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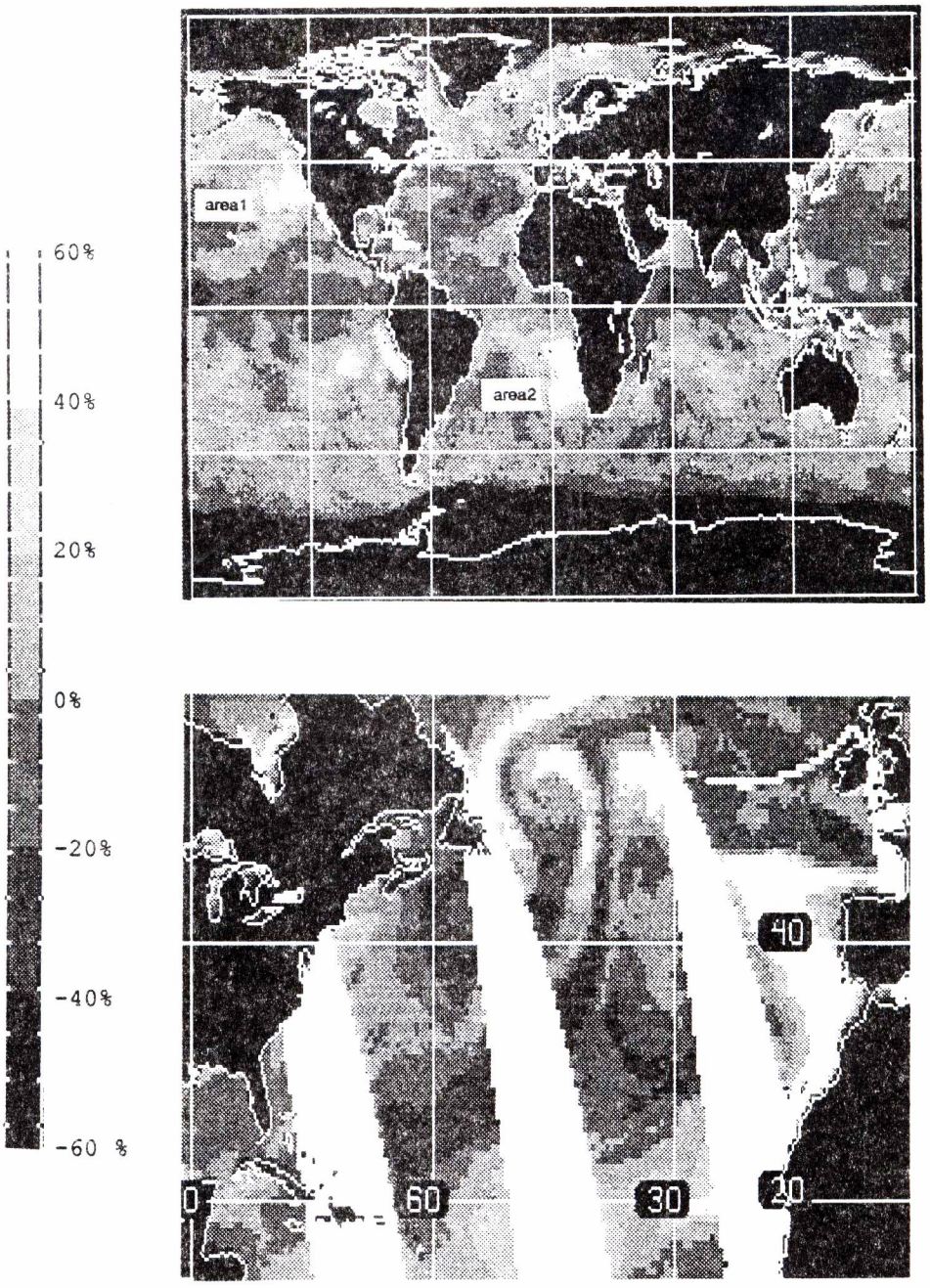

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Centre européen pour les prévisions météorologiques à moyen terme

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(see article page 3)

This Newsletter is edited and produced by User Support.

The next issue will appear in June 1992.

Readers of this Newsletter will find a first assessment of the performance of the CRAY Y-MP/C90, the Centre's new supercomputer. One consequence of its introduction at ECMWF is the need to update the data handling system to accommodate the recent and anticipated large increase in data handling requirements. An article on the data handling system upgrades describes the IBM ES9000/580 installed for this purpose, and associated measures.

Other articles cover the present status of the ECMWF wide-area communications network, and the introduction of the Xcfs facility (graphical user interface to CFS).

The main meteorological article in this issue is a study of the total precipitable water data received from the Special Sensor Microwave/Imager, and compared with radiosonde observations used by ECMWF.

Notification of the ECMWF annual seminar to be held in September is included in this issue.

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CHANGES TO THE OPERATIONAL FORECASTING SYSTEM

Recent changes

On 10 December 1991, enhancements to the quality control of AIREP and SATOB data were introduced. In particular, the restrictions to the use of SATOB data over land have been relaxed.

Problems have been experienced with the numerical stability of the model, the reasons are under investigation. On 7 January 1992 the horizontal diffusion was increased and the time-stepping for cumulus momentum transfer was changed. The diffusion was modified again on 15 January 1992.

Since 20 February 1992, PAOB surface data from the Australian Bureau of Meteorology have been used in the analysis.

Planned changes

A procedure will be implemented to process the cloud-cleared radiance data received from NESDIS to retrieve the temperature profiles to be passed to the analysis. The retrieval is based on a variational inversion technique.

- Bernard Strauss

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COMPARISON BETWEEN SSM/I AND ECMWF TOTAL PRECIPITABLE WATER

1. Introduction

With the launch of the first SSM/I in June 1987, we are for the first time able to measure the total column water vapour of the atmosphere over oceans in almost all weather conditions, with a spatial resolution of about 60 km. This is a tremendous opportunity for weather forecasters, who are always in need of more data, especially over the oceans where the conventional means of measurement (radiosondes, meteorological stations, etc.) are very sparse. SSM/I total precipitable water (TPW) has a number of potential uses: for instance, as a diagnostic for investigating problems with the forecast model's hydrological cycle or in data assimilation. We have started to investigate the potential uses of SSM/I-TPW for the forecast/analysis system of ECMWF. Our first task has been to compare SSM/I-TPW with ECMWF analysis and with radiosonde observations in order to identify the critical problems. A technical description is given first below, then the first results are presented.

2. Technical description

The Special Sensor Microwave/Imager (SSM/I) is a seven channel microwave radiometer which measures the atmospheric and surface microwave radiances at 19.3, 22.2, 37.0 and 85.5 GHz. The atmospheric parameters which can be retrieved over the ocean include the total precipitable water, cloud liquid content, surface marine wind speed and precipitation. These four parameters are all important for numerical weather prediction. Table 1 gives a summary of these four geophysical parameters which can be retrieved from SSM/I data. The values reported in Table 1 correspond to the original requirements and they are representative of the order of magnitude of the achieved performances. The radiometer measurements can also be used to infer information about snow and ice cover.

DMSP-F8 orbit and SSM/I operation

The SSM/I is flown on the Defense Meteorological Satellite Program (DMSP) spacecraft. The satellite is sun-synchronous, with a circular near-polar orbit at an altitude of 833 km and an inclination of 98.8°. The orbit produces 14.1 revolutions per day. The ascending node (equatorial crossing) is 6h13 local time. The active portion of the conical scan covers a swath of 1400 km, which results in the 24 hour global coverage shown in Fig. 1. The cross-hatched areas are missed. The diamond-shaped regions will be covered after 72h. The DMSP spacecraft and SSM/I are further described in Hollinger et al. (1990, 1991).

