European Centre for Medium Range Weather Forecasts

ECMWF NEWSLETTER

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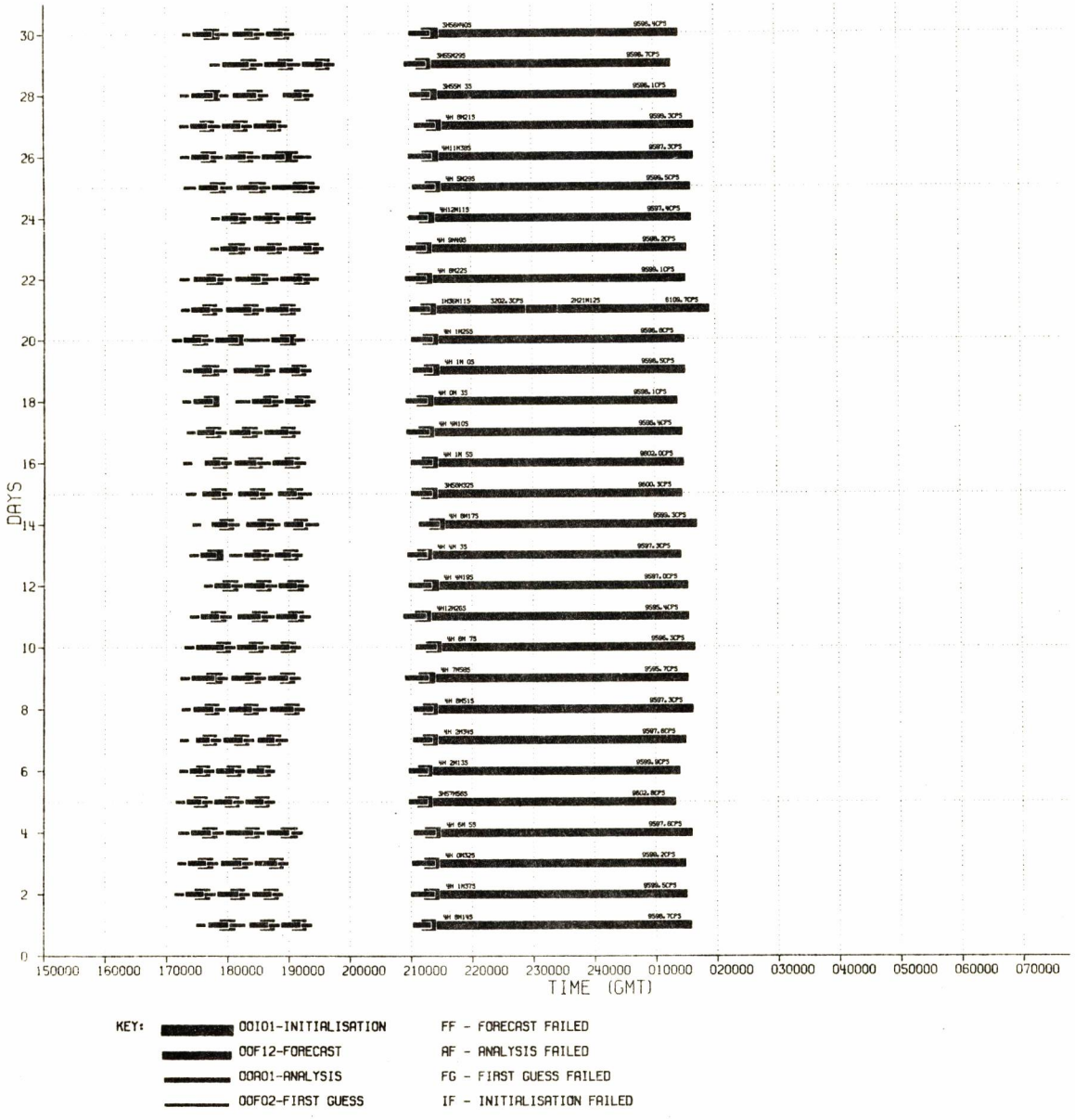
Number 17 - October 1982

OPERATIONAL SUITE RUNS JUNE 1982



IN THIS ISSUE:

* NOTE: These articles directly concern the computer service; we recommend that computer users read them all.

COVER: Operational Suite Runs June 1982, see article on page 4

This Newsletter is edited and produced by User Support.

