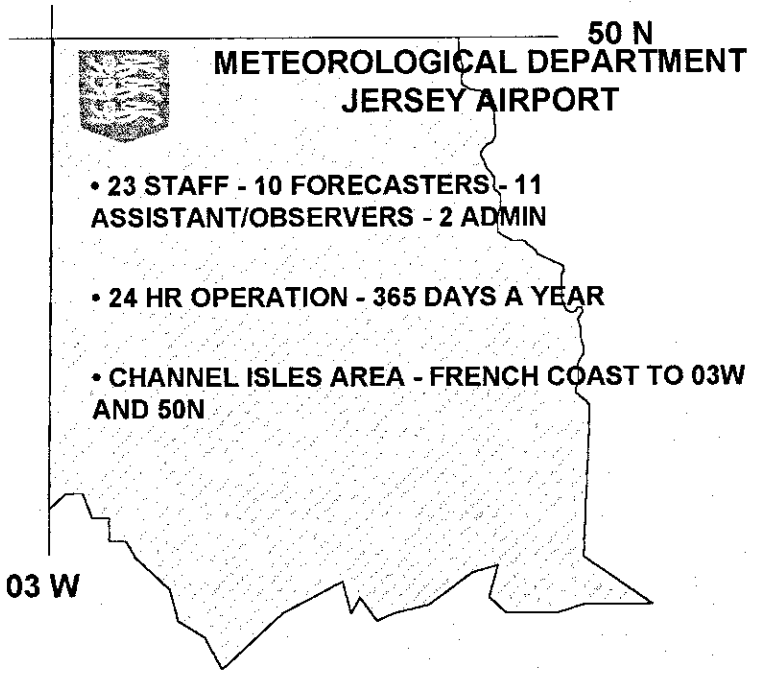
MSLP + Difference (from C62 LAM) after Q/C + smoothing



FORECAST PRODUCTION USING UNIX OFFICE AUTOMATION SOFTWARE

Applixware

A. R. Pallot



METEOROLOGICAL DEPARTMENT
JERSEY AIRPORT

- 23 STAFF - 10 FORECASTERS - 11 ASSISTANT/OBSERVERS - 2 ADMIN

- 24 HR OPERATION - 365 DAYS A YEAR

- CHANNEL ISLES AREA - FRENCH COAST TO 03W AND 50N

- EXPECTED TO MAKE FINANCIAL RETURN ON SOME PRODUCTS

USER REQUIREMENT

- **PROFESSIONAL PRODUCT**

  High Quality - Presentable

- **EASY AND QUICK TO PRODUCE**

- **FAX FACILITY**

  Some system management of fax destinations - customer list

- **RESILIENT**

  Backup or Duplicate system in event of failure

FORECAST PRODUCTS FOR

- **SHIPPING**

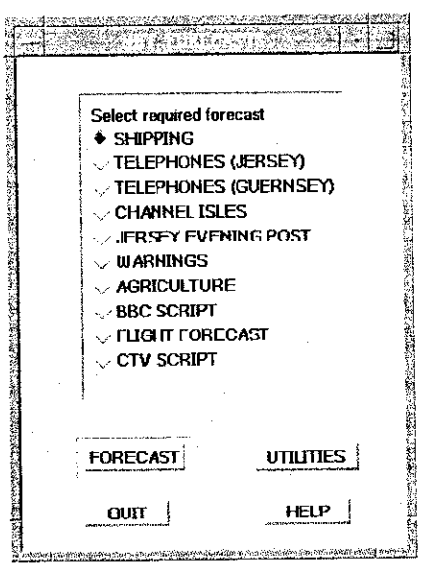
  24/48/72/96 hr Forecasts - MetFAX - TIS - Shipping Co - Wind Warnings

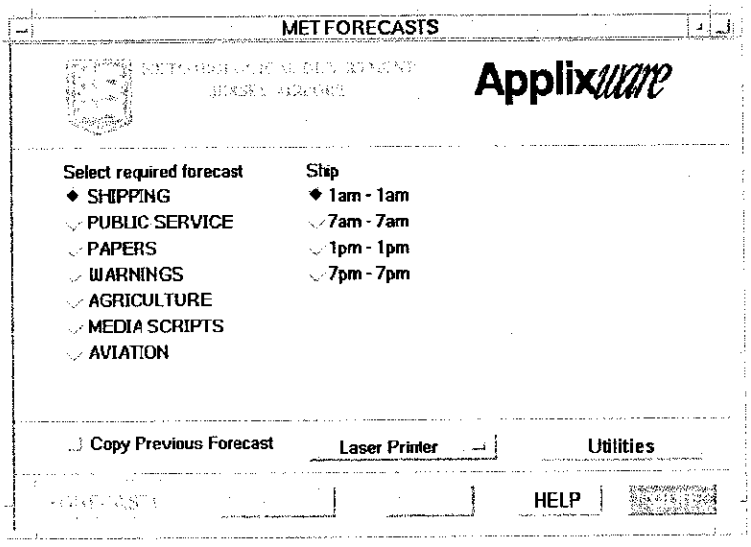
- **GENERAL PUBLIC**

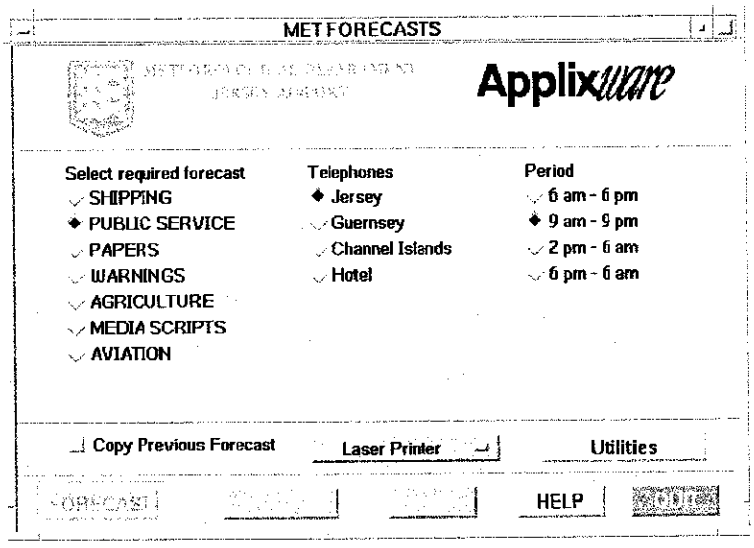
  Recorded Telephone - Teletext - Internet - Local TV - Local Radio - Agriculture - SevWx Warnings

- **AVIATION**

  Flight Forecast - TAFS - SIGMETS




MET FORECASTS
Applixware
Select required forecast
SHIPPING
PUBLIC SERVICE
PAPERS
WARNINGS
AGRICULTURE
MEDIA SCRIPTS
AVIATION
Ship
1am - 1am
7am - 7am
1pm - 1pm
7pm - 7pm
Copy Previous Forecast
Laser Printer
Utilities
HELP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Applixware
Select required forecast
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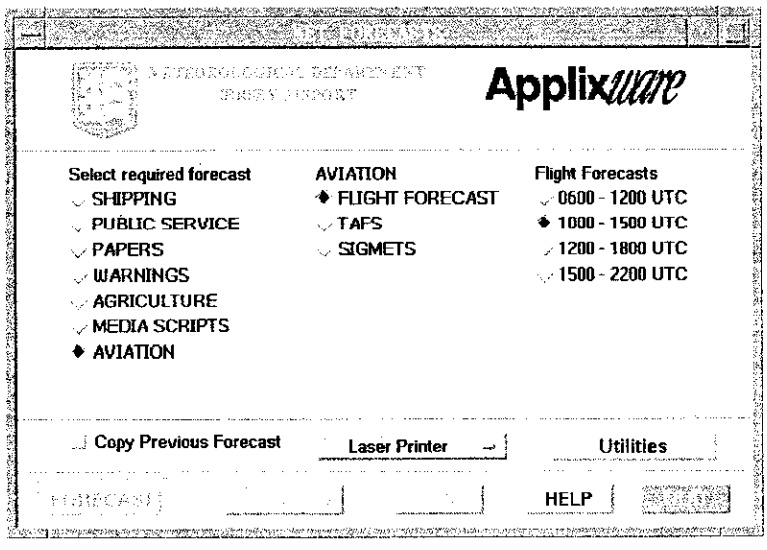
PUBLIC SERVICE
PAPERS
WARNINGS
AGRICULTURE
MEDIA SCRIPTS
AVIATION
Telephones
Jersey
Guernsey
Channel Islands
Hotel
Period
6 am - 6 pm
9 am - 9 pm
2 pm - 6 am
6 pm - 6 am
Copy Previous Forecast
Laser Printer
Utilities
HELP



Channel Islands Shipping Forecast for the area bounded by latitude 50°N, the French coast between Cap de la Hague and Ile de Brehat and longitude 3°W.

Issued by the Jersey Met Office at 6 am Tuesday 3rd June 1997 for the period ending 7 am on Thursday

General Situation

Forecast from 7 am on Tuesday until 7 am on Wednesday

Wind :		
Weather :		
Visibility :		
Sea State :		
Swell :		
St. Helier Sea Temperature:		degrees Celsius

Tides	Low	**Water St. Helier**	12.16 pm	1.8	**Metres**
	High	**Water St. Helier**	6.02 pm	10.4	**Metres**

Comments on tabulated wind and wave forecasts :

Channel Islands Shipping Forecast for the area bounded by latitude 50°N, the French coast between Cap de la Hague and Ile de Brehat and longitude 3°W.

Issued by the Jersey Met Office at 6 am Tuesday 3rd June 1997 for the period ending 7 am on Thursday

At the time of issue there were Gale Warnings in force for sea areas : Wight, Portland, Plymouth and the Channel Isles.
At the time of issue there was a Strong Wind Warning in force for : the Channel Islands area.

General Situation
At 4 am, thundery trough lying along the south coast of England, expected to move slowly north, as a weak and temporary ridge of high pressure builds over France.

Forecast from 7 am on Tuesday until 7 am on Wednesday

Wind : Easterly force 4 in the extreme north of the area at first, otherwise variable force 1 to 3.

Channel Islands Shipping Forecast for the area bounded by latitude 50°N, the French coast between Cap de la Hague and Ile de Brehat and longitude 3°W.

Issued by the Jersey Met Office at 6 am Tuesday 3rd June 1997 for the period ending 7 am on Thursday

General Situation
At 4 am, thundery trough lying along the south coast of England, expected to move slowly north, as a weak and temporary ridge of high pressure builds over France.

Forecast from 7 am on Tuesday until 7 am on Wednesday

Wind :	Easterly force 4 in the extreme north of the area at first, otherwise variable force 1 to 3.
Weather :	Patches of mist and low cloud at first and again later in the night, otherwise fair, with isolated thundery showers.
Visibility :	Poor in mist or showers otherwise moderate to good.
Sea State :	Locally moderate in the north at first otherwise slight or smooth.
Swell :	2 to 4 ft.
St. Helier Sea Temperature:	14 degrees Celsius

Tides	Low	**Water St. Helier**	12.16 pm	1.8	**Metres**
	High	**Water St. Helier**	6.02 pm	10.4	**Metres**

Comments on tabulated wind and wave forecasts :
Look OK.

Outlook from 7 am on Wednesday until 7 am on Thursday

Wind :	Variable force 1 to 3 becoming east to northeast force 3 to 4.
Weather :	Mist patches at first then fair with isolated showers, becoming rather cloudy on Thursday with an increasing risk of thunderstorms.

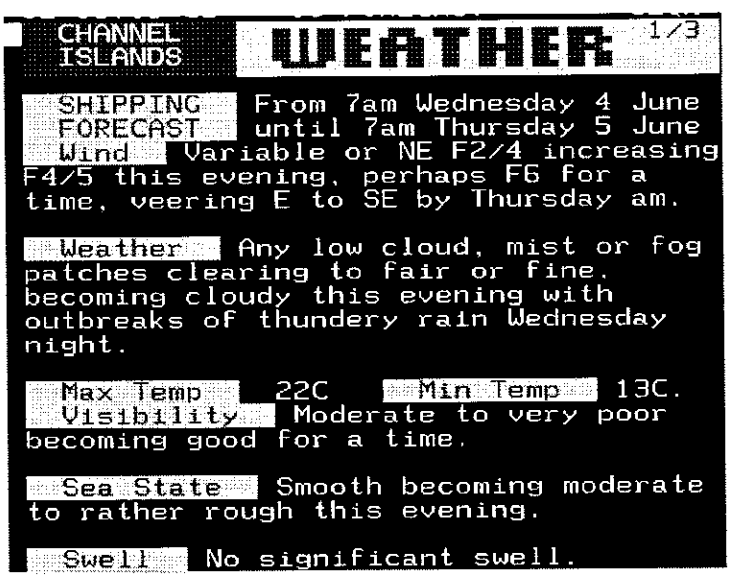
Channel Islands Shipping Forecast prepared for EMERAUDE Lines
for the area bounded by latitude 50°N, the French coast between Cap de la Hague and Ile de Brehat and longitude 3°W.