TABLE 1: SSM/I products (from Hollinger et al., 1990)

Parameter	Geometric Resolution (km)	Range of Values	Quantization Levels	Absolute Accuracy
Ocean Surface Wind Speed	25	3-25	1	± 2 m/s
Cloud Water	25	0-1	0.05	± 0.1kg/m^2
Integrated Water Vapor	25	0-80	0.10	± 2.0kg/m^2
Precipitation over Water	25	0-25	0,5,10,15, 20, ≥ 25	± 5mm/h

Calibration/validation of SSM/I products

The Naval Research Laboratory (NRL) organised and conducted the DMSP SSM/I Calibration/Validation effort. The goals of this project were to establish that the instrument was operating properly and making accurate absolute radiance measurements, and to check the accuracy of the retrieved products. The results are fully described in Hollinger et al. (1991). They show that some of the requirements reported in Table 1 were not met when the pre-launch retrieval algorithms were used. New algorithms were developed. For TPW retrieval the new recommended algorithm (Hollinger et al., 1991) has been developed by Alishouse et al. (1990). One of its main advantages is that it is global, i.e. it can be applied over the whole globe and avoids the spurious gradients generated by the original segmented algorithm. The claimed accuracy (standard deviation of error) ranges between 3-6 kg/m^2 depending on the latitude.

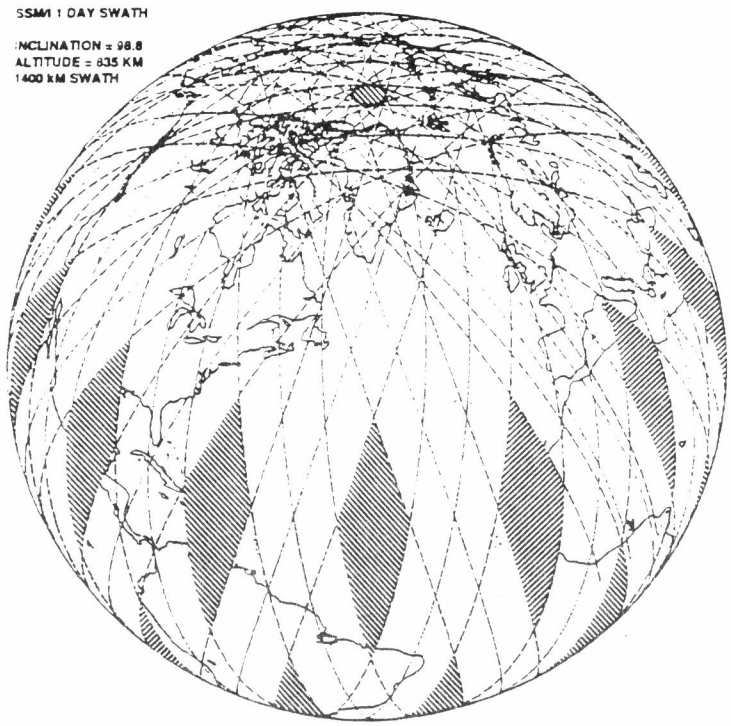

Fig. 1: Earth coverage of the SSM/I in a 24 h period. Only the shaded areas are not observed in this time period (from Hollinger et al., (1990))

3. SSM/I data at ECMWF

ECMWF receives SSM/I data through the WetNet project (Young et al. (1990)). WetNet is a five year NASA funded pilot programme, which began in July 1990, devoted to examining the role of a remote interactive network in an earth science research environment. The primary data source for the WetNet project is the SSM/I on board the DMSP satellites. Complementary GOES IR images are added to the data base. The basic method for retrieving the WetNet data is through a magneto-optical (MO) disk distribution. Each MO disk contains 14 days of data. A WetNet workstation, based on an IBM PS/2 and on the McIDAS (Man computer Interactive Data Access System) software, is used to process and display the data.

Together with the SSM/I brightness temperatures, several other products are included in the WetNet data base. The TPW is one of these products: over sea, SSM/I-TPW is retrieved from brightness temperatures using the non-linear regression algorithm of Alishouse et al. (1990).

On each MO disk, daily and 14-day average total precipitable water fields are available in a rectangular grid with a 0.5° x 0.5625° latitude/longitude mesh (~ 60 km). This sampling is about equal to the largest footprint related to the 19.35 GHz channel.

4. Results

Our first exercise was to compare SSM/I-TPW daily fields over sea with radiosonde observations (raobs) collocated (in space and time). To avoid land contamination, only raobs launched from small islands or weather ships were selected. The number of suitable stations was about 100. When the time/space collocation constraints and quality control of the raobs were taken into account, it was found that only a few stations could be used every day. Until now, SSM/I-TPW has been compared with raobs for three days (24 July 1987, 4 August 1987, 8 August 1987) giving 38 cases. We have used the raobs at 12 GMT only, which means that the time lag between raobs and SSM/I observations might reach ± 12 hours. Despite land contamination and the large time lag allowed (± 12 hours) the results are quite good, giving a 0.8 kg/m^2 bias and 3.8 kg/m^2 standard deviation. These figures are consistent with those reported by Alishouse et al. (1990). Although the number of samples is very small, this preliminary result is quite encouraging regarding the SSM/I-TPW quality.

The second stage was to compare SSM/I-TPW against ECMWF analysed humidity fields. We have computed the difference between the average over 14 days of the TPW from SSM/I (provided by WetNet) and the same field from ECMWF analyses. In order to identify and track persistent patterns in the difference field (dTPW), two successive periods were studied: 20 July to 2 August 1987 and 3 August to 16 August 1987. The results of a re-run of the data assimilation system using a more recent physical parametrization (operational model version of July 1991), have been used at T106 resolution. Two extended and large positive differences, of up to 60% of SSM/I-TPW, were identified in dTPW. These two patterns are persistent over the two 14-days periods. They are located near the North West American coast (referred to as area 1) and near the South West African coast (area 2) and are represented in light grey and white in Fig. 2. These features correspond to subsidence areas in which the humidity structure might not be well represented by the model. It is interesting to note that the same behaviour was reported by Eymard et al. (1989), at least for area 2, when they compared the total precipitable water retrieved from SMMR (Scanning Multichannel Microwave Radiometer) with an earlier version of the ECMWF model analysis. It is very unlikely that such large differences could arise from cloud contamination as shown in (Phalippou, 1992) or from surface conditions (SST, surface wind speed).