The next issue will appear in December 1982

ECMWF SEMINAR/WORKSHOP 13-24 SEPTEMBER 1982
INTERPRETATION OF NUMERICAL WEATHER PREDICTION PRODUCTS

Introduction

The 1982 ECMWF Seminar, 13-17 September, was introductory to the Workshop held the following week. During the workshop, participants from Member States gained practical experience with a comprehensive statistical software package and a newly created European archive, developed and implemented at ECMWF in order to allow the Member States to carry out research and development work in statistical interpretation of numerical weather prediction products. Over 30 participants from fourteen Member States attended the seminar, of whom 15 remained for the workshop.

Seminar 13-17 September 1982

The seminar was opened by the Director of ECMWF, Dr. L. Bengtsson, who reviewed the progress made in numerical modelling over the last 30 years. The lectures given throughout the week were grouped in six sessions covering the following topics:

1. ECMWF data assimilation and forecasting system.

2. Methods in verification and statistical interpretation.

3. Performance of the ECMWF model.

4. Member States' experience with interpretation.

5. Member States' experience with ECMWF products.

6. ECMWF verification and interpretation studies.

The emphasis during this seminar was on the statistical approach to the interpretation of numerical weather prediction products.

Sessions 1 and 3 were covered entirely by ECMWF staff. H. Glahn and A. Murphy from the United States gave invited lectures in session 2, and S. Kruizinga, C. Finizio and D. Rousseau, from the Netherlands, Italy and France respectively, were the invited lecturers in session 4 on the Member States' experience with interpretation.

In session 5, seminar participants from Member States had the opportunity to report on their experience with ECMWF products. Altogether eight presentations were given in this session; one paper, which arrived late, was distributed amongst the participants.

The final day of the seminar was devoted to ECMWF verification and interpretation studies. ECMWF staff reported on their experience with statistical methods applied to interpret direct model output. The studies were based on a newly created European archive and a comprehensive statistical software package developed and implemented at ECMWF to ease data access and preparation, and to allow future development work in statistical verification and interpretation with a minimum of effort.

Workshop 20-24 September 1982

Apart from two additional lectures on methods in statistical verification and interpretation, the workshop week was entirely devoted to laboratory sessions, during which the participants from the Member States had the opportunity to get practical experience with the statistical software package and the European data base mentioned above. Working in four small groups, they carried out interpretation studies of medium range forecasts for a location in Europe. Some guidance was given by proposing five different projects for the three parameters temperature, wind and precipitation. The groups had the choice of eight locations in Europe, for which data sets had been prepared in advance. The European archive covers a period of one and a half years from 1 March 1981 onwards, a data sample which was long enough to allow creation of a learning and test file.

Most popular with the participants were projects to study the probability of precipitation in the medium range, either applying the regression technique (REEP) or the multiple discriminant analysis (MDA). Probability forecasts can be used to quantify the uncertainty of a weather forecast and they are not directly available as model output. The possibility of exploring this field attracted a lot of interest amongst the participants. One group decided to study the interpretation of local wind forecasts.

The flexibility and usefulness of the software is demonstrated clearly by the fact that during this workshop week, literally from Monday afternoon until Thursday evening, the participants managed to cover the full spectrum of development work in statistical interpretation. This included the creation of predictands and predictors, together with derived parameters such as thickness or vorticity, screening for predictors, applying to independent data, and verification of direct model output as a standard of comparison. The groups summarised their studies in short reports and presented their experiences in using the software, and their results, on Friday morning.

Summary

The seminar and workshop were well received by the participants. They all acknowledged the ease in application of the statistical software and the data handling. Several participants expect ECMWF to give future support in data handling, and guidance in the use and application of statistical methods. This software is still experimental and, together with a USER GUIDE, prepared for the workshop, will be revised based on the experience gained during the workshop. Most of the programs are portable for future use directly in the Member States. The software, which is summarised in Table 1, will enable the user, either from within the Centre, or in remote batch mode from the Member States, to retrieve data from the European archive via GETDATA, to process the sequential target file, create an on-line data base and run verification or statistical interpretation with any of the available programs.