Issued by the Jersey Met Office at 6 am Wednesday 4th June 1997
for the period ending 7 am on Friday

General Situation
At midnight, a weak ridge of high pressure covered Britain and the Channel.

Forecast from 7 am on Wednesday until 7 am on Thursday

Wind :	Variable or northeast force 2 to 4 increasing force 4 to 5 this evening, perhaps force 6 for a time, veering east to southeast by Thursday morning.
Weather :	Any low cloud, mist or fog patches clearing to fair or fine, becoming cloudy this evening with outbreaks of thundery rain Wednesday night.
Visibility :	Moderate to very poor becoming good for a time.
Sea State :	Smooth becoming moderate to rather rough this evening.
Swell :	Not significant.
St. Helier Sea Temperature:	14 degrees Celsius



FORECAST FOR JERSEY FROM 2 pm TODAY WEDNESDAY JUNE 4, 1997 UNTIL 6 am TOMORROW

Weather : Mainly sunny and very warm, becoming cloudy overnight with outbreaks of thundery rain.

Max : 23 °C **Min :** 13 °C

Visibility : Moderate becoming poor later.

Wind : East light force 2 or 3, backing northeast moderate force 4 perhaps fresh force 5, veering southeast by morning.

Open Sea State : Smooth becoming moderate.

Tides	High	**Water St. Helier**	6.49 p.m	10.7	**Metres**
	Low	**Water St. Helier**	1.36 a.m	1.4	**Metres**

Forecast from 6 am until 6pm tomorrow Thursday :

Weather : Cloudy with outbreaks of thundery rain, then fair with sunny periods.

Max : 19 °C

Wind : Southeast moderate force 4, veering south to southwest.

Observatory noon temperature 19 °C **MSL Pressure** **1014** **mb**

12 noon Airport Observation : E2 4 ml haze 1014Fs 20C

FORECAST FOR THE BAILIWICK OF GUERNSEY FROM 2 pm TODAY WEDNESDAY JUNE 4, 1997 UNTIL 6 am TOMORROW

Weather : Mainly sunny and warm, but with fog and low cloud around Alderney at first. Becoming cloudy overnight with outbreaks of thundery rain.

Max : 20 °C **Min :** 13 °C

Visibility : Moderate locally very poor.

Wind : East light force 2 or 3, backing northeast moderate force 4 to fresh force 5, veering southeast by morning.

Open Sea State : Slight becoming moderate.

Tides	Water St. Peter Port	am/pm	metres
	Water	am/pm	metres

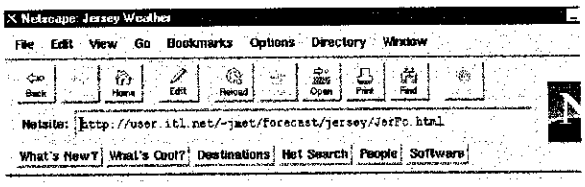
Forecast from 6 am until 6pm tomorrow Thursday :

Weather : Cloudy with outbreaks of thundery rain, then fair with sunny periods.

Max : 19 °C

Wind : Southeast moderate force 4, veering south to southwest.

This forecast will be updated at about 4:30 this afternoon.



METEOROLOGICAL DEPARTMENT
JERSEY AIRPORT

FORECAST FOR JERSEY FROM 9 am UNTIL 9 pm TODAY
WEDNESDAY JUNE 4, 1997

Weather : Mainly sunny and hazy, becoming very warm.

Max : 23 °C

Visibility : Moderate.

Wind : East light force 2 or 3, backing northeast moderate force 4 this afternoon.

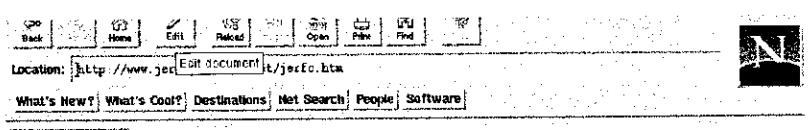
Open Sea State : Smooth becoming slight to moderate.

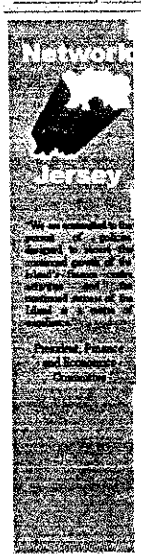
Forecast from 9 pm until 9 am tomorrow Thursday :

Weather : Fair becoming cloudy with outbreaks of thundery rain.

Min : 13 °C

Wind : Northeast moderate force 4 to fresh force 5, veering southeast.





METEOROLOGICAL DEPARTMENT
JERSEY AIRPORT

FORECAST FOR JERSEY FROM 2 pm TODAY WEDNESDAY JUNE 4, 1997
UNTIL 6 am TOMORROW

Weather : Mainly sunny and very warm, becoming cloudy overnight with outbreaks of thundery rain.

Max : 23 °C

Min : 13 °C

Visibility : Moderate becoming poor later.

Wind : East light force 2 or 3, backing northeast moderate force 4 perhaps fresh force 5, veering southeast by morning.

Open Sea State : Smooth becoming moderate.

Forecast from 6 am until 6pm tomorrow Thursday :

Weather : Cloudy with outbreaks of thundery rain, then fair with sunny periods

Max : 19 °C

Wind : Southeast moderate force 4, veering south to southwest.

Jersey Met

6 DAY WEATHER OUTLOOK FOR JERSEY

Issued Tuesday June 3, 1997

(Please also refer to comments and footnotes)

Period [1]	MAX [2]	MIN [2]	FROST [3]	WIND [4]	WEATHER	% RAIN [5]
Today. Tuesday	19		Nil	VRB or NE F1 - 3	Fair with sunny periods. Risk of a shower.	10
Tuesday night.		11	Nil	VRB F1 -2	Fair. Risk of a shower.	10
Wednesday	20		Nil	VRB F1 -3	Fair with sunny periods.	10
Wednesday night.		12	Nil	NE F1- 3	Fair becoming cloudy. Risk showers later.	25
Thursday	19		Nil	NE F3 - 4	Rather cloudy. Thundery showers later.	75
Thursday night.		13	Nil	NE F3 bec SW F4	Showers clearing to fair periods.	75
Friday	18		Nil	SW F4-5 bec SE F3	Fair becoming cloudy.	20
Friday night.		14	Nil	SE bec S F4 - 6	Rain clearing to fair periods and showers.	70
Saturday	18		Nil	S - SW F5 - 7	Fair periods. Scattered showers.	50
Saturday night.		12	Nil	SW F5 - 6	Fair periods. Scattered showers.	40
Sunday	19		Nil	SW - W F4 - 5	Fair with sunny periods. Risk of a shower.	15
Sunday night.		11	Nil	SW - W F3 - 4	Fair. Risk of a shower.	15

Synoptic evolution and comment

Slack pressure over the Channel today will give way as a series of lows move towards Biscay and then northeast across Britain from Thursday. The rest of the period will be unsettled with some rain and strong winds at times.

Confidence

Confidence is high in the change to unsettled weather from Thursday. Low confidence in the details, especially winds and timing of rain from Friday onwards

1 Today 1000 to 1800, otherwise 0600 to 1800 daytime and 1800 to 0600 night-time

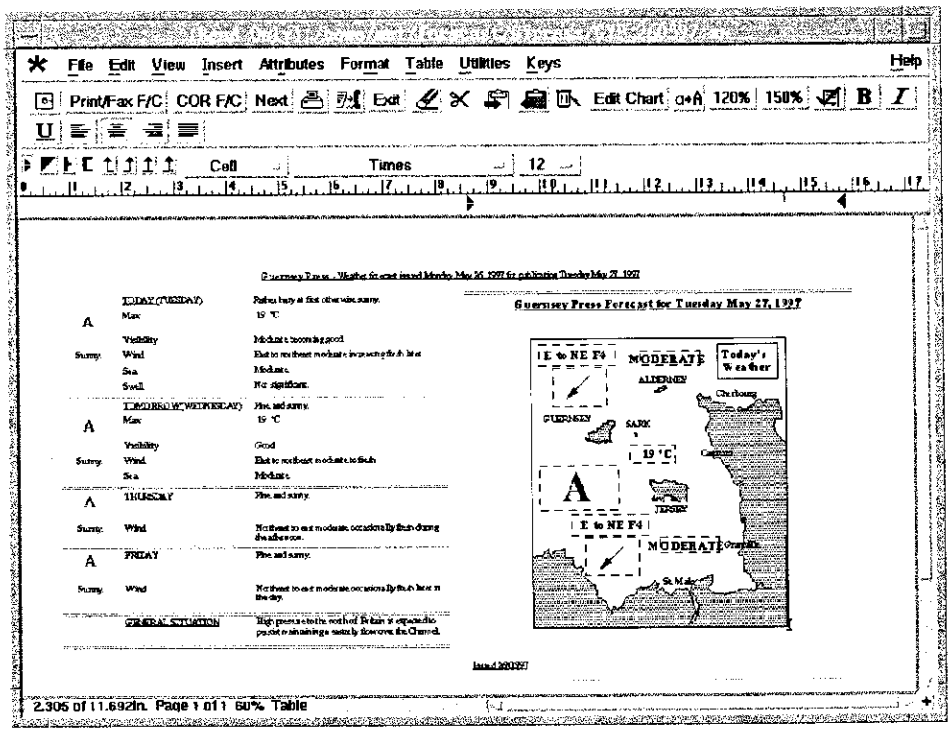
2 Temperatures are in Celsius

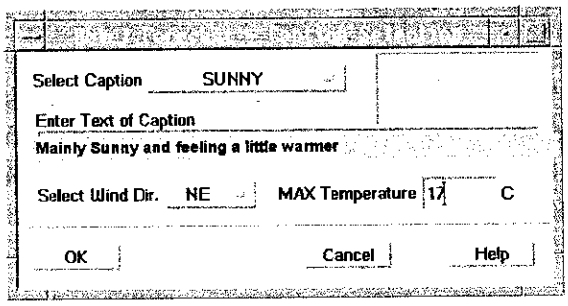
3 Risk of ground frost - nil, low, medium or high.

4 Wind is given as the significant direction and mean range of forces for the period

5 Rainfall is as % chance of rain greater than 0.4mm for any one location in Jersey

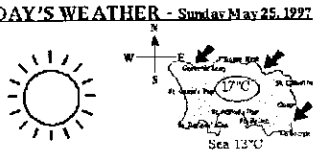
For additional advice call the forecaster on 069 66 77 77





JERSEY MET.

TODAY'S WEATHER - Sunday May 25, 1997



MAINLY SUNNY AND FEELING A LITTLE WARMER

FORECAST FROM 2 pm UNTIL 2 pm TODAY SUNDAY MAY 25, 1997

Weather : Mainly sunny and feeling a little warmer.

Max : 17 °C

Visibility : Good.

Wind : Moderate fresh force 5 to strong force 6 with gusts to 35 m.p.h.

Open Sea State : Rough.