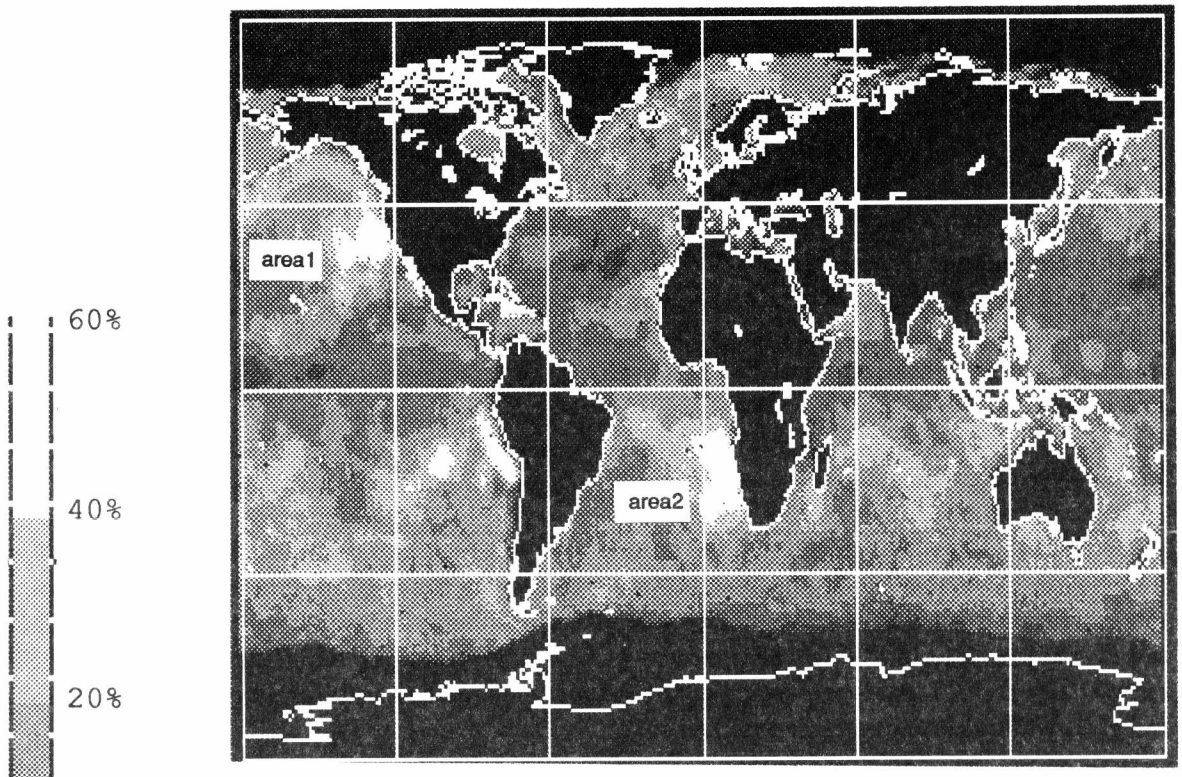

Fig. 2: (ECMWF-TPW - SSM/I-TPW) / (SSM/I-TPW) averaged over 14 days (3 - 16 August 1987)

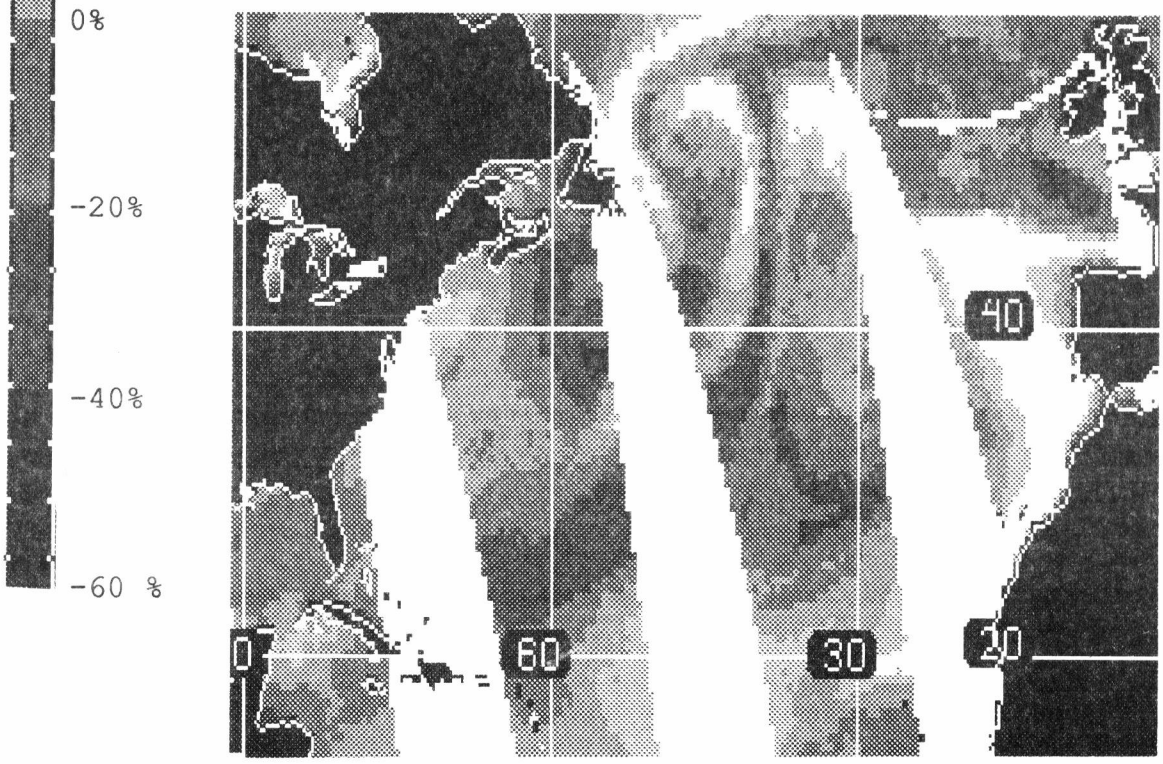

Fig. 3: As Fig. 2, but for one satellite pass (4 August 1987 at 09Z). In this case, ECMWF-TPW is computed using the average of 6Z and 12Z analyses

Another comparison between SSM/I-TPW was performed near a front in the North Atlantic (30°N, 50°E) on 4 August 1987. Fig. 3 shows that the structure and the location of the front in the analysis are in quite good agreement with SSM/I observations. However, the intensity of the front in humidity is too weak compared to SSM/I values. The strongest deficit in ECMWF-TPW is about 30% of SSM/I-TPW.

5. Discussion

Seven SSM/I's have been scheduled for launch over the next two decades. The third SSM/I was launched in November 1991, and WetNet plans to provide the related data in the near future. A new instrument called SSM/IS should fly with the atmospheric and water vapour sounders SSM/T1 and SSM/T2 on F16 to F20 DMSP spacecraft. The experience gained in the processing of SSM/I will be very useful for the processing of the future temperature and humidity sounders AMSU A and B (Advanced Microwave Sounding Unit).

Comparisons between SSM/I and ECMWF total precipitable water have shown large differences over extended areas. These differences are persistent during the period 20 July - 16 August 1987. We are currently investigating the reasons for these discrepancies.

- Laurent Phalippou

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AN INTRODUCTION TO THE CRAY Y-MP/C90

As indicated in the Computer Division plans (ECMWF Newsletter No. 56), ECMWF will install a Cray Y-MP/C90 in June 1992. An outline description of this machine is presented here, paying particular attention to differences from the current Cray Y-MP/8, to migration issues and to expected performance.

The hardware

For most purposes, it suffices to think of the C90 as a 'fast YMP'. The major changes resulting in faster execution are:

clock period 4.167ns	(a factor of 1.44 improvement)
double pipes	(up to a factor of 2 improvement)
more processors	(up to a factor of 2 improvement)

Double piping means that for each vector functional unit, two floating point results are computed every clock period. This gives a peak performance for one cp of four results per clock period, (+ and * overlapped) or 960 Mflops. In order to support this change, the vector registers are doubled in length so that the maximum length vector operation becomes 128. To be consistent with this, the vector mask register (VM) has been enlarged to 128 bits.

The functional unit times for vector and scalar instructions are generally shorter (i.e. fewer segments in the pipes) with the exception of memory references. In particular, the reciprocal approximation function is significantly faster, so that scalar codes, which use divide extensively, will improve by more than the clock period ratio.

The instruction buffers have been doubled in size, allowing larger code segments such as loops to be executed repeatedly without reloading the instructions from memory.

A 'fetch and increment' instruction has been added to allow very fast scheduling of fine grain parallelism. This should benefit autotasked codes.

The VHISP connection between memory and SSD has been improved and has a theoretical capability of 1.7 GB/sec, compared to 1.0 GB/s on the Y-MP/8.

Although a full size C90 contains 16 processors, the initial configuration at ECMWF will have only 12. Also, the main memory is restricted to 128 Mw, which means that the full memory to register bandwidth is not available. Due to the way in which memory is subdivided into sections and subsections, there will be a small penalty on memory accesses, currently estimated to be from 5% to 8% of the total run time on most codes.

Compatibility

The C90 contains a YMP compatibility mode allowing YMP instructions to be executed without change. This means that YMP binaries can be executed without recompilation on C90, albeit at less than optimal performance. A typical loss of performance due to running in YMP mode is 10% to 15%.

However, there are some changes in machine instructions which make modifications to the assembler code necessary. The most obvious examples relate to the vector length register and the vector mask register.