- Horst Böttger

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ECMWF MODEL OUTPUT STATISTICAL PROCEDURES

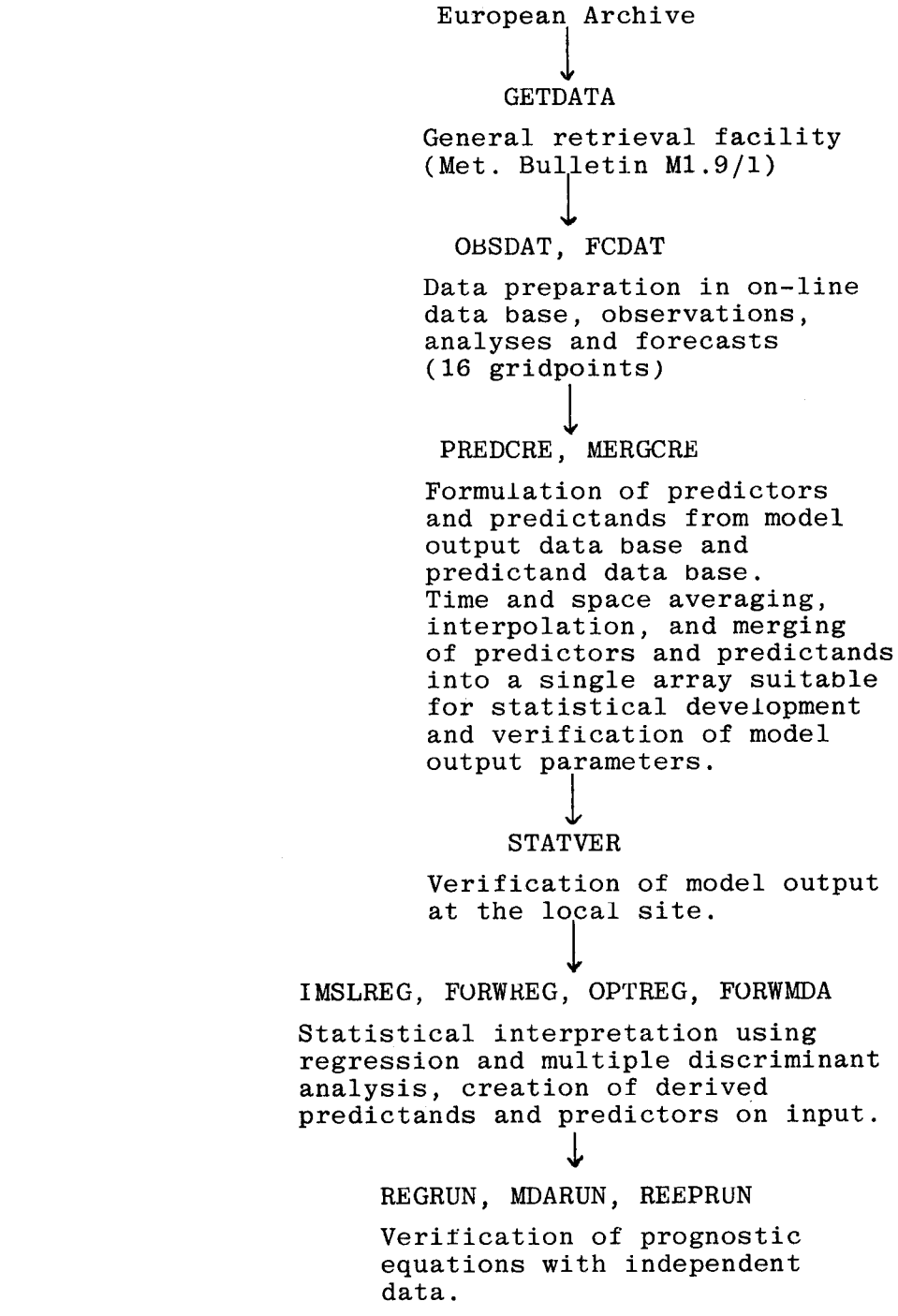

TABLE 1: Software package described in USER GUIDE to ECMWF Model Output Statistical Procedures

OPERATIONAL SUITE RUN DIAGRAMS

This edition of the Newsletter contains three examples, including the front cover illustration, of the Operational Suite run diagrams which are now produced each month. The plots show run times for the major Cray components of the daily forecast run:

- the analysis which runs four times each day for the main reporting hours of 18.00, 00.00, 06.00, and 12.00 GMT and comprises three stages:

6 hour first guess forecast	(OOF02)
analysis	(OOA01)
initialisation	(OOI01)

- the 10-day forecast (OOF12)

The plotted lines show the elapsed time of each program in different thicknesses, for each day of the month. In addition the total elapsed time and the CPU time for the 10 day forecast, OOF12, are plotted.