Tides	Hi	Water St.Helier	9.14a.m	10.6	Metres
	Lo	Water St.Helier	5.54p.m	1.6	Metres

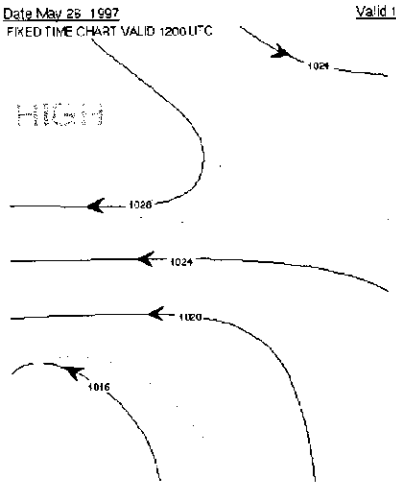
Issued by Jersey Met 23 May 1997 at 04.46 GMT

Signed_____

FORECAST FOR FLIGHTS BELOW 15,000FT WITHIN A 100km RADIUS OF JERSEY (AREA 1)

Date May 28 1997 Valid 1000 to 1500 UTC NUMBER 102

FIXED TIME CHART VALID 1200 UTC



GENERAL SITUATION AT 0500 UTC			
High pressure to the west of Britain maintained a easterly flow over the Channel			
WINDS / TEMPS	1000 FT	060/20KT	PS11
	2000 FT	050/25KT	PS05
	5000 FT	060/15KT	PS03
	10000 FT	090/15KT	PS02
	18000 FT	100/15KT	MS13
FREEZING		11000FT	
AIRFRAME ICING		NIL	
WEATHER			
Locheare at first otherwise no significant weather.			
VISIBILITY			
Loc 8km at first otherwise 10 - 25km			
CLOUD			
LOC 1 - 2/8 ST AT FIRST 500 - 900FT / 1200			
WARNINGS			
Nil			
OUTLOOK TO 270000 UTC			
Little change.			
F/C LOWEST MSL PRESSURE		1013 mb	

NOTE TEMPS ARE IN DEGS CELSIUS, AND CLOUD AMOUNTS IN OKTAS. ALL HEIGHTS ARE AMSL, AND ALL TIMES UTC CLOUD HEIGHTS ARE BASE/TOPS. TWO HEIGHTS SEPARATED BY HYPHEN (-) SHOW POSSIBLE VARIATION IN BASE OR TOPS

TIME OF ISSUE 06:24 UTC SIGNED ? SW

New Dialog

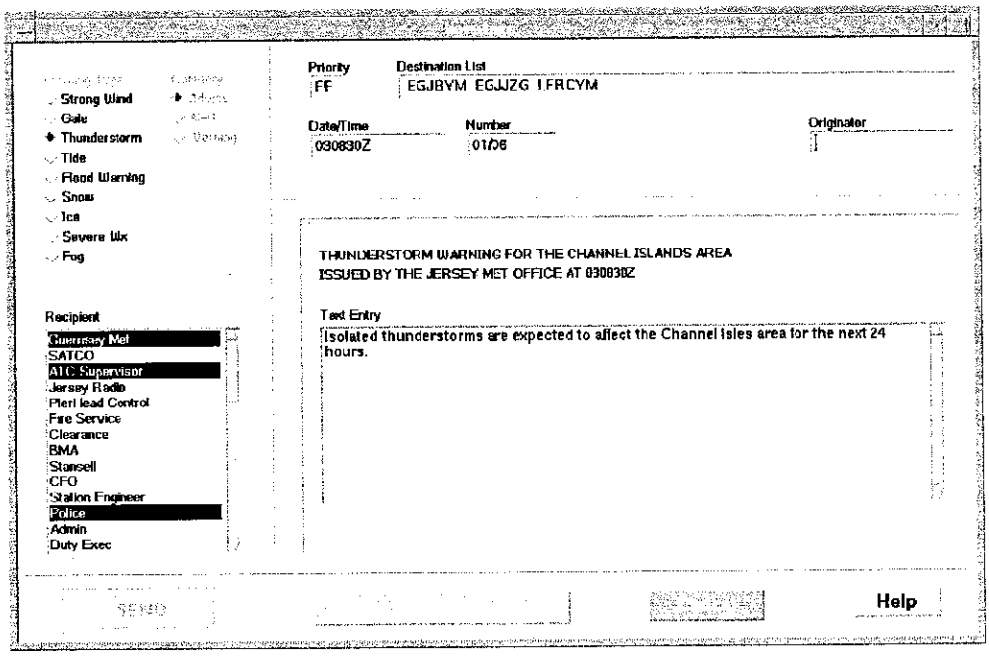
FCUK13 EGJJ 270000 Enable/Disable Duplication

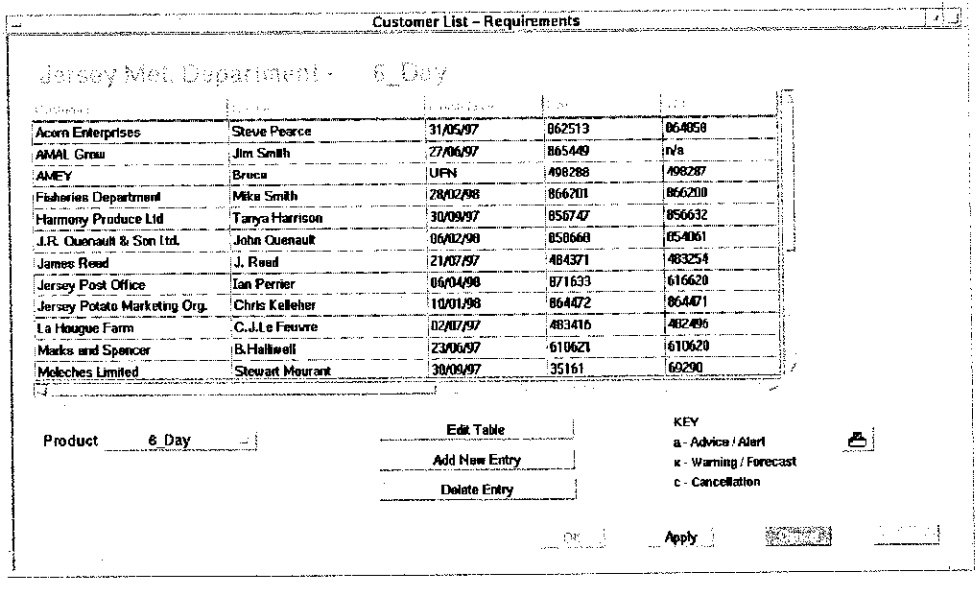
EGJJ 270110 06015KT CAVOK BECMG 0408 8000 SCT008=

EGJB 270110 06015KT CAVOK BECMG 0408 8000 SCT008=

EGJA 270110 06015KT CAVOK BECMG 0408 8000 SCT008=

SEND


Strong Wind
Gale
Thunderstorm
Tide
Flood Warning
Snow
Ice
Severe Wx
Fog
Priority
FF
Destination List
EGJBYM EGJJZG TFRCYM
Date/Time
030830Z
Number
01/06
Originator
THUNDERSTORM WARNING FOR THE CHANNEL ISLANDS AREA
ISSUED BY THE JERSEY MET OFFICE AT 030830Z
Text Entry
Isolated thunderstorms are expected to affect the Channel Isles area for the next 24 hours.
Recipient
Guernsey Met
SATCO
ATC Supervisor
Jersey Radio
Plant lead Control
Fire Service
Clearance
BMA
Stansell
CFO
Station Engineer
Police
Admin
Duty Exec
Help


Customer List – Requirements
Jersey Met Department - 6 Day
Acorn Enterprises | Steve Pearce | 31/05/97 | 862513 | 864858
AMAL Group | Jim Smith | 27/06/97 | 865449 | n/a
AMEY | Bruce | UPN | 498288 | 498287
Fisheries Department | Mike Smith | 28/02/98 | 866201 | 866200
Harmony Produce Ltd | Tanya Harrison | 30/09/97 | 856747 | 856632
J.R. Quenault & Son Ltd. | John Quenault | 06/02/98 | 858668 | 854061
James Reed | J. Reed | 21/07/97 | 484371 | 483254
Jersey Post Office | Ian Perrier | 06/04/98 | 871633 | 616620
Jersey Potato Marketing Org. | Chris Kelleher | 10/01/98 | 864472 | 864471
La Hougue Farm | C.J.Le Feuvre | 02/07/97 | 483416 | 482496
Marks and Spencer | B.Halliwell | 23/06/97 | 610621 | 610620
Moleches Limited | Stewart Mourant | 30/09/97 | 35161 | 60290
Product
6 Day
Edit Table
Add New Entry
Delete Entry
KEY
a - Advice / Alert
w - Warning / Forecast
c - Cancellation
Apply

FUTURE DEVELOPMENTS

- Increasing Use of Graphics
- Move Fax to E-mail
- Develop Forecast Database
- Voice Synthesis of Forecasts

CONCLUSION

- Commercial view - hand written to Word Processed
- WP - More Inovative Products
- Able to serve more individual customers with out increase in work load
- Generating Income from New Products

INTERACTIVE PRODUCTION WITHIN SYNERGIE

Since 1994, year of the first operational relase, the SYNERGIE software has been so much improved and enriched that it is now considered as a godd, but yet perfectible,tool for working. Nowadays, SYNERGIE offers a consistent and user-friendly environment for visualization of meteorological data : i.e. a nearly complete set of functionalities and a database which grows day-after-day. This environment makes the software be appreciated not only by forecasters of METEO-FRANCE but also by ones of foreign meteorological offices.

On order to be a complete forecaster workshop, SYNERGIE has to deal now with production.

(T1) A production task can be devided into two main parts, that we in METEO-FRANCE have called Expertise production and end user presentation. For this second part, it has been decided that a new and different software should be developped ; but for the first part and because of the forecaster cognitive process, i.e. analysis then forecast, it is obvious that the tool for working, and accordingly the environment, must be the same as for visualization tasks. So all production applications have been or will be developped and integrated within the SYNERGIE environment.

Now, let's have a look on our past developments.

Interactive production within SYNERGIE has began for about three years, thanks to two important applications named SYMPOSIUM and METEOMEDIA. The aim of SYMPOSIUM was the construction of a sensible weather database by national, regional and local forecasters. The METEOMEDIA application allows to produce different finds of forecasting documents for internal and also external users like medias, TV ... These applications have been separately developped and then integrated within SYNERGIE and the lessons that we have learned from these experiences are :

* the validation of the Expertise Database concept ;
* an experience of Expertise Data transfert between different locations ;
* an imperious need of tools for input help and for initialization - particulary true in case of database filling;
* and an experience of Expertise Production separated from the end user presentation part, which was in the METEOMEDIA application totally out of SYNERGIE, and even outside of METEOFRANCE.

(T2) What about our current developments on interactive Expertise production now ?

For about two years, our efforts have been devoted to the development of a tool or an application that will allow forecasters to do Expertise inputs on their workstation, for instance a graphic editor. For this purpose, we have assumed the three following points :

* the tool must be as generic as possible. When used by an application, it will only be necessary to customize it. This induces development and maintenance economy (time saving) and above all, a best consistency of the software.
* the concept of object, with two aspects :
  -> graphical objects which is the best transcription for a meteorological phenomenon. Forecasters are used to work with drawn symbols. These objects have geographical coordinates so they can be surimposed on any visualized data
  -> numerical objects in order to exchange them or to manimulate them, for instance in initialization process or temporal interpolation, and also in the end user presentation task.
* the intercative 4D numerical output modification is not at early times our concern because we think that the object concept fits better with the forecaster way of dealing with a weather situation. Almost all phenomena can be considered as discontinuities, for instance a cold or warm front, a low pressure center, a convective clouds zone ... and objects give a better representation of these discontinuities than numerical fields.

So in spite of a big change in his working tools, the object concept ensures a good accordance with the forecaster working method.

(T3&4) Now let's look at some examples of objects inputs.

- first this is an input of meteorological objects in order to produce a significant weather chart over Western Europe. You can see the user interface, with some buttons for the input and other ones for manipulations of objects. There is also a high-level wind field. You can notice that the user can add drawn or textual annotations in the drawing area.
- the second example is an input in order to produce an isobaric prediction chart named PREISO at METEO-FRANCE. Again there are numerical fields (sea-level pressure and humidity) and also a satellite image. And in these drawing-areas there are also annotations.

In these two examples geographical domains and meteorological objects are different but the computer tool, i.e. the "black box" is the same and in each case has only been differently customized. There is something important about these annotations : you can see here the user interface. the "black box" is the same as before but there is an additional and interesting functionality named "Exporter". Annotations drawn in any drawing area of visualization can be exported from this drawing area to an objects input drawing area, whatever the cartographic projection may be. This builds an active link between visualization windows and Expertise production ones and again this is very close to the forecaster working method. In fact they were waiting for such a tool available on their workstation.

(T5) The next important topic is the initialization. Past experiences have shown that any application of production developped and integrated within SYNERGIE should contain and propose initialization functionalities in order that forecasters could work with input guesses. In our case of interactive production, we have planned to develop different kinds of initialization processes :

- by results of statistical or dynamical algorithms : for instance 3D-detection of jet-streams or incing index ... Research of good algorithms for the detection of meteorological phenomena is actually a great concern at METEO-FRANCE, especially for the development teams who work close to forecasters, in order to use the results of these algorithms as objects for an inout guess.
- by objects from an input made at any other location. Here we want to develop the functionality of objects transfert. For instance the fronts of an isobaric prediction chart (i.e. objects "fronts") can be used as a guess of the input for a significant weather chart.
- by objects from the previous input on the same work position. this process will be particulary used in the case of high-frequency Expertise production.

The improvement and the increasing use of initialization processes will gradually raise the automatic nature of Expertise production applications.

(T6) I'd like to say few words about our last developments concerning the interactive numerical output modification : since last year efforts have been devoted to improve this tool's performance and ergonomics in order that in 1998 forecasters will have an user-friendly and efficient tool to thier disposal. Nowadays forecasters can interactively modify sea-level pressure and wind field and we wish to extend the functionality to any other field : tropopause, humidity ...