Performance

Speed up of scalar code is fairly obvious and will be close to the clock period ratio. The increase in the vector/scalar relative performance makes the machine less well balanced than its predecessor.

The main difficulty in estimating performance improvement is to quantify the gain due to the double pipes for vector codes. This can best be studied by executing some simple kernels at varying vector lengths.

Figs. 1 and 2 show the performances of a SAXPY operation in megaflops for various vector lengths. This operation (Z = aX + Y) was coded in the simplest possible way and therefore the performances achieved may not be the best possible (eg loop unrolling improves the speed). However, they indicate the basic performance differences between the Y-MP and the C90, namely:

(a) the C90 peak performance (r infinity) for this kernel is more than 2.9 times that of the Y-MP but the vector length for half peak performance ($n_{1/2}$) has increased from 88 to 128. In other words, for sufficiently long vectors, the C90 extracts more than 90% of the dual pipe speed up and reaches nearly 80% of its theoretical peak speed.

(b) the penalty is a slower build up to peak speed, as indicated by the increase in $n_{1/2}$.

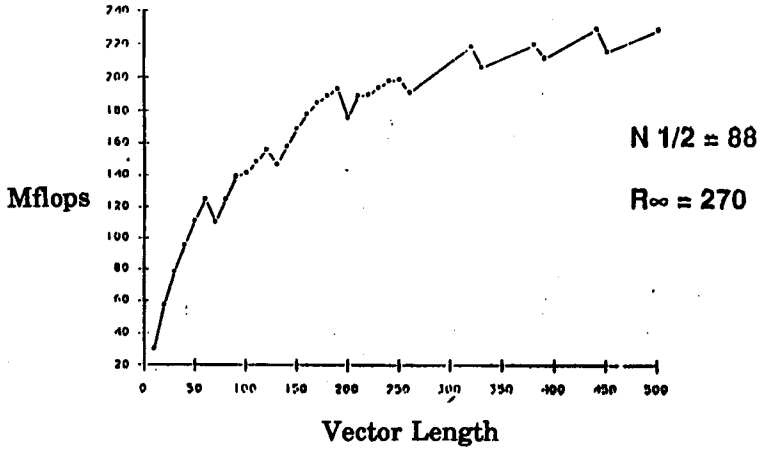

Fig. 1: Performance of a SAXPY operation in megaflops for various vector lengths, on the Y-MP

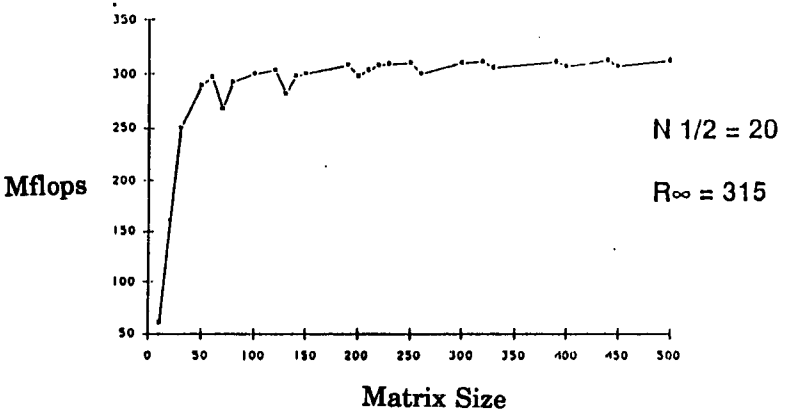

Fig. 3: Performance of a simple matrix multiply, shown as a function of matrix sizes for the Y-MP

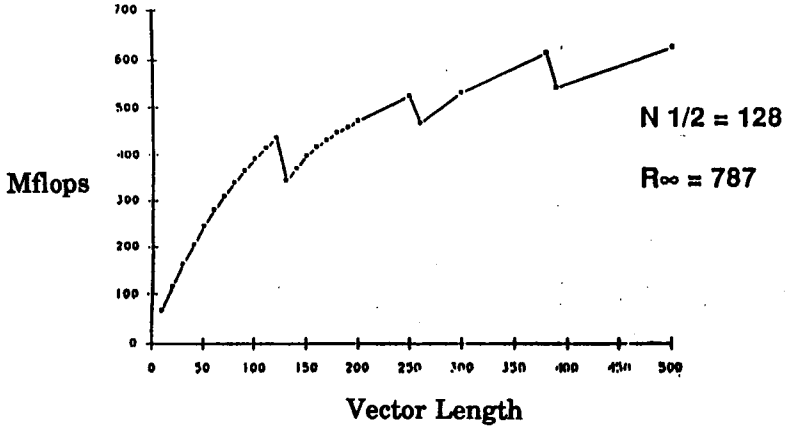

Fig. 2: Performance of a SAXPY operation in megaflops for various vector lengths, on the C90
(note the difference in the vertical scale from Fig. 1)

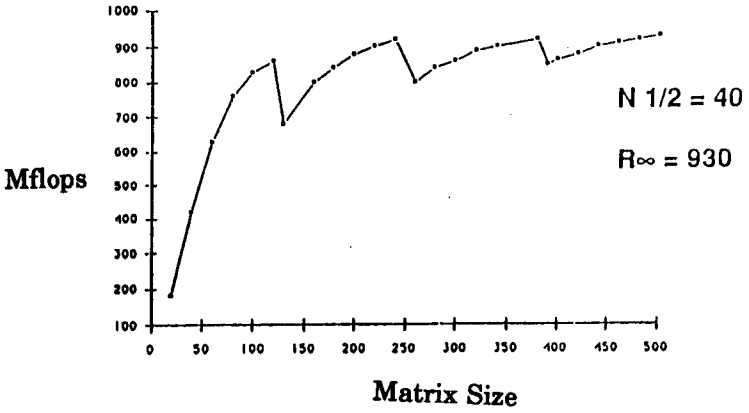

Fig. 4: Performance of a simple matrix multiply, shown as a function of matrix sizes for the C90

The second kernel is a simple matrix multiply using the BLAS 3 routine SGEMM. Figs 3 and 4 show the performance as a function of vector length (or matrix size) for the Y-MP and the C90. Again, the speed-up of the C90 over the Y-MP is impressive for large matrices, with the C90 reaching 93% of theoretical peak speed. As with SAXPY, $n_{1/2}$ has increased, though in this case 90% of peak speed is measured with matrices as small as 200.

Production model

In order to investigate the performance capabilities of the full system, the current production model was run using varying numbers of processors and varying model resolution.

Table 1 shows the speed-up of a single C90 processor compared to a single Y-MP processor for 3 model resolutions. The average vector length (AVL) as reported by the hardware performance monitor is also given.

Table 1: C90/Y-MP cp speed-ups

	T42	T106	T213
	1.9	2.18	2.41
AVL	41	58	91

It is clear that the higher resolutions with longer vectors are much more successful at extracting benefit from the second vector pipes. Even so, the best (2.41) represents a speed up of only 1.6 due to the dual pipes (in addition to the clock period improvement), and higher speed-up ratios will obviously require greater average vector lengths. Note that the AVL figure reported here is the instruction level vector length which can never exceed 128. There is no easy way to measure the AVL at the Fortran loop level. Much of the reason for the relatively low AVL is the reduced grid implemented in today's operational model. Polar rows have very short vectors (16) whereas equatorial rows contain 640 points.

Table 2 shows the multitasking speed-ups for the model running on the Y-MP and the C90 at resolution T213.

Table 2: Y-MP and C90 multi-tasking speed-ups

#np	YMP	C90
4	3.9	3.9
8	7.59	7.5
12		10.6
16		13.5

Apparently, the C90 multitasking speed-up is almost, but not quite, as good as that achieved on the Y-MP. Since the model code is identical in all respects, this loss may be attributed to memory bank conflicts or may be due to a relatively larger serial execution time. For example, some of the I/O time from the workfiles contributes to the serial time. The I/O speed has improved by a factor of about 1.7 which is less than the speed-up in computations (2.4). Hence the serial time becomes relatively greater. It can also be argued that the serial code will tend to be more scalar in nature than the highly vectorised parallel code.