Note that the programs which run on the Cyber front-end handling data acquisition, database postprocessing, dissemination and archiving are not shown on these diagrams. It is planned to include diagrams showing Cyber times in future Newsletters.

The diagram for June 1982 on the front cover, shows the suite running under very stable conditions. The 18.00, 00.00, 06.00 analyses ran in the early evening, followed after a short break by the 12.00 analysis with a fixed data cutoff time of 20.45 GMT running straight on into the 10 day forecast.

The July diagram shows a change of pattern on the 14th when the daily operational schedule was changed to allow an early morning 18.00 analysis, a lunchtime 00.00 analysis, and the 06.00 and 12.00 analysis in the evenings. The weekend schedule remained similar to the June pattern. Note the effect of major hardware problems on 12 July with a subsequent late start on the 13th, and further problems on 31st. The early evening start on the 27th followed the introduction of changes to the data assimilation to allow recovery time in case of problems.

The August schedule is similar to the second half of July. From 18 August, on weekdays, the running of the 00.00 analysis was decided by the on-duty meteorological analyst from a survey of the midnight data coverage available at lunchtime. The analysis could either continue during lunchtime or could be postponed until early evening if data was short.

- John Chambers

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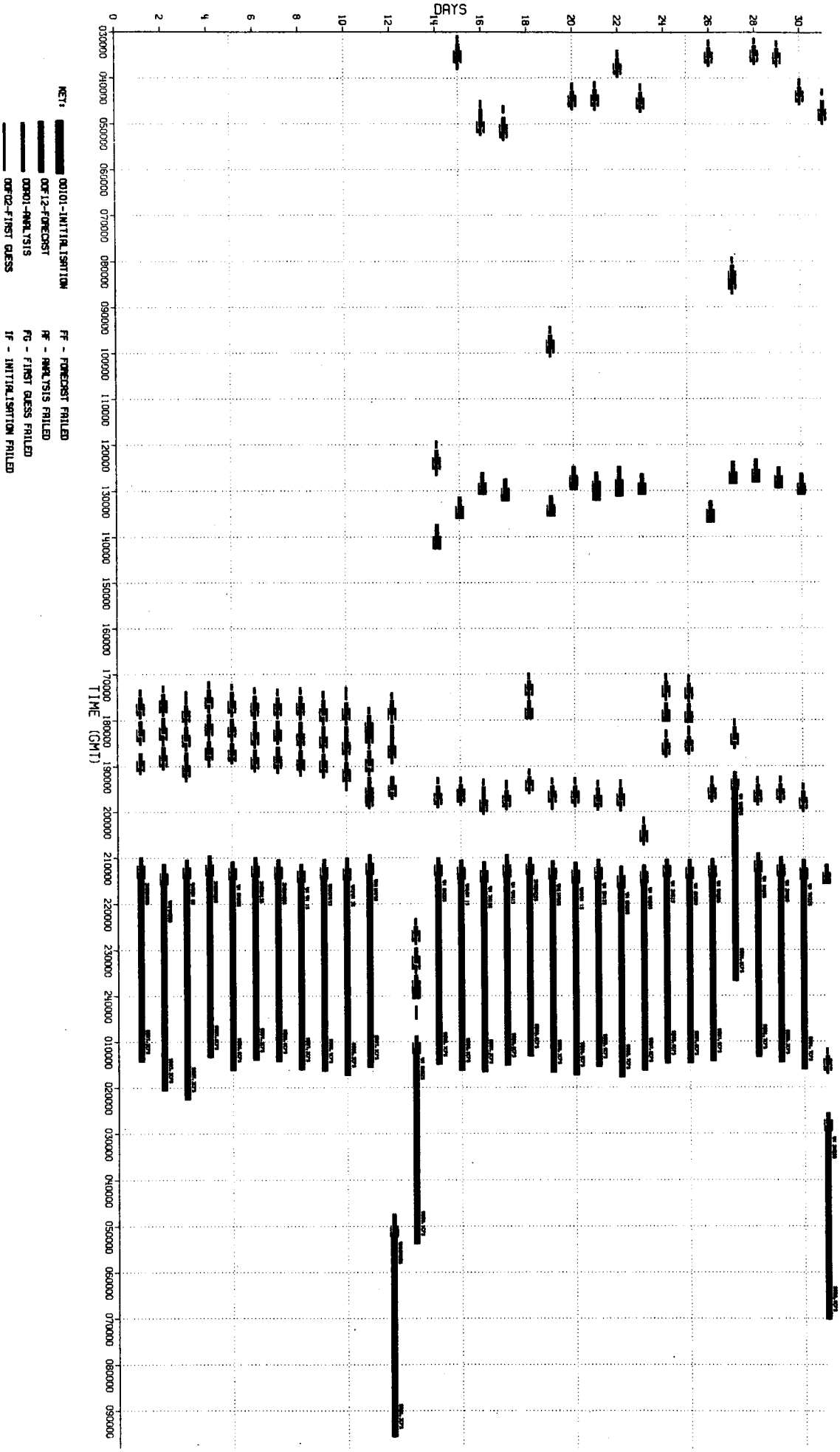
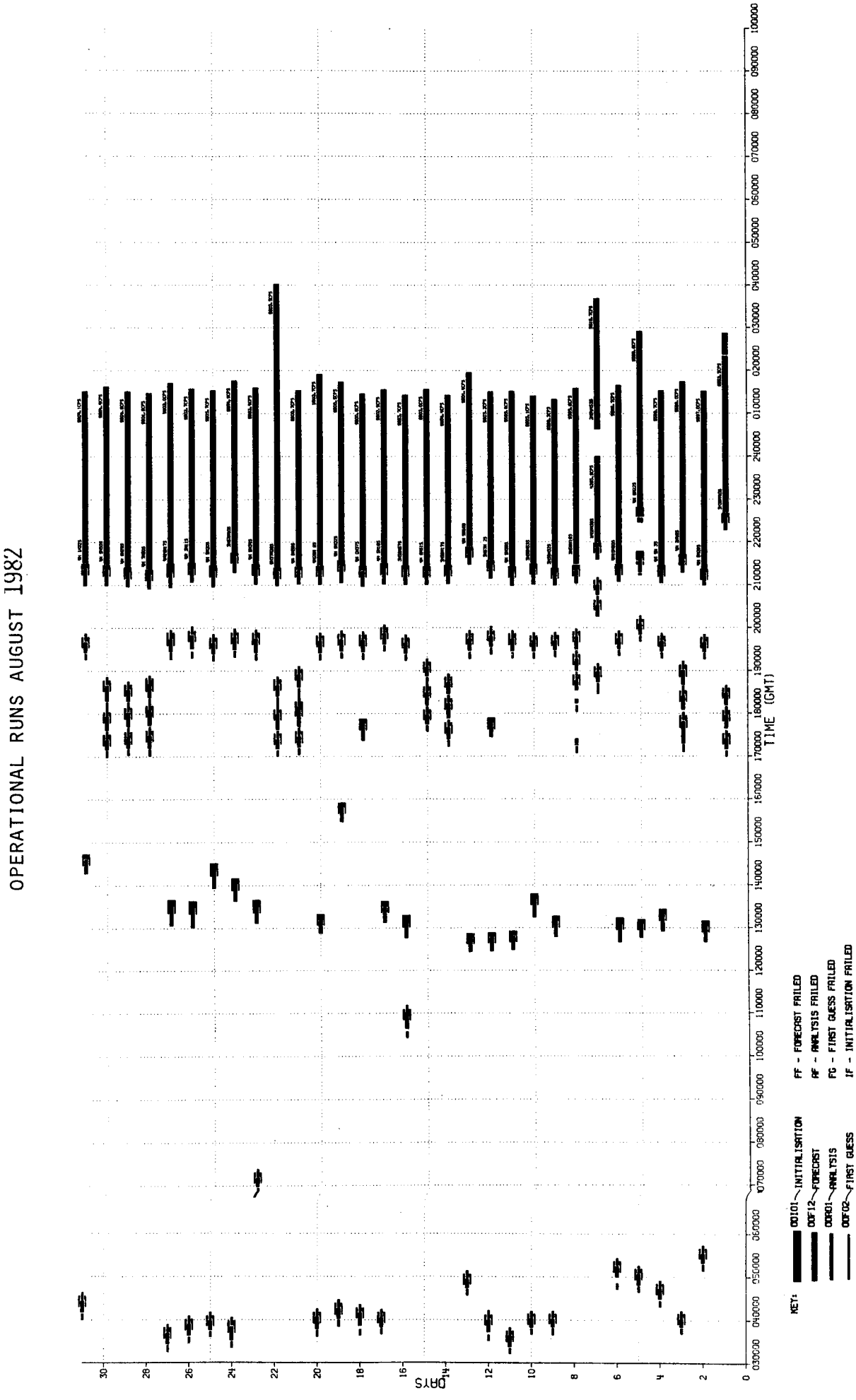