As a conclusion, I'd say that we have developped a graphical objects editor used by different applications of Expertise production and this tool will be operational soon.

But we also have to consider it as one of the features of the whole Expertise production process within SYNERGIE on which we wish to have a general approach.

For the next months, the SYNERGIE program will have to deal with a fast and powerful increase of Expertise production applications on operational workstations.

METEO FRANCE

Service Central d'Exploitation de la Météorologie

SYNERGIE

INTERACTIVE PRODUCTION

* INTERACTIVE EXPERTISE PRODUCTION
  IN THE SAME ENVIRONMENT AS VISUALIZATION

* PAST DEVELOPMENTS

⇨ VALIDATION OF THE EXPERTISE DATABASE CONCEPT

⇨ EXPERIENCE OF EXPERTISE DATA TRANSFERT BETWEEN DIFFERENT LOCATIONS

⇨ IMPERIOUS NEED OF TOOLS FOR INPUT HELP AND FOR INITIALIZATION

⇨ EXPERIENCE OF EXPERTISE PRODUCTION SEPARATED FROM THE PRESENTATION FOR END USERS

SCEM/PREVI/AERO Stéphanie DESBIOS

9 juin 1997

METEO FRANCE

Service Central d'Exploitation de la Météorologie

SYNERGIE

INTERACTIVE PRODUCTION

* CURRENT DEVELOPMENTS IN EXPERTISE PRODUCTION

➔ THE TOOL MUST BE AS GENERIC AS POSSIBLE

➔ OBJECT CONCEPT

↳ *GRAPHICAL OBJECT*

↳ *NUMERICAL OBJECT*

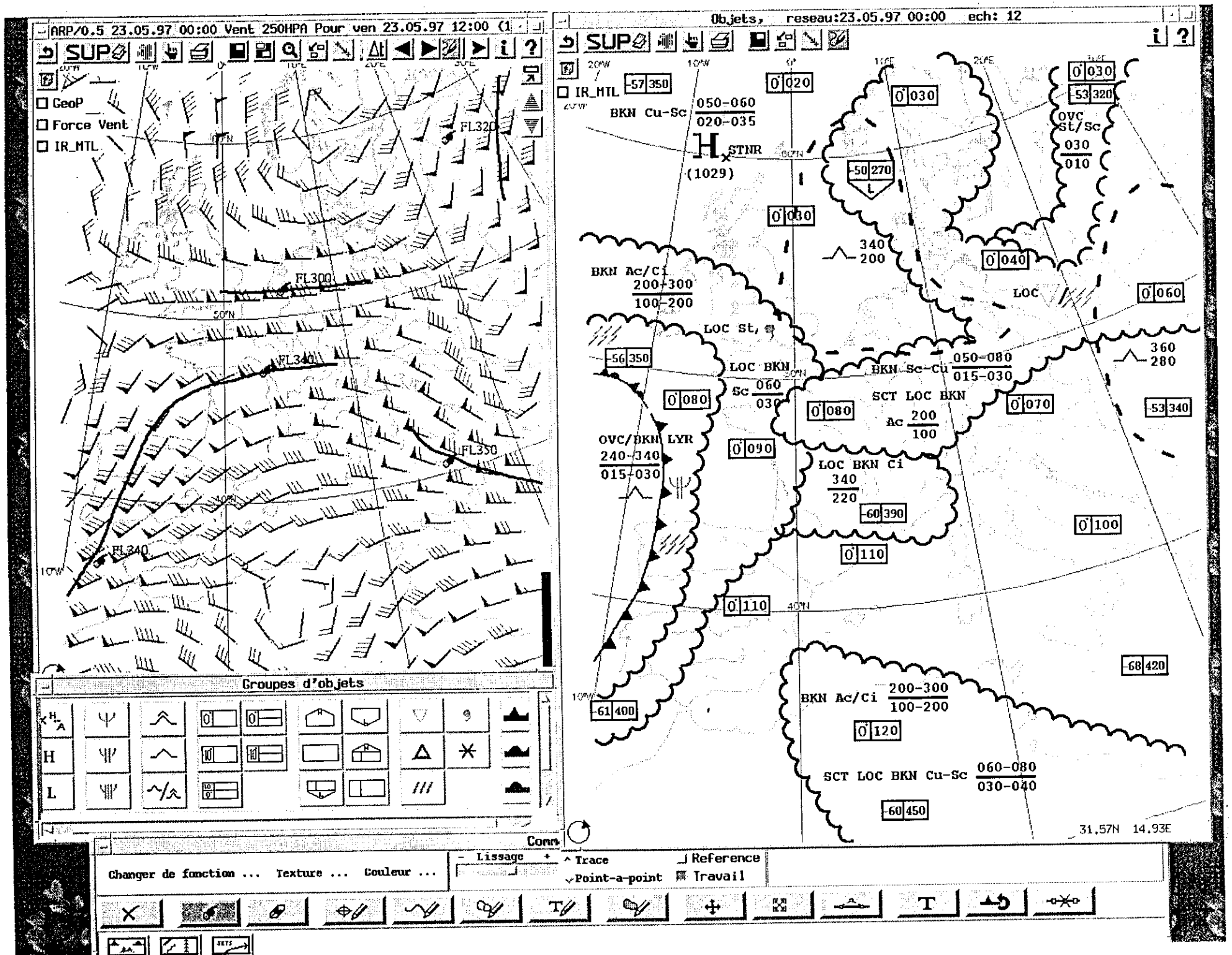
➔ INTERACTIVE 4D NUMERICAL OUTPUT MODIFICATION :

NOT OUR FIRST CONCERN

ACCORDANCE WITH THE FORECASTERS' WORKING METHOD

SCEM/PREVI/AERO Stéphanie DESBIOS

9 juin 1997


ARP/0.5 23.05.97 00:00 Vent 250HPA Pour ven 23.05.97 12:00 (1
SUP
GeoP
Force Vent
IR_MTL
FL320
FL300
FL340
FL350
FL340
50°N
40°N
10°W
Groupes d'objets
Objets, reseau:23.05.97 00:00 ech: 12
SUP
IR_MTL
-57 350
0 020
BKN Cu-Sc 050-060 / 020-035
STNR
(1029)
0 030
-50 270
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0 030
-53 320
OVC St/Sc 030 / 010
0 030
340
200
0 040
LOC
0 060
BKN Ac/Ci 200-300 / 100-200
LOC St
-56 350
LOC BKN Sc 060 / 030
BKN Sc-Cu 050-080 / 015-030
SCT LOC BKN Ac 200 / 100
0 080
0 080
0 070
-53 340
360
280
OVC/BKN LYR 240-340 / 015-030
0 090
LOC BKN Ci 340 / 220
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0 110
0 110
40°N
-68 420
-61 400
BKN Ac/Ci 200-300 / 100-200
0 120
SCT LOC BKN Cu-Sc 060-080 / 030-040
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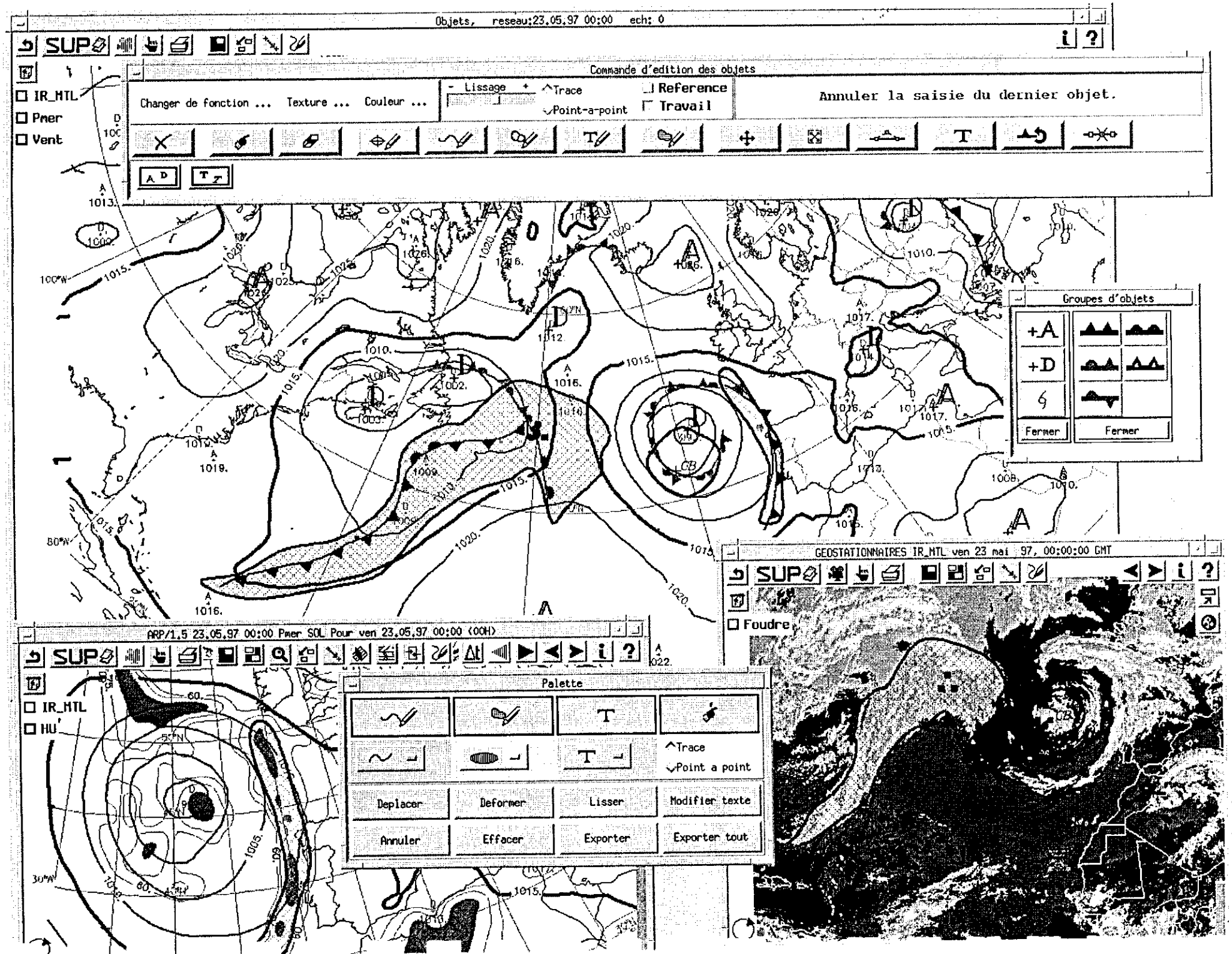
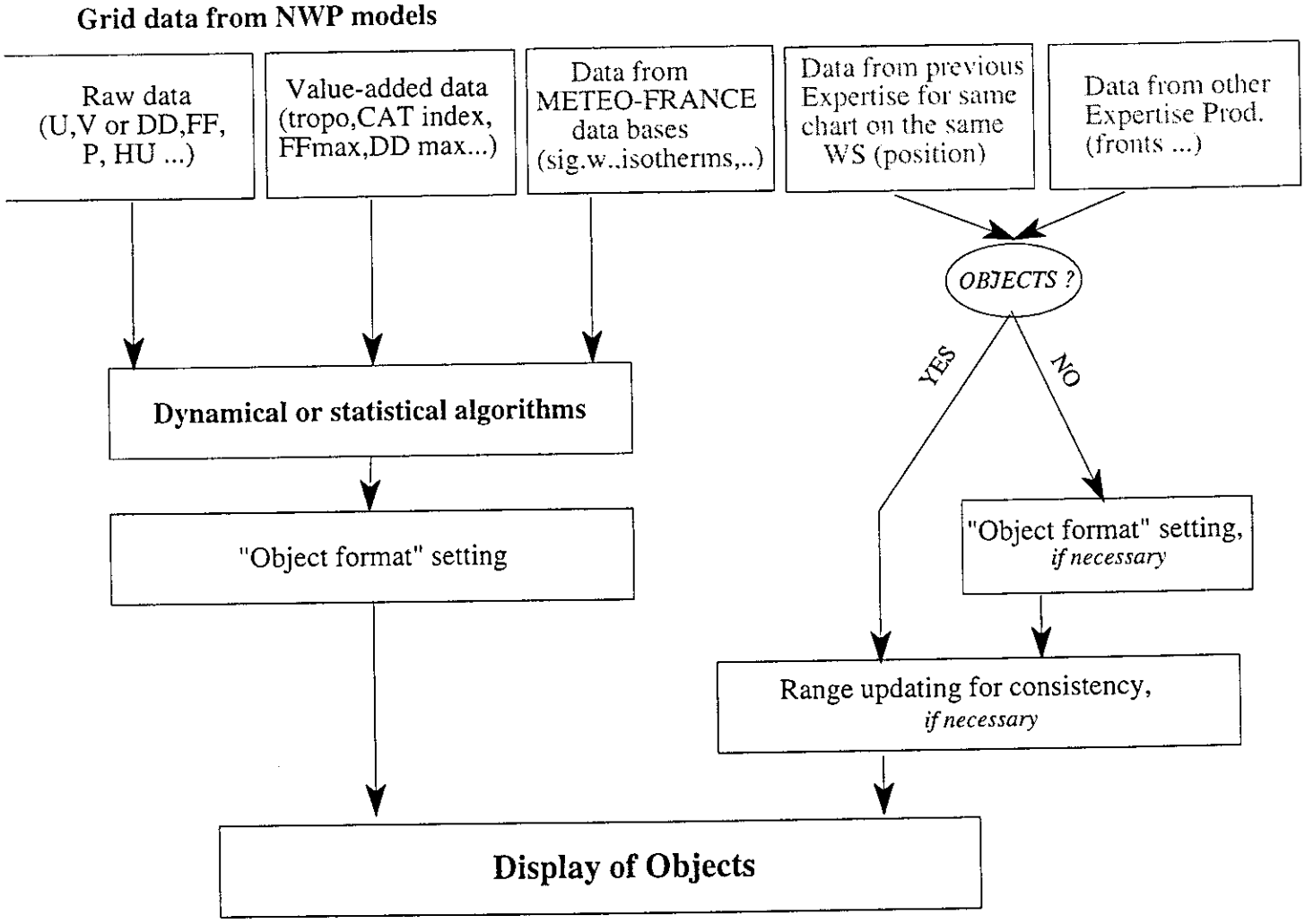
31.57N 14.93E
Changer de fonction ... Texture ... Couleur ...
Lissage
Trace
Point-a-point
Reference
Travail