A further test was carried out in order to check Y-MP compatibility. A model binary generated on Y-MP was found to execute correctly on C90 with a 13% loss of speed. Since the main difference is the use of 64-word vectors instead of 128, this is presumably a measure of the benefit seen by taking advantage of the longer vector registers.

A similar speed-up was seen for the same reason when an FFT assembler coded routine was converted from vl=64 to vl=128.

Extrapolation of this short model test suggests that a 10 day forecast using 16 processors will take about 55 minutes. Note that this excludes post-processing and product generation costs. This corresponds to a C90/16 to YMP/8 ratio of about 4.3. For the initial 12-processor configuration at ECMWF, the model speed-up over the YMP/8 is likely to be about 3.3.

However, the new forecast model (IFS), which is expected to take over production before the end of this year, is likely to perform rather better since care has been taken to merge shorter rows together in order to maximise vector length. No measurements on a C90 have yet been made.

Summary

The tests carried out indicate the following:

* The machine exists and works in the same way, and generates the same results as the Y-MP.

* The benefit gained from the dual pipe functional units depends a great deal on the vector length but can be nearly doubled for sufficiently long vectors. In general, the start-up time for vectors is longer, and requires longer vectors to reach an efficiency equivalent to the Y-MP.

* Multitasking efficiency is almost as good as on the Y-MP. The serial portion has probably improved to a lesser extent than the parallel portion.

* Migration from the Y-MP to the C90 can be carried out initially without recompilation at the cost of a modest performance penalty.

- David Dent

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DATA HANDLING SYSTEM UPGRADES

In the constellation of computers that are used in the Centre, some stand out more than others. The Cray Y-MP is obviously the most famous of our machines. The Vax and Cyber systems, used to interface with the Y-MP, are also well known to the users, as are the numerous PCs and Workstations.

Less well known, perhaps because its access is concealed from the users, is an IBM mainframe supporting a Data Handling System. It is used as the Centre's main data repository, on which all data generated on the various Centre computers are stored. A CFS[1] file handling system is used to handle this data and to organise its efficient archival and retrieval. It is accessed either directly, through the ECFILE interface, or through the MARS[2] interface. The latter allows operational and research applications, initiated either by Centre staff or by the Member States, to access this data in meteorological terms. All this is performed under the control of an MVS operating system.

Since the CFS services started, in 1984, the volume of data stored has increased at a rate of 60% a year, and has now reached a level of 5 TeraBytes.

The installation of increasingly powerful supercomputers, as well as the demand for the provision of new services (e.g. access to CFS from workstations, support of very high speed connections to the CRAY), have dramatically increased requirements for processing power and direct access storage on the IBM machine. Because of this, the IBM 3090-150E mainframe that was in use up to the end of last year was obsolescent, being hardly able to support the load increase generated by the YMP 8 installed last spring, and suffering more and more frequent problems of stability in the data handling applications.

To alleviate the bottleneck, and in order to prepare for the installation of the Y-MP C90, a new hardware configuration was put into service in January 1992.

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1 Common File System, developed by Los Alamos National Laboratory

2 Meteorological Archival and Retrieval System, developed by ECMWF

A new IBM ES9000/580 mainframe has been installed. Comprising 3 CPUs and 320 MB of memory[3], it is roughly 6 times as powerful as the old 3090-150E that it replaced.

A new disk subsystem, connected to the mainframe via optical cable channels, gives an extra 60 GigaBytes of direct access storage, bringing the total to 180 Gigabytes. Most of this space is used by CFS to store files that are accessed regularly, allowing their retrieval without delay.

The Centre is also in the process of installing a third StorageTek silo. As a result, the capacity of the StorageTek Automated Cartridge Library will be brought up to 18000 cartridge tapes, representing 3.6 Terabytes of data. Each of these tapes may be accessed with a minimum of delay via one of the 24 cartridge drives found in the silos.

Several types of network links are used to support the connection between the IBM and the Centre's other computers. TCP/IP connections to the Centre's Ethernet Network are supported by Network Systems and Ultra devices. High speed connections to the YMP are provided via channel to channel adaptors by Superlink, a proprietary interface developed by Cray.

The equipment installed in January will also enable us to initiate new developments. For example, work on the installation of a very high speed connection[4] between the IBM and the CRAY via a HiPPI link will start soon. At a later stage, an experimental Unix-like system will be installed in parallel with the MVS system, and will be used to evaluate the Unix-based file management system in the context of the Centre's activity.

The installation of the new Data Handling System (Fig. 1) has greatly improved the quality of the file services provided to the Centre's research community. It should allow us to work without major problems for the lifetime of the Y-MP C90 and will allow progressive migration to a more standardised Unix environment.

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[3] 256 MB of central memory, 64 MB of expanded memory

[4] Over 24 MegaBytes/second

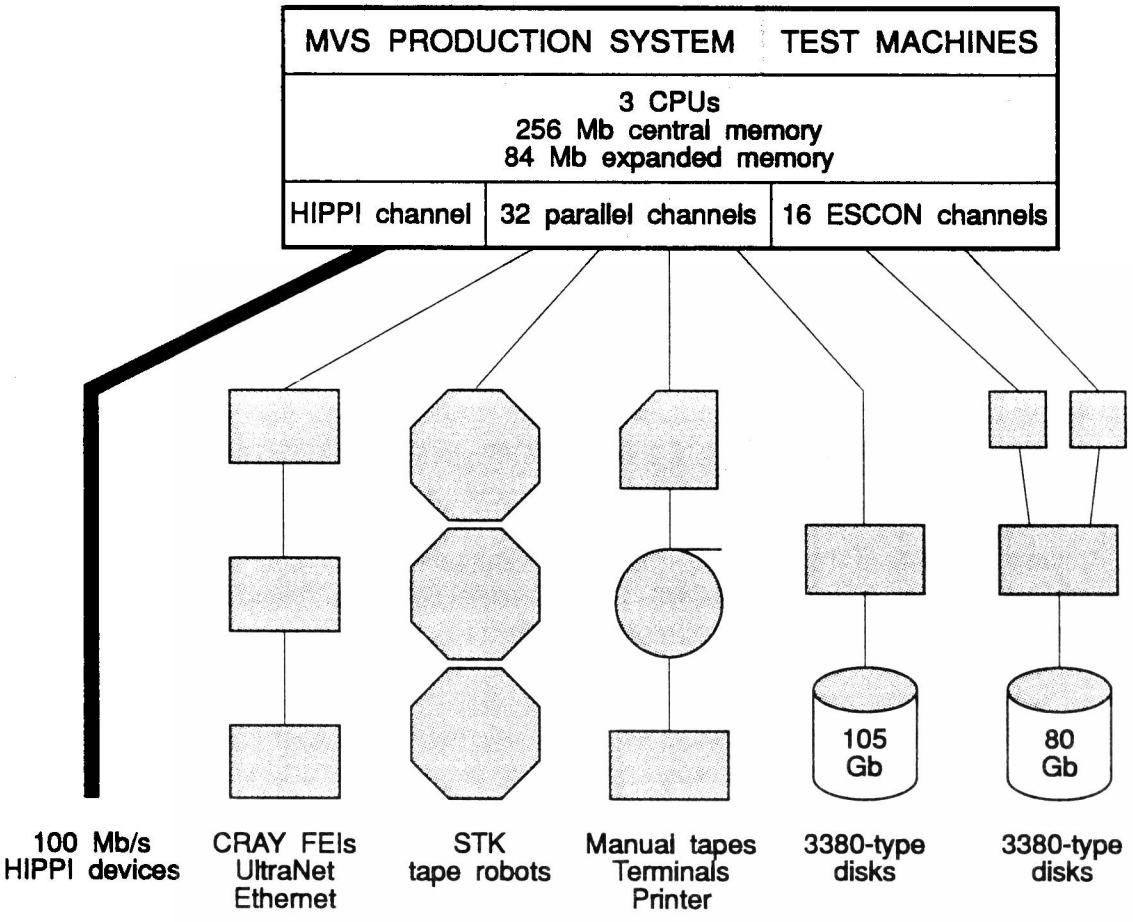

Fig. 1: ECMWF Data Handling System: IBM ES/9000-580 configuration

- Francis Dequenne

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DIGITAL LINKS TO MEMBER STATES

Bringing the ECMWF communications network into the '90s

History

When the Centre was establishing its communications network in the late 1970s, there were few standard solutions to draw upon. Communications links were slow and expensive by current standards, and most of the software and protocols needed to drive them had to be developed specifically - and expensively - for the Centre's network. The fastest links in the first network configuration used modems at 2400 bits per second over telephone lines.