OPERATIONAL SUITE RUNS JULY 1982


OPERATIONAL RUNS AUGUST 1982
TIME (GMT)
DAYS
KEY:
CD101 — INITIALISATION
CDF12 — FORECAST
CDR01 — ANALYSIS
CDF02 — FIRST GUESS
FF - FORECAST FAILED
AF - ANALYSIS FAILED
FG - FIRST GUESS FAILED
IF - INITIALISATION FAILED

ARCHIVING

1. New archiving streams

Two new archive streams were put into daily operation on 31 August 1982.

AUPG - global uninitialised analyses on standard pressure levels.

FGPG - global 6 hour forecast first guess fields on standard pressure levels.

From these streams, it is possible to retrieve fields for 18Z 29 August 1982 onwards, using the standard retrieval utilities GETDATA/FINDATA (see ECMWF Meteorological Bulletins M1.9/1 and M1.9/2, or Computer Bulletins B6.7/2 and B6.7/3).

Upper air fields are archived with spectral truncation T80 and include:

vorticity) horizontal components (u,v) can be generated
divergence) via GETDATA
temperature
relative humidity
geopotential
vertical velocity - AUPG contains both uninitialised and initialised vertical velocity with GETDATA parameter (PARM) values WU and W respectively.

Surface fields are archived on the model grid (1.875^{o} x 1.875^{o}). FGPG contains the full set of surface parameters (see GETDATA guide) but AUPG contains only:

surface pressure
surface temperature
soil wetness
10 metre (u,v) wind components
2 metre temperature
2 metre dewpoint
cloudcover

The new GETDATA parameters are:

TYPE = URANA for AUPG
TYPE = RFG for FGPG

(corresponding on-line database options are UANA and FG).

2. Modification to GETDATA retrieval of on-line fields

On 12 October 1982, GETDATA will be changed so that on-line fields in the target file will be sorted by level first and then by parameters. This will mean that fields in a target file from an on-line database retrieval will appear in the same order that they would from an archive retrieval.

3. Extension of European area archives

The European area archive of analysis and forecast fields on standard pressure levels has been extended backwards in time by the inclusion of a data backlog built up from global archives and stored sigma level files on magnetic tape. This archive now covers the period from 10 March 1981 up to 25 November 1981, forecast timesteps are available only at 12 hour intervals (H+0, H+12,....).

- John Chambers

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REVISED INITIALISATION

A new version of the initialisation was introduced operationally on 21 September, 1982. The changes are described below:

1. Diabatic Tendencies

The major shortcoming of adiabatic nonlinear normal mode initialisation is the supression of diabatically driven circulations; the most prominent example being the tropical Hadley circulation.

So far, inclusion of physical processes has not been possible because of convergence problems in the iterative process involved. Using an estimate of the diabatic forcing, which does not interact with the iteration, helps to circumvent the problem. This estimate is computed by time-averaging the physical tendencies (convection, radiation, vertical diffusion) during a 2-hour forecast starting from the uninitialised analysis. An additional "gravity-mode" filter, which keeps only those components which force inertia-gravity waves with periods longer than a certain cut-off period, retains the large scale, climatological features and discards the less reliable small scale structures.

2. Surface pressure restore

After the first iteration, the analysed surface pressure is restored with a latitude-dependent weighting. In the extra-tropics, this leads to a 30% reduction in RMS surface pressure changes.