Objets, reseau:23.05.97 00:00 ech: 0
SUP
IR_MTL
Pmer
Vent
Commande d'edition des objets
Changer de fonction ...
Texture ...
Couleur ...
Lissage
Trace
Point-a-point
Reference
Travail
Annuler la saisie du dernier objet.
Groupes d'objets
+A
+D
Fermer
Fermer
ARP/1.5 23.05.97 00:00 Pmer SOL Pour ven 23.05.97 00:00 (00H)
IR_MTL
HU
Palette
Trace
Point a point
Deplacer
Deformer
Lisser
Modifier texte
Annuler
Effacer
Exporter
Exporter tout
GEOSTATIONNAIRES IR_MTL ven 23 mai 97, 00:00:00 GMT
Foudre
CB

SYNERGIE

EXPERTISE PRODUCTION

INITIALIZATION PROCESS



METEO FRANCE

Service Central d'Exploitation de la Météorologie

SYNERGIE

INTERACTIVE PRODUCTION

* INTERACTIVE NUMERICAL OUTPUT MODIFICATION

⇨ IMPROVEMENT OF PERFORMANCE AND ERGONOMICS

⇨ NOW , SEA-LEVEL PRESSURE AND WIND

IN THE FUTURE , ANY OTHER FIELD

⇨ 3D OR 4D CONSISTENCY ... FOR THE NEAREST FUTURE !

FAST AND POWERFUL INCREASE

OF EXPERTISE PRODUCTION

APPLICATIONS

ON OPERATIONAL WORKSTATIONS

SCEM/PREVI/AERO Stéphanie DESBIOS

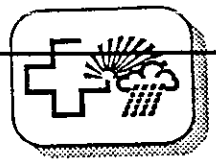
9 juin 1997

1997 EGOWS Meeting at
METEO FRANCE
9 - 12 June 1997

Session 4 : Interactive Production and New Development environments:

Swiss Meteorological Institute-*Christian Pauli*

UK Met office - *Peter Newcomb*



Swiss Meteorological Istitute

METEOROLOGICAL WORKSTATION PROJECT

8th EGOWS Meeting

Toulouse, 9 - 12 June 1997

Java and Object Orientation in the metAP project

Ch. Pauli
Swiss Meteorological Institute
Zürich, Switzerland

Software Development Steps for metAP

- Use Case Workshops
- Business Object Model (BOM)
- First version
- Review of BOM
- Version 1.0
  - Forecast Product Editor
  - metAP database
  - Visualization (Table, QuasiCH)

-> This process is started for each "application" of the metAP project. Several processes now run in parallel (at different stages). Users now write most of the Use Case documents.

Forecast Prod. Edt., metAP-DB

Visualization (Table, Q-CH)

Meteograms

Forecast Editor

Software Development Steps for metAP

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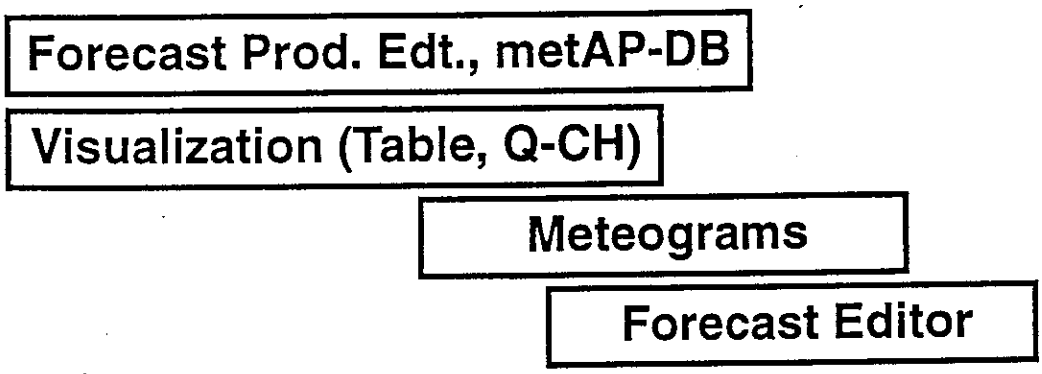
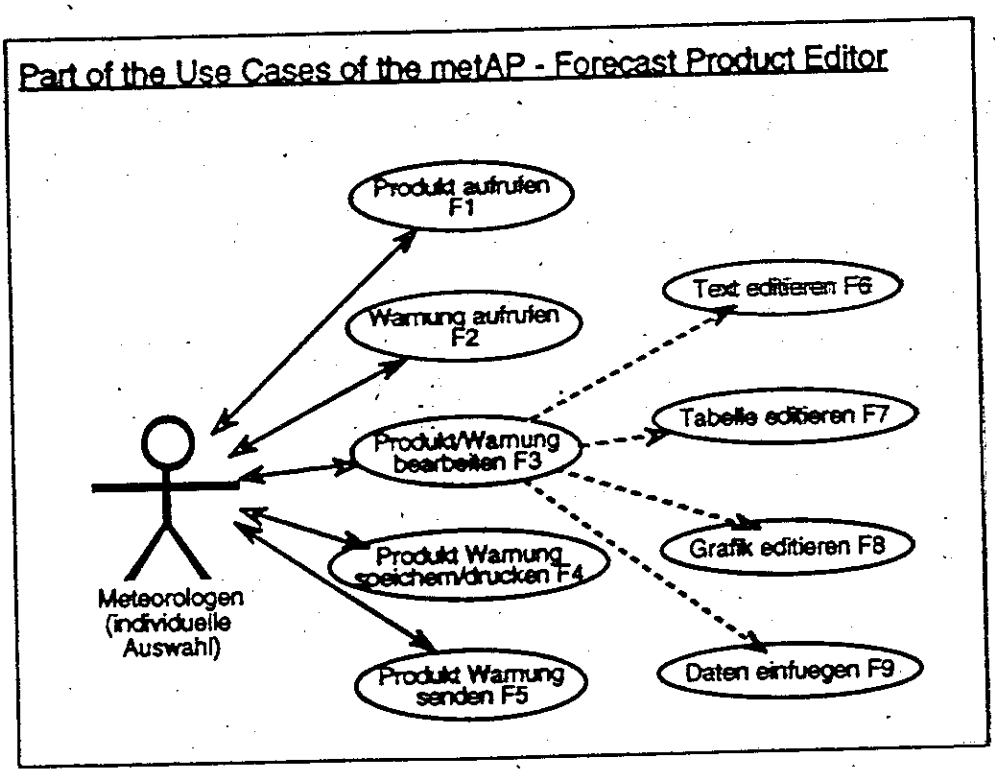


Use Cases

- Use Cases = scenarios, task chains of system use
- first step in application development
- contain scenarios "what happens when", and in this way define the implementation in software of business processes
- use cases specify requirements with actors (user, other systems) that exchange information with the system
- result in a shared vison of the application of the user and software developer



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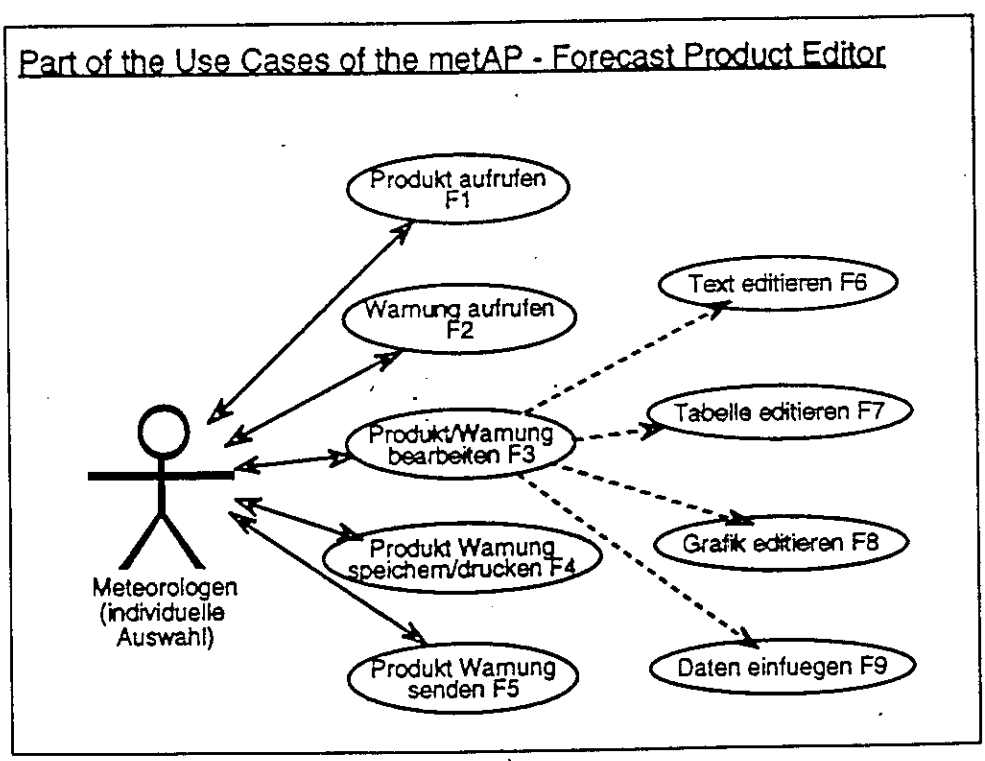
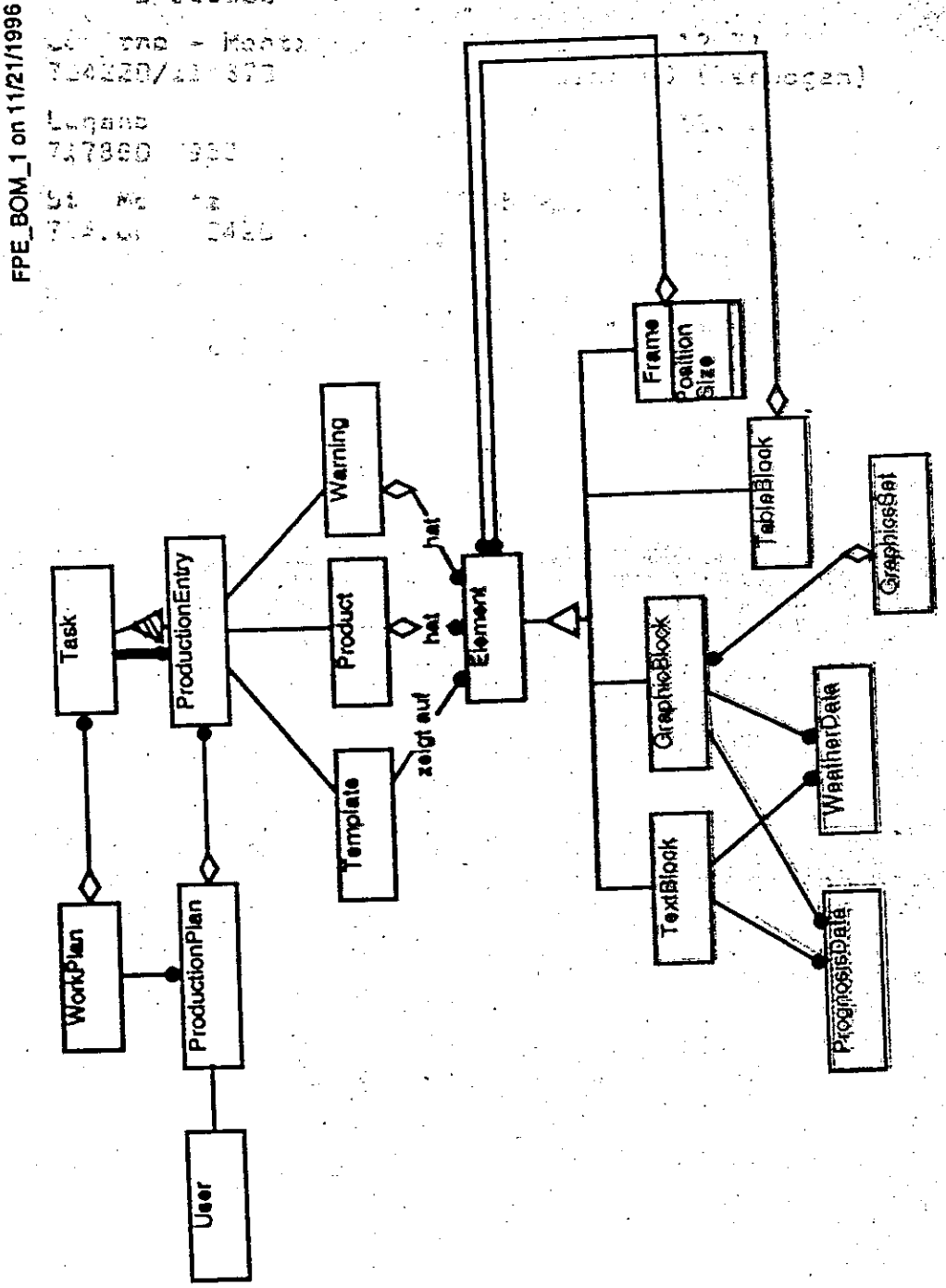