In the 1980s, the network was revised and progressively upgraded with the introduction of the VAX telecommunications system. Some of the links were updated so that the data could be carried over more modern, standard networks using X.25 protocols. The speed of the lines was increased until most Member States were able to transfer data at 9600 bits per second.

At the same time, the use of DECnet protocols was introduced. This allowed Member States to install a relatively cheap package which could communicate with the Centre, and at the same time provided many more functions than had been available with the original system. Most Member States today are using DECnet protocols, but some have preferred to wait for a non-proprietary, open protocol.

New technology

There have been three significant developments in the field of data communications since the VAX-based telecommunications system was introduced.

Firstly, the price of faster (64 Kilobits per second) digital communications links fell, as the PTTs introduced digital technology for their voice traffic, and as more competition entered the communications market.

Secondly, the availability of open protocols became vastly better. In particular, the protocol suite known as TCP/IP, developed in the USA for the Department of Defense Internet, became very widely available at low cost. The new protocols were suitable for use both on local networks, and over communications links, forming a wide-area network. The Centre and many Member States make extensive use of TCP/IP protocols in their every-day operations.

Thirdly, the technology of network interconnection made considerable advances. High-speed network interconnection units (routers) became available which could pass protocols between different kinds of connection, both local- and wide-area. The best of these are fast, reliable and very flexible.

Making progress

Several Member States were finding their existing communications with the Centre too slow. In December 1987 Council had approved the use of 64 Kilobit-per-second digital links to Member States, and a proposal was made to the Technical Advisory Committee in 1989 that links using the newer technology should be installed and evaluated.

The Technical Advisory Committee recommended adoption of the project to Council, and Council, in November 1989, approved the establishment of a 64 Kilobit-per-second link, using TCP/IP protocols, to the French national meteorological service (Meteo France) as a pilot project. The decision was to connect the link via network routers manufactured by Cisco corporation in the U.S.A., since the Centre already had positive experience with these units.

The new line was installed in March 1991; initial data contact was made on 14 March. The dissemination of forecast data and other services was transferred to the new line on 11 April, and the old line was removed from service on 15 May.

Experience with the link

In general, the experience with the new link has been entirely positive. Two services are provided: an X.25 connection, which carries the old ECNET protocols, and a TCP/IP connection. The TCP/IP connection is used to provide interactive and file transport access to the Centre's machines for users at Meteo France, and the X.25 connection will be retained to provide support for other services such as X.400 mail (see Fig. 1).

The equipment reliability has been excellent: no failure of the Cisco routers has occurred at either end of the link. The digital line suffered from one break in service during the early trials but has been reliable since then.

Apart from the usual small problems expected in such a project, the services which were available via the analogue link were transferred smoothly and successfully to the X.25 sub-circuit on the new link. No breaks in service attributable to the new link have been reported.

The new TCP/IP services have worked well, since they were first made available to Meteo France users. At present, TCP/IP can be used directly for file transport and for interactive connection. The higher bandwidth available makes both these services more usable than the system previously available.

Leaving the past behind

The data dissemination service for France is still using the old ECNET protocols devised in 1978. Meteo France wishes to move to TCP/IP, but there is an outstanding problem of compatibility with the original systems on which the files are processed.

TCP/IP file transport is based on the UNIX view of a file as an unstructured series of bits. In the past, the file structure of the dissemination files has been reproduced when the files are transferred to Member States' systems. This is not possible, however, when the file transport mechanism is FTP within TCP/IP. Some initial experiments have already been performed and progress is being made: the French national meteorological service wishes to discontinue the use of ECNET protocols as soon as practicable.

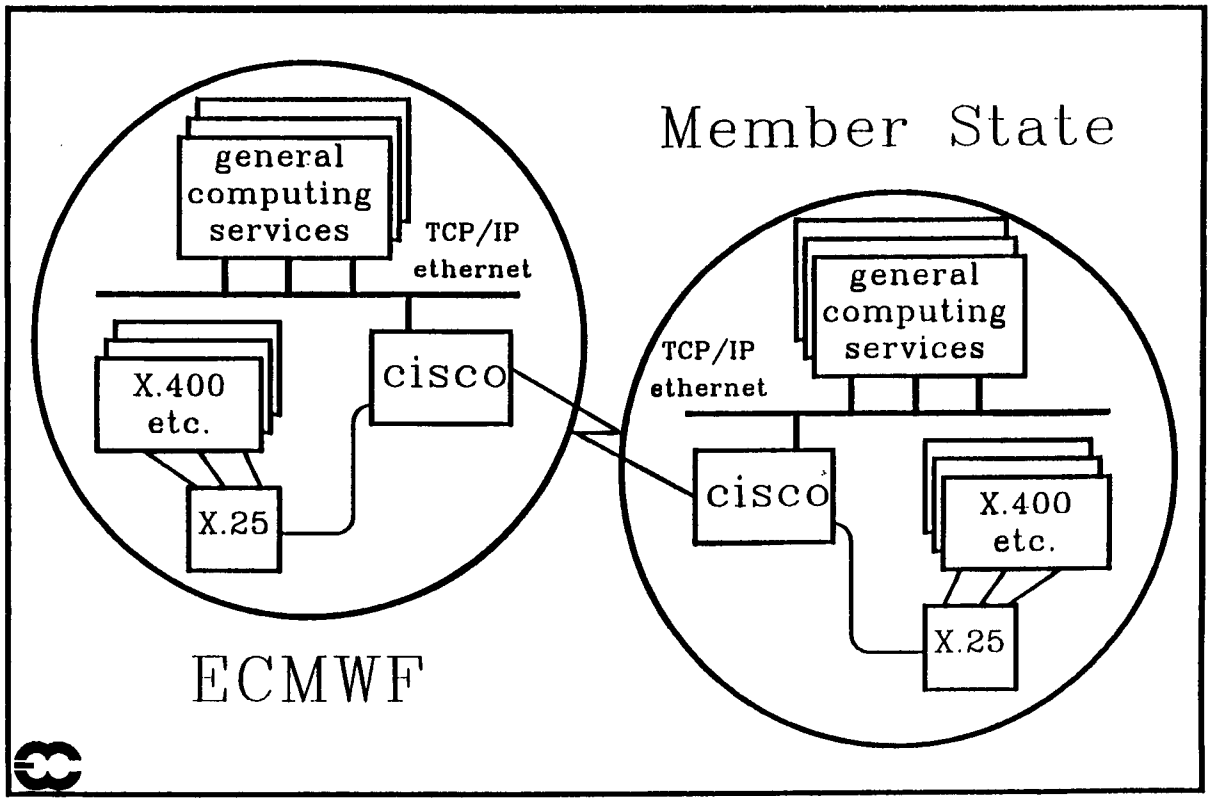

Fig. 1: ECMWF communications with Member States

Further progress

As a result of the experience with the link to Meteo France, Council approved the use of TCP/IP protocols in December 1991.