3. Isothermal basic state

The old scheme sometimes diverged near the poles. This problem is overcome by using an isothermal (300K) basic state instead of an ICAO atmosphere.

4. Results

The scheme outlined above has been tested by re-running a data assimilation of the FGGE period 5-11.6.1979. Figure 1 shows the time-averaged (6 days), initialised velocity potential at 200 mb for adiabatic initialisation. Figure 2 shows that diabatic initialisation leads to stronger divergent circulations. Other improvements include the retention of the Hadley cell and a reduction of the spin-up time of the model. Scores show an improvement in the tropics for the first two days of the forecast, particularly for the long waves. After 5 days, a modest improvement shows up in the extra-tropics.

- Werner Wergen

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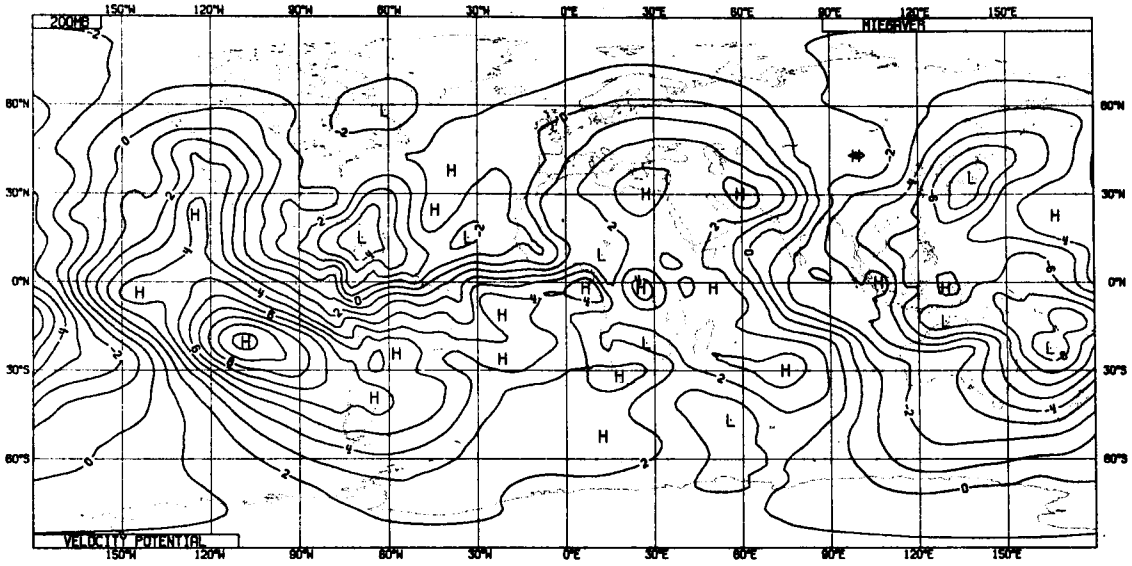

Fig. 1 Time averaged (6.6-11.6.1979), initialised velocity potential at 200 mb, old scheme. Units: $10^6 M^2/sec$.