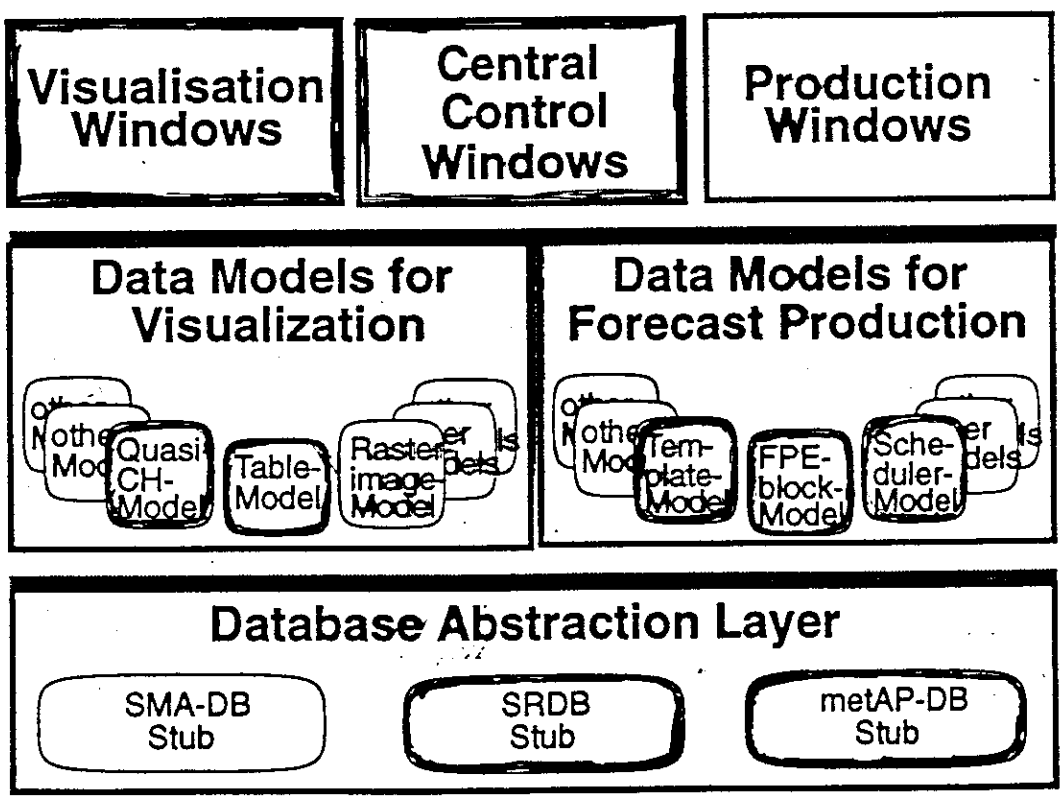
FPE-Business Object Model



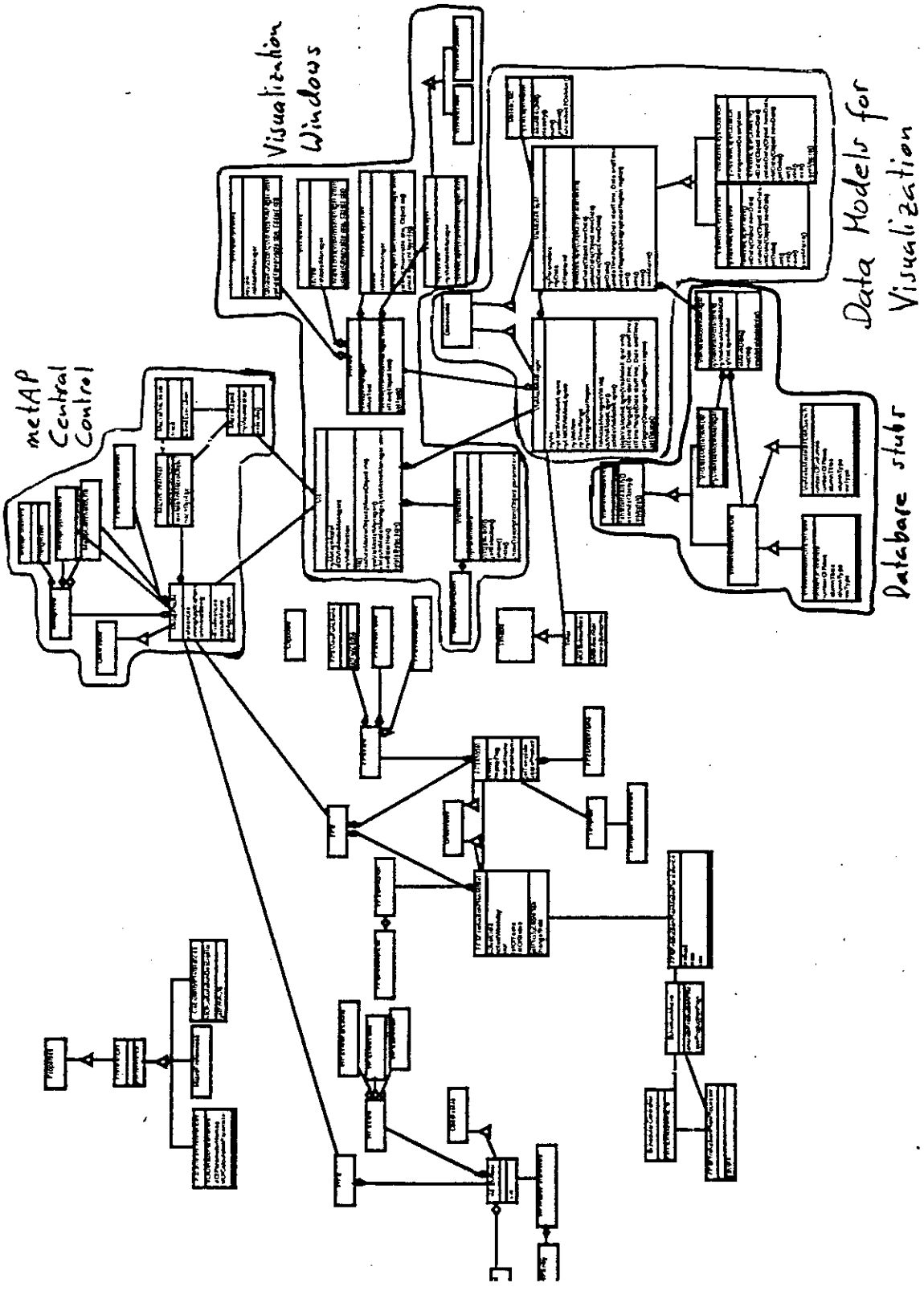
Systemarchitecture metAP (March '97)

Layered system architecture of the metAP-system:

- Grafical User Interface (Presentation model)
- Application logic (Data model)
- Database layer (Meta model)



Objekt Model metAP (März '97)



OO experiences

- **"Good" code appears now, 1 year after OOA/OOD decision**
- **OO without a team is not possible**
- **Paradigm shift in the usage of time**
  "Analysis -> Design -> Implementation"
  shifts from 10:10:80 to **40:40:20**
- **Training is important**
- **Coaching / Reviews are important for system anaysis/design**
- **"There's no way back"**
- **OO is a strategic IT-decision**

Outsourcing

+ Use the IT Know How on the market

+ clear definition of interaction and roles

+ management commitment

- Use Case texts are not enough to be used as specifications (technical details, usage details)

- Without Know how on meteorological subject and (operational) needs outsourcing will be unsuccessfull

- Inhouse support from users and software engineers considerable

-> outsourcing is successfull if there
- is a partnership
- are clearly defined goals
  (needs time for analysis, time for support from inhouse, payment with upper limit)

Development environment metAP

Language and code management

o SUN: JDK 1.1 and JDK 1.1.1

o Take Five: SNiFF+ 2.3

Design

o AONIX: StP Software through Pictures
(StP Core 2.3.01, OMT 3.3.01)

Application logic and GUI

o KL Group: JClass Live Table Pro 2.01

o KL Group: JClass bwt 2.01

Database

o SUN: JDBC 1.001 (02.00.R000)

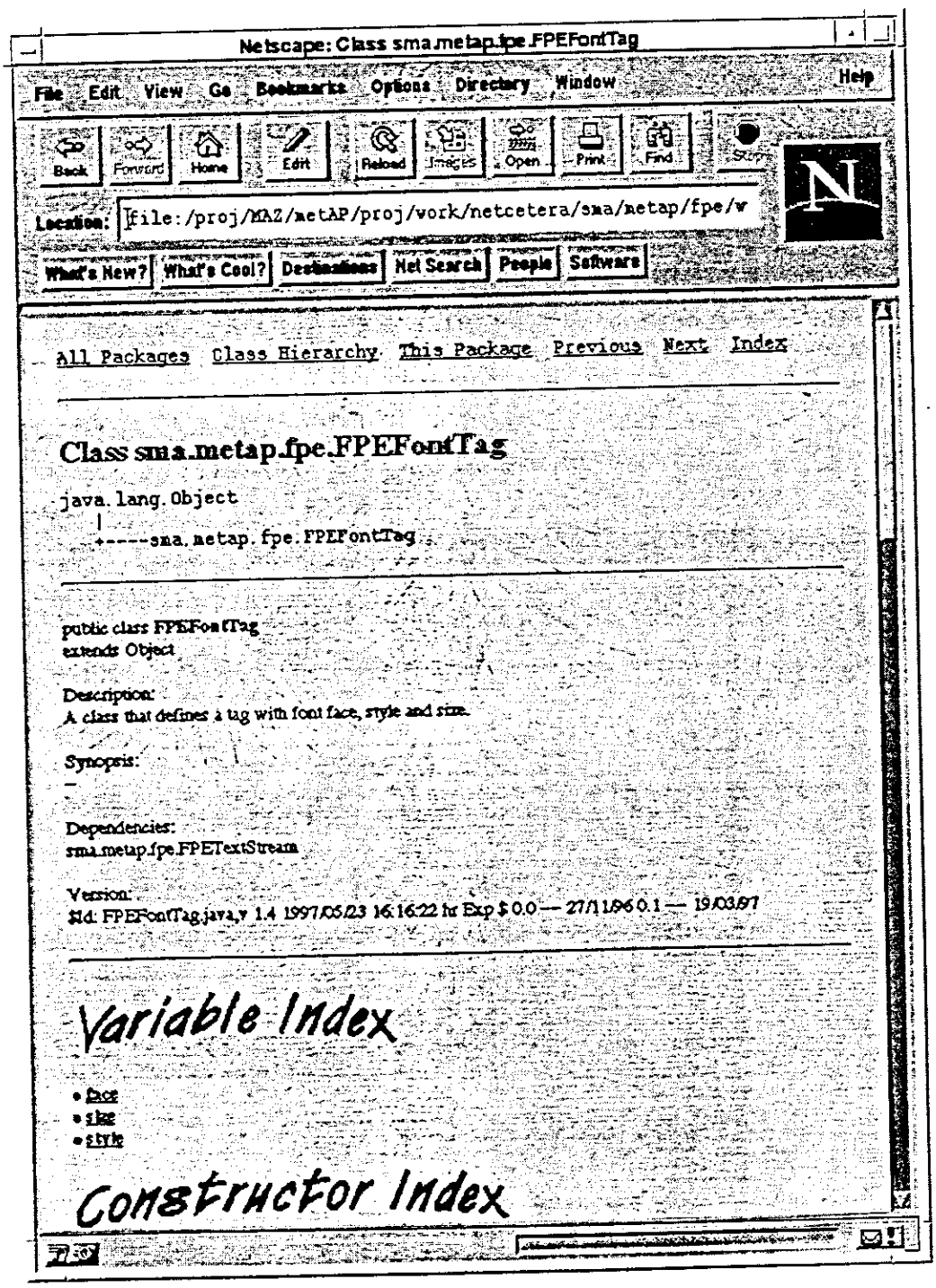
o EMPRESS: EMPRESS 6.8

JAVA - advantages: metAP-view

- Object orientation
- Dynamic loading
- Code documentation system
- JDK as the only one basis of the Java environment
- Intra- and Internet capabilities
- Evolution of the Java market
- Platform independence
- Promise of platform independent component technology (Java Beans)