Table 1: The currently supported protocols on ECMWF's networks

	LAN	WAN
● TCP/IP	yes	yes
● DECnet	yes	yes
● CDCnet	yes	no
● Novell IPX	yes	no
● ECNET	no	yes

Shortly after the French link was installed, a similar link was provided for Deutscher Wetterdienst (DWD) in Offenbach. This link uses different protocols, but has been an equal technical success. The climate research centre DKRZ in Hamburg also makes use of the Centre's facilities via the new link.

Requests for the new facilities have been received from a number of other Member States, and the Centre is equipping itself to meet this demand. Probably another four Member States will be connected via digital links during 1992.

The move towards use of higher-speed links and standard protocols allows use of the link for new and more demanding applications. It enables the Centre to be more efficient in its own operations and to offer a better service to Member States. For these reasons, the Centre fully supports the move to digital links and TCP/IP protocols for any Member State which wishes to make use of it.

- Richard Dixon

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XCFS

Xcfs is a Graphical User Interface to CFS. It provides users with all the file management capabilities of CFS, in a more user-friendly environment than existing command-line interfaces (ecfile and the MASS interface).

Interface description

Xcfs comprises one top-level window, permanently displayed, and a dozen transient 'pop-up' windows. The user selects one CFS command at a time in the top-level menu bar, which pops up the related command window. That, in turn, pops up another window, typically the Password window or the User Validation window. The interaction between Xcfs and CFS is logged in a scrolled list in the top-level window.

All pop up windows have one group of push buttons (OK/Cancel/Help) in common. "OK" validates the current settings of the window and sends the command to CFS, but does not hide the window. This allows several identical commands in a row for different files or directories. "Cancel" hides the window and allows the user to select another CFS command in the top-level window. "Help" will provide some help in a future release (currently scheduled for later this year).

Interface consistency

The whole application conforms to the following standards:

- file and directory handling are separated at the top level, as CFS offers different options to create, delete etc. a file or a directory;
- there is one window per CFS command;
- files and directories are selected within each command window, not at the top level;
- all possible options for a CFS command are visible from this command window, password and user validations, however, are managed in sub-windows in order to keep command windows fairly small;
- user-defined defaults allow customization of the expiry date of a new file, its storage group, its future activity, etc.

Clashes between different CFS options should not happen. They have been avoided by using the two kinds of "toggle buttons" offered by Motif: radio buttons allow one, and only one, of them to be selected at a time, while "check boxes" may be selected independently.

File transfer

File transfer between CFS and the user's workstation is based on the standard FTP utility. In order to save bandwidth, this FTP is performed directly between CFS and the machine physically holding the file (i.e. the file server). Otherwise, NFS mounting would cause a lot of data to travel between the user's workstation and the file server for nothing.

To implement this optimization, Xcfs manages a file server table, and identifies the file servers of all files that need to be transferred: xerxes, charybdis, epix... or the user's workstation. The table comprises one username/password entry per file server and is used by FTP to log in to each file server. Whenever a new entry is required, Xcfs prompts the user. Several file servers may be accessed within one session, and the username/password specified for a file server may be changed at any time.

This optimization has a drawback: FTP to Member States' workstations is not currently available, as file servers need to be known to the ECMWF 'host' file in order to be identified. This situation may be improved in the future if required.

Passwords and User Validations

Passwords and User Validations adhere to the following policy: all entries are stacked in order to facilitate re-use, and only selected entries are taken into account when a command is sent to CFS. These remain active as long as they are on the selected list. It should be borne in mind that when a password is specified to access a file, this password will probably not be used thereafter and should therefore be unselected for future commands.

Before using Xcfs, users need to register a new username under CFS. Please contact User Support to be registered. Users' passwords will be pre-expired, and Xcfs will prompt for a new password the first time it is run.

Environment

Xcfs was designed for the X Window System environment and built with the OSF/Motif widget set. It has been developed and tested on SUN workstations running SunOS 4.1.1 and either of these two window systems:

MIT's X11R4

SUN's OpenWindows 3.

Both Motif and OpenLook window managers are supported, though Open Windows has some idiosyncrasies which clash with some Motif features. Xcfs has been written in ANSI C, so that it can be ported easily to new platforms when required. Just a few X resources have been hardcoded, so users should be able to customize the application quite easily (e.g. translating labels and messages into their own languages).

Users are invited to report bugs and design enhancement wishes via e-mail (Internet: syj@ecmwf.co.uk).

- Jean-Philippe Martin-Flatin

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ADVISORY AND VISITOR SERVICES

Last year some changes were made to the way the Advisory service is run. This brief article gives a summary on how to contact Advisory now.

The opportunity is also taken to remind visitors of the current procedure they should follow.

Advisory service

For some time the Advisory function had been carried out either by telephone, or by Centre staff visiting User Support in their offices. The Advisory Office itself was little used. Because of a lack of office accommodation, as of July 1991 the Advisory Office in the User Area became a staff member office and ceased to be an Advisory Office.

The Advisory service is now available as follows:

HOURS AVAILABLE	0900 - 1200 and 1400 - 1700 Monday to Friday except for ECMWF official holidays
TELEPHONE	Internal 2801, external +44 734 499 801
TELEX	847908 ECMWF G
TELEFAX (facsimile)	+44 734 869 450
BLEEPER	User Support bleeper numbers - see telephone directory (note: the bleeper service is only available from telephones within ECMWF)
POST	Address all correspondence to: User Support ECMWF Shinfield Park Reading RG2 9AX UNITED KINGDOM

ELECTRONIC MAIL

The Centre is connected to Internet: the relevant address for Advisory is: Advisory@ecmwf.co.uk

For those Member States with a DECnet link to ECMWF, the relevant mail address for Advisory is: ADVISORY

Visitor facilities

There is only a limited amount of office space available for visitors who wish to use the computer system. Because of this, visitors are asked to adopt the following procedure:

* contact the Operations Department departmental secretary to reserve a place in advance. Please give as much notice as possible;

* In order to give priority to visitors who come from a distance, reservations from local users will not be accepted until 5 days before the beginning of the week in question. For example, reservations from local users for any day(s) in one week will not be accepted before Monday of the previous week;

* casual visitors are welcome at any time to take up spare places, even though no reservations has been made in advance. They may telephone the ECMWF receptionist to check if space is available.

Operations Department Secretary: telephone: +44 734 499 131

ECMWF Receptionist: telephone: +44 734 499 896

Postal address:

Operations Department Secretary
ECMWF
Shinfield Park
Reading
RG2 9AX
UNITED KINGDOM.

- Andrew Lea

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STILL VALID NEWS SHEETS

Below is a list of News Sheets that still contain some valid information which has not been incorporated into the Bulletin set (up to News Sheet 278). All other News Sheets are redundant and can be thrown away.

No.	Still Valid Article
204	VAX disk space control
205(8/7)	Mispositioned cursor under NOS/VE full screen editor
207	FORMAL changes under NOS/VE
212	MFICHE command from NOS/VE
214	NAG Fortran Library Mark 12 News Sheets on-line
224	Job information cards
230	Access to AB printer via NOS/VE CDCNET
235	VAX public directory - how to create
236	Alternative VAX graphics service for in house users
247	Use of CFSPATH/TARGET parameter within MARS retrievals
248	Changes to the Meteogram system
253	Copying/archiving NOS/VE catalogs to ECFILE Copying complete UNICOS directories to ECFILE
254	UNICOS carriage control
260	Changes to PUBLIC directories for VAX users
261	Meteogram system on UNICOS

No.	Still Valid Article
265	Lost UNICOS outputs submitted via RJE or VAX Microfiche changes
266	Reminders on how to import/export magnetic tapes
267	Checking on your UNICOS account usage
268	Changes to WMO FM 92 GRIB
270	Changes to the Meteogram system; Advisory Office
271	New ECFILE features on UNICOS
276	UNICOS 6 differences Periodic deletion of all Cray /tmp files
277	UNICOS 6 (more differences)

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TABLE OF TAC REPRESENTATIVES, MEMBER STATE COMPUTING REPRESENTATIVES AND METEOROLOGICAL CONTACT POINTS