SNiFF+ Source Code Editor

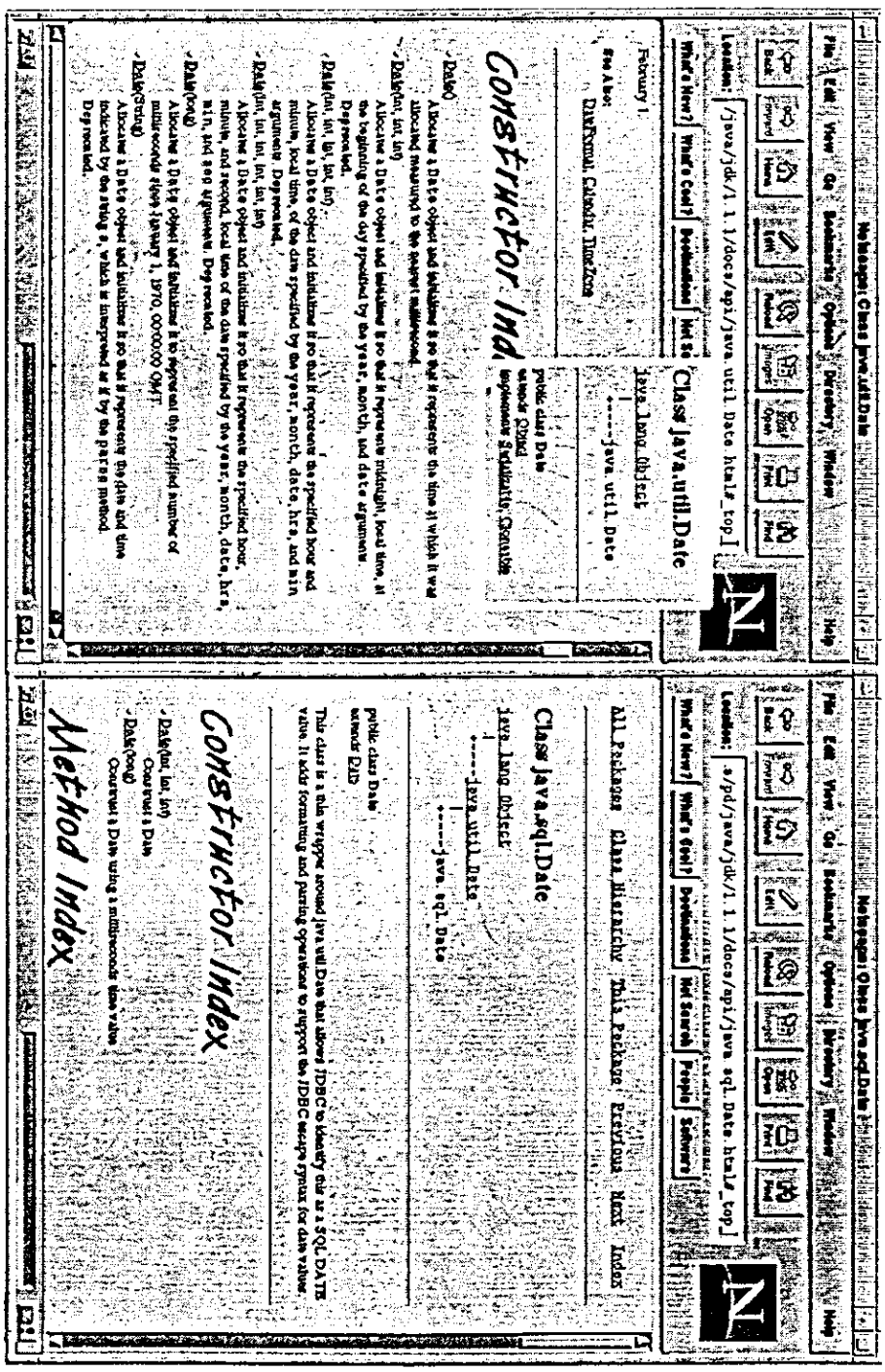
Java Documentation: Class (1)



Java inconveniences

- **Java is young and not yet stable**
  - Version difficulties
    ("version 1 world")
    (JDK 1.02->1.1->1.1.1; JDBC versions)
  - import java.xx.*
  - "undocumented" features
  - CLASSPATH administration
  - Multithreading effects
  - Performance (→ graphics next year ..., productive system today
  - Explosion in number of API's
  - Fast market development
    (" The day you finish a class you can buy it")
- **Industry strength development tools**
- **Java Beans (Components) not jet available**
- **Foundation classes**
- **Bound to commercial class libraries**

Date()


Class java.util.Date
java.lang.Object
java.util.Date
Constructor Index
Method Index
Class java.sql.Date
java.lang.Object
java.util.Date
java.sql.Date
Constructor Index

Important developments in technology for metAP

- Standardization
- Java components (Beans)
- Rapid application development tools (RAD)
- Integrated development environments
  - OOA / OOD tools; StP / SNiFF+J
  - Unified Modeling Language (UML)
- CORBA / IDL

- specific meteorological components (-> droplets!)
- design patterns for meteorological "problems"
- architecture

The Use of 3rd Party Software in Operational Systems

Peter Newcomb

UK Met Office

CONTENT

- 3rd Party Software versus In-house Development
- Procedure for Choosing the Right Package
- Advantages of 3rd Party Software
- Disadvantages of 3rd Party Software
- Examples used in Horace
- Summary

3rd Party vs In-house

- Resouces: man-power, time, budget
- Expertise
- Support

Choosing the Best Package

- User Requirement
- Time
- Information on choice
- Comparison exercise
- Discussion with Users

Advantages of 3rd Party Software

- Zero Development Time/Cost
- Wide User Experience
- Bug Tested
- Automatic Updates
- Additional functionality

Disadvantages of 3rd Party Software

- Cost - initial, copies, documentation, media; annual
- Licencing
- Accurate fit to Requirement
- Development
- Maintenance
- Training
- Implementation

Examples in Horace

- CGView
- Zeh
- StP
- X-Designer
- XRT Graph & Table
- Conpac
- Configuration Management

Summary

- In-house solutions require sufficient:
  - Time
  - Man-power
  - expertise
  - support including training
- 3rd Party solutions require:
  - money
  - Support
- How successful has 3rd Party software been in Horace?

1997 EGOWS Meeting at
METEO FRANCE
9 - 12 June 1997

Join Session EGOWS/COST78 : See COST78 REPORT

Development in the UK-*Eddy Caroll*

Developments in Sweden - *Stefan Nilsson*

Developments in Germany- *Dirk Heizenreder*

Development in KNMI - *Dirk Blaauboer*

1997 EGOWS Meeting at

METEO FRANCE

9 - 12 June 1997

Answers to the questionnaire about the caracteristics of the systems and the competences

Danish Meteorological Institute

Item	Answer	please contact (e-mail address)
1 Hardware :	SUN Sparc	jbb@dmi.min.dk
	Intel Pentium Pro	kec@dmi.min.dk
2 Operating System :	Solaris for Sparc	jbb@dmi.min.dk
	Solaris for Intel	kec@dmi.min.dk
3 Language(s) used	C	jbb@dmi.min.dk
	C++	bko@dmi.min.dk
	Fortran	jbb@dmi.min.dk
	Java	kec@dmi.min.dk
4 Software management	(none)	
5 GUI builder	XDesigner	jbb@dmi.min.dk
6 Data Base	(none)	
7 Debugging tools	Purify (detect memory leaks)	bko@dmi.min.dk
	Pure Coverage (code profiling)	bko@dmi.min.dk
8 Graphic package(s)	XGKS	jbb@dmi.min.dk
	MetView	jbb@dmi.min.dk
9 Class libraries	(none)	
10 Documentation design tool	(none)	
11 Auto testing tools	(none)	
12 Desktop publishing tool	FrameMaker	jbb@dmi.min.dk
13 Output formats	GRIB	jbb@dmi.min.dk
	BUFR	lau@dmi.min.dk
	HTML	kec@dmi.min.dk
	PS	jbb@dmi.min.dk
14 Others	CDE (Desktop style graphical interface)	jbb@dmi.min.dk
	DCW (Digital Chart of the World)	bko@dmi.min.dk

ECMWF

Item	Answer	jens.daabeck@ecmwf.int
1 Hardware :	SGI HP 9000 DEC-ALPHAstation 255 Sun* IBM 6000	
2 Operating System :	IRIX 5.3/6.2/6.4 HP-UX 10.01 OSF1 alpha V4.0 464 Solaris 2.5.1* AIX 4.1.1	
3 Language(s) used	C++, C, FORTRAN	
4 Software management	Clearcase	
5 GUI builder	X-Designer	
6 Data Base	MARS, Empress	
7 Debugging tools	SGI WorkSop Debugger 2.6.5 (cvd)	
8 Graphic package(s)	S-GKS 3.2.3 (Xelion), OpenGL*	
9 Class libraries	STL	
10 Documentation design tool		
11 Auto testing tools	QA - C++ 2.0 Purify	
12 Desktop publishing tool	FrameMaker 4	
13 Output formats	PostScript level 2	
14 Others	Conicon 3 library (Univ. of Bath) Xpm library (public domain)	

Comments

Metview/Magics is being developed on SGI and, at ECMWF, also tested on HP, DEC- ALPHA and Sun* platforms

* planned

England Horace software

Item	Answer	Initial contact Peter Newcomb (pdnewcomb@meto.gov.uk)
1 Hardware:		HP 9000 7/8 series
2 Operating System:		HP-UX versions 9 and 10
3 Languages used:		Fortran-77, C
4 Software Management:		Continuus
5 GUI Builder:		X-Designer
6 Database:		Developed in-house
7 Debugging Tools:		Softbench, Purify, Quantify
8 Graphic Packages:		GKS, XRT graph, Zeh Graphics CGMage Conpac
9 Class Libraries:		None
10 Documentation + Design Tools:		Software Through Pictures (StP), Netscape
11 Auto Testing Tools:		None
12 Desktop Publishing tool:		Island, Applix, MS-Office
13 Output Formats:		CGM, GRIB, BUFR, HPGL-2, TIFF, T4
14 Others:		User interface- CDE and VUE

Finland

Item	Answer	kari.niemela@fmi.fi
1 Hardware :	VAX, SGI, PC	
2 Operating System :	VMS, IRIX 6.2, WinNT	
3 Language(s) used	FORTRAN, C, C++	
4 Software management	MS Visual C++	
5 GUI builder		
6 Data Base	ORACLE, Neons	
7 Debugging tools	Case Vision(SGI), MS Developer Studio(PC)	
8 Graphic package(s)		
9 Class libraries		
10 Documentation design tool		
11 Auto testing tools		
12 Desktop publishing tool		
13 Output formats		
14 Others		

Comments
This is not only where our MWS runs, but also what we use > for nowadays' development.