Member State	TAC Representative	Computing Representative	Met. Contact Point
Belgium	Dr W Struylaert	Mme L Frappez	Dr J Nemeghaire
Denmark	Dr A M Jørgensen	Mr P Henning	Mr G R Larsen
Germany	Dr B Barg	Dr B Barg	Dr Rüge
Spain	Mr T Garcia-Meras	Mr J Juega	Mr R Font Blasco
France	Mr J Goas	Mr J Toussaint	Mr J Goas
Greece	Mr D Katsimardos/	Mr I Iakovou/	Mr J Stamatiou/
	Dr. G. Sakellarides	Mr G Konstantinidis	Mrs M Refene
Ireland	Mr J Logue	Mr L Campbell	Mr T Sheriden
Italy	Dr M Capaldo	Dr S Pasquini	Dr M Conte
Yugoslavia	Dr S Nickovic	Mr T Stojiljkovic	Dr S Nickovic
Netherlands	Mr S Kruizinga	Mr S Kruizinga	Mr G Haytink
Norway	Mr K Björheim	Ms R Rudsar	Mr P Evensen
Austria	Dr G Wihl	Dr G Wihl	Dr H Gmoser
Portugal	Mrs I Barros Ferreira	Mr C M Fernandes	Mrs I Barros Ferreira
Switzerland	Mr M Haug	Mr B Bachofner	Mr M Schönbächler
Finland	Dr M Alestalo	Mr T Hopeakoski	Mr P Nurmi
Sweden	Mr H Larsson	Mr S Orrhagen	Mr R Joelsson
Turkey	Director-General	Director-General	Director-General
United Kingd.	Dr R Wiley	Dr A Dickinson	Mr C R Flood

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ECMWF ANNUAL SEMINAR

Every year ECMWF organises a seminar to discuss progress in a selected topic related to numerical weather forecasting. The seminar forms part of our educational programme and is aimed at young, mainly post-graduate/post-doctorate scientists in the ECMWF Member States. The subject of the 1992 seminar will be:

Validation of weather forecasts and large-scale simulations

and will take place during the week of 7-11 September 1992.

The seminar will discuss validation of NWP models in terms of synoptic performance, forecast of weather elements, flow in the vicinity of orography, and flow-dependence of forecast errors. Validation of large-scale simulations will be discussed in terms of, inter alia, maintenance of the mean flow and eddy activity, the use of new methods for validation of radiative balance, cloud properties, surface fluxes and other aspects of the model performance.

The seminar will cover the following topics:

* Validation of synoptic scale flow

* High resolution modelling studies for validating large-scale models

* Validation of weather elements

* Validation of parametrizations.

Further information on the programme and registration details will be mailed to all national meteorological services as well as a number of universities and institutes in the Member States around May of this year.

- Els Kooij-Connally

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ECMWF CALENDAR 1992

16 (pm) - 20 Apr	***ECMWF holiday***
4 May	***ECMWF holiday***
27 Apr - 19 Jun	Meteorological Training Course:
	Met 1 (27 Apr - 15 May) Numerical methods, adiabatic formulation, data assimilation, satellite data
	Met 2A (18 - 21 May) General circulation, systematic errors & predictability
	Met 2B (26 May - 5 Jun) Parametrization
	Met 3 (8 - 19 Jun) Use & interpretation of ECMWF products
22 - 25 May	***ECMWF holiday***
4 - 5 Jun	Council - 36th session
31 Aug	***ECMWF holiday***
7-11 Sep	Seminar: Validation of weather predictions and large-scale simulations over the European area
28 - 30 Sep	Scientific Advisory Committee - 20th session
28 - 30 Sep	Member States' Computer Representatives - 7th meeting
30 Sep - 2 Oct	Technical Advisory Committee - 17th session
6 - 8 Oct	Finance Committee - 49th session

9 - 12 Nov	Workshop: Variational assimilation with emphasis on 3-dimensional aspects
23 - 27 Nov	Workshop: Parallel processing
2 - 3 Dec	Council - 37th session
24 - 28 Dec	***ECMWF holiday***

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ECMWF PUBLICATIONS

Computer Bulletin B8.3/2(2)	ECFile Concepts
Meteorological Bulletin M1.5/2	Research Manual 1: ECMWF Data Assimilation Scientific Documentation
Meteorological Bulletin M1.6/2	Research Manual 3: ECMWF Forecast Model Physical Parametrization
Technical Memorandum No. 183	Rabier, F., and P. Courtier: Four-dimensional assimilation in the presence of baroclinic instability
Technical Memorandum No. 184	Hoffman, R.N., J.-F. Louis and T. Nehrkorn: A method for implementing adjoint calculations in the discrete case
Technical Memorandum No. 185	Rizzi, R., C. Serio, G. Kelly, V. Tramutoli, T. McNally and V. Cuomo: The cloud clearing comparison exercise

Technical Report No. 67

Lionello, P., H. Günther and P. Janssen: Assimilation of altimeter data in a global third generation wave model

(Proceedings of) Seminar on numerical methods in atmospheric models, 9-13 September 1991 (2 volumes)

(Proceedings of) Workshop on fine-scale modelling and the development of parametrization schemes, 16-18 September 1991

Forecast and verification charts to end December 1991

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INDEX OF STILL VALID NEWSLETTER ARTICLES

This is an index of the major articles published in the ECMWF Newsletter series. As one goes back in time, some points in these articles may have been superseded. When in doubt, contact the author or User Support.

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USEFUL NAMES AND 'PHONE NUMBERS WITHIN ECMWF

			Room*	Ext.**
DIRECTOR	-	David Burridge	OB 202	2001
HEAD OF OPERATIONS DEPARTMENT	-	Michel Jarraud	OB 010A	2003
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Other methods of quick contact:	-	Telex (No. 847908)		
	-	Telefax (No. 869450)		
	-	VMS MAIL addressed to ADVISORY		
REGISTRATION				
Project Identifiers	-	Pam Prior	OB 225	2384
User Identifiers	-	Tape Librarian	CB Hall	2315
COMPUTER OPERATIONS				
Console	-	Shift Leaders	CB Hall	3333
Reception Counter	-	Tape Librarian	CB Hall	2315
Tape Requests	-	Tape Librarian	CB Hall	2315
Terminal Queries	-	Norman Wiggins	CB 026	2308
Telecoms Fault Reporting	-	Michael O'Brien	CB 028	2306
DOCUMENTATION - Distribution	-	Els Kooij-Connally	Library	2751
LIBRARIES (ECLIB, NAG, etc.)	-	John Greenaway	OB 226	2385
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Division Head	-	Horst Böttger	OB 007	2060
Applications Section Head	-	Rex Gibson	OB 101	2400
Operations Section Head	-	Bernard Strauss	OB 004	2420
Meteorological Analysts	-	Andreas Lanzinger	OB 003	2425
	-	Ray McGrath	OB 005	2424
	-	Anders Persson	OB 002	2421
Meteorological Operations Room	-		CB Hall	2426
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Systems Software Section Head	-	Claus Hilberg	CB 133	2350
User Support Section Head	-	Andrew Lea	OB 227	2380
User Support Staff	-	Antoinette Alias	OB 224	2382
	-	John Greenaway	OB 226	2385
	-	Norbert Kreitz	OB 207	2381
	-	Pam Prior	OB 225	2384
Computer Operations Section Head	-	Peter Gray	CB 023	2300

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* CB - Computer Block
OB - Office Block

** The ECMWF telephone number is READING (0734) 499000, international +44 734 499000, or direct dial to (0734) 499 + last three digits of individual extension number, e.g. the Director's direct number is (0734) 499001.

DEC MAIL: Contact scientific and technical staff via VMS MAIL, addressed to surname.

Internet: The ECMWF address on Internet is **ecmwf.co.uk**
Individual staff addresses are firstname.lastname, e.g. the Director's address is David.Burridge@ecmwf.co.uk