p. 09-19292526

France Synergie Software

Item	Answer	MF Voidrot: marief@meteo.fr!
1 Hardware :	SUN Sparc	
2 Operating System :	Solaris 2.5.1*	
3 Language(s) used	C, FORTRAN ,ProC, SQL, Shell	
4 Software management	Home made shells	
5 GUI builder	X-Designer	
6 Data Base	Oracle, Neons	
7 Debugging tools	Dbx	
8 Graphic package(s)	Magics,GKX, X, Motif	
9 Class libraries		
10 Documentation design tool	Applix	
11 Auto testing tools		
12 Desktop publishing tool	FrameMaker 4 , Applix	
13 Output formats	PostScript level 2	
14 Others	Conicon 3 library (Univ. of Bath) Xpm library (public domain)	

Comments

Greece

Item	Answer	John Bassiakos :bask@shark.hnms.gr
1 Hardware	:	SGI R10000, R4400, R4000, SUN ULTRA1
2 Operating Sytsem	:	IRIX 5.3, 6.2, SOLARIS 2.5
3 Language Used	:	C
4 Sofware Managment	:	
5 GUI builder	:	XDesigner, MOTIF
6 Data Base	:	Unix Tree like
7 Debugging tools	:	Operating System debugging tool.
8 Graphic packages	:	MAGICS, SGKS, METVIEW,
9 Classic libralies	:	X-WINDOWS
10 Documentation tool:		
11Auto testing tool	:	
12 Desktop publishing:		
13 Output formats	:	GRIB, IMAGE, ASCII, BUFR, T4
14 Others		

Ireland

Item	Answer	please contact (e-mail address)
1 Hardware :	SGI Indy	jhamilton@irmet.ie
2 Operating System :	Irix	jhamilton@irmet.ie
3 Language(s) used	C/Fortran-77	jhamilton@irmet.ie
4 Software management	none [but we use RCS in Hirlam]	
5 GUI builder	none	
6 Data Base	directory of GRIB files for graphics	lcampbell@irmet.ie
	Ingres database for Climatology	lkeegan@irmet.ie
7 Debugging tools	dbx	
8 Graphic package(s)	developed locally [PCONTR]	jhamilton@irmet.ie
9 Class libraries	none	
10 Documentation design tool	none	
11 Auto testing tools	none	
12 Desktop publishing tool	Quark Xpress	lkeegan@irmet.ie
13 Output formats	Postscript/EPS/HPGL	jhamilton@irmet.ie
14 Others	LanWorkplace for Windows	

Comments -------- The above refers mainly to the operational graphics system for the forecast office. We have other hardware for satellite display and radar display [DEC alpha]. The graphics system for the forecasting office is called xcharts and is written in-house in C and Fortran directly in X/Motif. We use 'LanWorkplace for Windows' to run PC's as X-terminals.

- ISRAEL

Item	Answer	Israel Rom : compsys@meteo-serv.gov.il

1 hardware : Silicon Graphics (origin 200, origin 2000)
2 Operating system : Irix
3 languages used : Fortrn, c
4 DataBase : Informix
Since we are at the midst of changing IMS computing infrastructure those are the characteristics I can detail for now.

Jersey - Channel Islands

Item	Answer	please contact (e-mail address) !
1 Hardware :	IBM RS6000 Models 320H, 25T, 390 http://www.rs6000.ibm.com	
2 Operating System :	AIX 3.2.5	
3 Language(s) used	C	
4 Software management		
5 GUI builder		
6 Data Base	Sea4 - a 4GL application development package with an X-ISAM DBMS	
7 Debugging tools		
8 Graphic package(s)		
9 Class libraries		
10 Documentation design tool		
11 Auto testing tools		
12 Desktop publishing tool	ApplixWare Version 4.2 (Words,Graphics & Spreadsheets) see http://www.applix.com	
13 Output formats	GNU - Ghostscript - postscript to T4 14	
14 Others	Hummingbird - Exceed 5 - X- Server software for PC see http://www.hummingbird.com	
	Ceemore - AddFax4 - Fax server software	

Comments
Contact Tony Pallot e-mail jmet@itl.net
Thought WWW links might be useful for anybody who wants a general overview of any of the products.
Main expertise is with Applix, particularly ELF their Extended Language Facility used for the construction of macros.

Netherlands

Item		Answer	Dick Blaauboer : blaauboe@knmi.nl
1	Hardware :	DEC alpha	
2	Operating System :	DEC Unix 4.0	
3	Language(s) used	C	
4	Software management	-	
5	GUI builder	-	
6	Data Base	-	
7	Debugging tools	-	
8	Graphic package(s)	X, Motif	
9	Class libraries	-	
10	Documentation design tool	-	
11	Auto testing tools	-	
12	Desktop publishing tool	-	
13	Output formats	postscript, HPGL, GIF, TIFF, JPEG	
14	Others		

Comments:

1. The system has been bought from an American vendor on our specifications. So some of the development tools (testing, debugging, documentation design, software management) are not relevant for us. System development and system maintenance are boarded out to the vendor. System management and configuration is done by ourselves without use of specific tools.
2. Next year our hardware is to be replaced. At this moment it is not yet clear to what platform we will move (depending on more external conditions).

: **Norway**

Item	Answer	Rita Moi : rita.moi@scud.oslo.dnmi.no
1 Hardware :	SGI, PC	
2 Operating System :	IRIX 5.3-6.*, MS-DOS	
3 Language(s) used :	FORTRAN, C, C++, PERL, PASCAL	
4 Software management :		
5 GUI builder :	X-DESIGNER, RAPIDAPP	
6 Data Base :	ORACLE	
7 Debugging tools :	DBX, CASEVISION	
8 Graphic package(s) :	PHIGS, GPHIGS, OPENGL	
9 Class libraries :	STL	
10 Documentation design tool :		
11 Auto testing tools :		
12 Desktop publishing tool :	WORD, FRAMEMAKER	
13 Output formats :	HDF, TIFF	
14 Others :		

Comments :

Slovakia

Item	Answer	Oldrich Spaniel : ol@shmuvax.shmu.sk
1 Hardware :	HP	
2 Operating System :	OS HP 9.05	
3 Language(s) used	C, FORTRAN	
4 Software management		
5 GUI builder	OSF Motif ?	
6 Data Base	No	
7 Debugging tools		
8 Graphic package(s)	NCAR	
9 Class libraries		
10 Documentation design tool		
11 Auto testing tools		
12 Desktop publishing tool		
13 Output formats	GMETA files, GIF, HTML	
14 Others		

Comments

Switzerland

Item	Answer	please contact (e-mail address)
1 Hardware :	SUN	rae@sma.ch
2 Operating System :	Solaris 2.4, 2.5	rae@sma.ch
3 Language(s) used:	C, Java, IDL, FORTRAN	pau@sma.ch. mat@sma.ch
4 Software management	SNiFF+, SPARCWorks	pau@sma.ch, vic@sma.ch
5 GUI builder:	IDL, Java	pro@sma.ch, mat@sma.ch
6 Data Base:	EMPRESS 6.8	gha@sma.ch, vic@sma.ch
7 Debugging tools	see 4	
8 Graphic package(s)	IDL,	pro@sma.ch
	MAGICS,	pek@sma.ch
	S-Plus	chi@sma.ch
	ghostview, xv,	pau@sma.ch
	ImageMagik	pau@sma.ch
	ive	ros@sma.ch
9 Class libraries	JClass Live Table Pro	mat@sma.ch, pau@sma.ch
	JClass bwt	mat@sma.ch, pau@sma.ch
10 Documentation design tool -		
11 Auto testing tools		
12 Desktop publishing tool	FrameMaker,	ure@sma.ch
	AutoCAD (UNIX)	pro@sma.ch
13 Output formats	mainly postscript	pek@sma.ch
14 Others	StP for System Analysis+Design	mat@sma.ch, pau@sma.ch

Russia

Item	Answer	Yuri Schmelkin :alex@mapmak.goldnet.ru
1 Hardware :	PC compatibles	
2 Operating System :	MS Windows, Windows 95, Windows NT	
3 Language(s) used	C, C++	
4 Software management	MS Visual C++	
5 GUI builder	MS Visual C++	
6 Data Base	proprietary	
7 Debugging tools	MS Visual C++	
8 Graphic package(s)	MS Windows	
9 Class libraries	MFC	
10 Documentation design tool	MS WinWord	
11 Auto testing tools	-	
12 Desktop publishing tool	MS WinWord	
13 Output formats	BMP, GIF, PCX	
14 Others		

Comments

Synthesis

1 Hardware :

SGI	ECMWF, Greece, Finland, Ireland, Israel, Norway
HP 9000	ECMWF, England, Slovakia
DEC-ALPHAstation 255	ECMWF , Netherlands
Sun	Denmark, ECMWF, France, Greece, Switzerland
IBM 6000	ECMWF, Jersey
VAX	Finland
PC	Finland, Norway

2 Operating System :

IRIX 5.3/6.2/6.4	ECMWF, Greece, Ireland, Israel, Norway
HP-UX	ECMWF, England, Slovakia
OSF1 alpha V4.0 464	ECMWF
Dec Unix 4.0	Netherlands
Solaris 2.5.1*	Denmark, ECMWF, France, Greece, Switzerland
Intel Pentium Pro	Denmark
AIX 4.1.1	ECMWF, Jersey
VMS	Finland
WinNT	Finland
MS Dos	Norway

3 Language(s) used

C++	ECMWF, Finland, Norway
C	Denmark, ECMWF, England, France, Greece, Finland, Ireland, Israel, Jersey, Netherlands, Norway, Slovakia, Switzerland
FORTRAN	Denmark, ECMWF, England, France, Finland, Ireland, Israel, Norway, Slovakia, Switzerland
Java	Denmark, Switzerland
PERL	Norway
Pascal	Norway
IDL	Switzerland

4 Software management

Clearcase	ECMWF
MS Visual C++	Finland
Continuus	England
SNIFF+	Switzerland
Sparcworks	Switzerland

5 GUI builder

X-Designer	Denmark, ECMWF, France, Greece, Norway
RapidAPP	Norway
IDL	Switzerland
Java	Switzerland

6 Data Base

MARS	ECMWF
Empress	ECMWF ,Switzerland
Unix Tree like	Greece, Ireland
Oracle	France, Finland, Norway
Neons	France, Finland

Ingres	Ireland
Informix	Israel
Sea4	Jersey

7 Debugging tools

Purify	Denmark, England
Quantify	England
Pure Coverage	Denmark
SGI WorkSop Debugger 2.6.5 cvd	ECMWF, Greece, Finland, Norway
Softbench	England
MS Developer Studio (PC	Finland
Dbx	Ireland, France, Norway

8 Graphic package(s)

GKS	England
XGKS	Denmark
S-GKS 3.2.3 (Xelion),	ECMWF , Greece
X Window	France, Greece, Netherlands
Motif	France, Greece, Netherlands, Slovakia
OpenGL*	ECMWF , Norway
MAGICS	Greece, France,Switzerland
Metview	Denmark
XRT Graph	England
Zeh graphics CGMage	England
Conpac	England
PHIGS	Norway
GPHIGS	Norway
NCAR	Slovakia
IDL	Switzerland
S-Plus	Switzerland
Ghostview	Switzerland
xv	Switzerland
ImageMagik	Switzerland
ive	Switzerland

9 Class libraries

STL	ECMWF , Norway
JClass Live Table Pro	Switzerland
JClass bwt	Switzerland

10 Documentation design tool

Software Trough Pictures (StP)	England, Switzerland

11 Auto testing tools

QA - C++ 2.0	ECMWF
Purify	ECMWF

12 Desktop publishing tool

FrameMaker	ECMWF ,France, Norway, Switzerland
Island	England
Applix	England, France, Jersey
MS-Word	England, Norway
Quark Xpress	Ireland
AutoCAD	Switzerland

13 Output formats

PostScript	Denmark, ECMWF , France, Ireland, Jersey, Netherlands,Switzerland

GRIB	Denmark,England, Greece
BUFR	Denmark,England, Greece
HTML	Denmark, Slovakia
HPGL	England, Ireland, Netherlands
HDF	Norway
TIFF	England, Netherlands, Norway
GIF	Netherlands, Slovakia
JPEG	Netherlands
T4	England, Greece
IMAGE	Greece
ASCII	Greece
EPS	Ireland
GNU	Jersey
Ghostscript	Jersey
GMETA files	Slovakia

14 Others

Conicon 3 library (Univ. of Bath)	ECMWF
Xpm library (public domain)	ECMWF
CDE	Denmark
DCW	Denmark
HP Vue	England
LandWorkplace for Windows	Ireland
Hummingbird	Jersey
Exceed 5	Jersey
Ceemore	Jersey
AddFax4	Jersey

1997 EGOWS Meeting at

METEO FRANCE

9 - 12 June 1997

List of participants

Toulouse, le 28/08/1997

EGOWS 97

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EGOWS 97

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