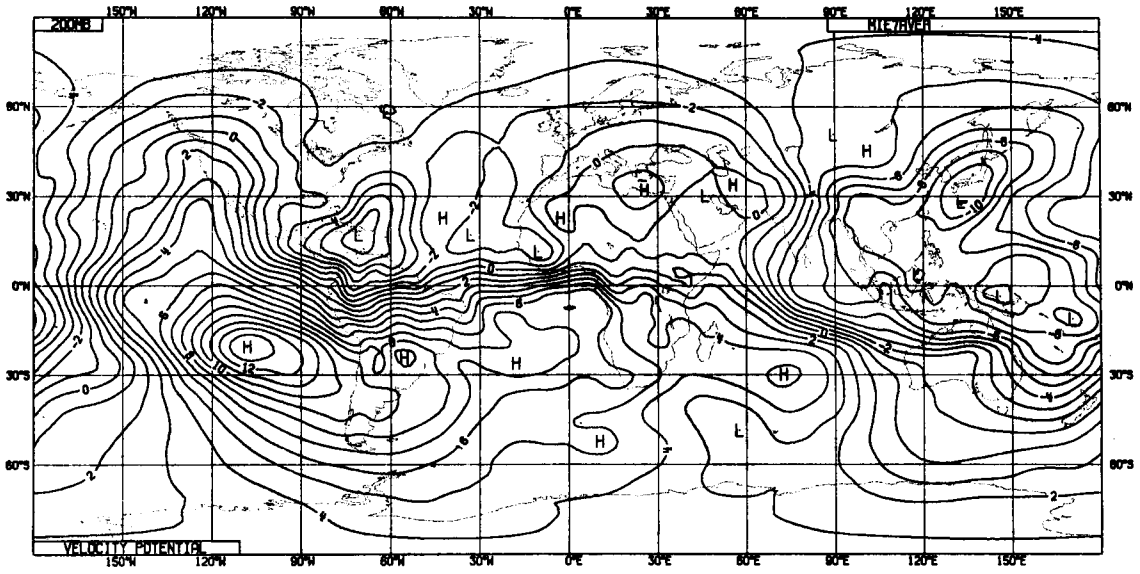

Fig. 2 Same as Fig. 1 but with new initialisation

FUTURE GRAPHICAL SERVICES AT ECMWF

In order to adapt to changing circumstances, with fewer personnel available for graphics support following staffing reorganisation, and taking into account that much of the present graphics hardware will need replacing in the near future, a review of the Centre's graphics facilities has been undertaken recently.

The following article gives a brief summary of the plans so far, with some tentative timescales for implementation.

Graphics Minicomputer

A large (or Super) minicomputer will be installed to handle a proportion of the graphics workload. The graphics minicomputer will be attached to the Cyber and Cray mainframes via the Local Area Network during 1983, and will allow those mainframes to pass device independent graphical data (e.g. GKS metafiles) to the graphics minicomputer where they will be transformed to the formats required by the specific graphics hardware devices. It will be possible to transfer graphical data via the local area network either as a file transfer, used for offline output, or in application-to-application mode, used to interact with applications programs on the Cybers.

This approach allows a variety of graphics hardware to be connected, which is particularly important. At present there is the need to connect the Aydin; in the future there will be the need to connect several low cost raster graphics displays, as well as a low-cost publication-quality plotter. Additionally, during the next 2 years, the Versatec plotters will be towards the end of their useful life and replacements will need to be purchased and connected. The Cyber is a particularly difficult machine to which to connect non-CDC devices. It offers only low speed (up to 9600 bits per second) or high cost special interfaces. Once the graphics minicomputer is connected to the mainframes via the local area network, all future connections will be much simplified. The requirements for the graphics minicomputer are such that only one system, the VAX 11 750, is capable of satisfying them, and an order has been placed with Digital Equipment Co. for delivery in 1982.

Software packages

Commercially available graphics software packages are currently being evaluated with a view to purchasing a comprehensive system for installation on the Cybers, the Cray and the minicomputer. An evaluation of our current graphics applications has revealed that the contouring applications produce the most output, although the applications are all very similar and straightforward. In comparison, there is a wide variety of graph drawing applications currently being run, as well as a number of graph drawing applications which must be done manually due to lack of software facilities. Investigations to date show that one very widely available package (DISSPLA) appears to satisfy all our graphic drawing requirements, as well as providing map drawing and contouring facilities. DISSPLA is produced and distributed by the company ISSCO and seems to be the package best suited to our needs. Facilities are also provided to allow the contouring facilities

to be extended and tailored to our specific requirements, which is a considerable advantage. DISSPLA is currently being evaluated in detail to determine whether it can fully satisfy our requirements.

It is expected that DISSPLA can be installed on the Cybers by the end of October 1982. Initially only a basic contouring facility will be available (comparable in facility with FASCON in the ECMWF contouring package but with improved labelling facilities) but higher quality contouring should be available by the end of 1982, integrated into DISSPLA.

Low Cost Raster Displays

During the last 2 years, the cost of colour raster display devices has decreased considerably. This is, in the main, due to 2 factors. Firstly the market for graphical devices has increased considerably, partly due to the increase in mainframe graphics usage, and partly due to the spread of small, personal computing systems, which also demand graphical output. Secondly, the cost of such displays was largely dictated by the cost of the memory contained within the terminal, As an example, the Aydin contains more than 0.75 megabytes of memory. Recent technological advances have allowed at least a 4 times reduction in memory prices.

The Tektronix displays used at the Centre were purchased early in 1978, with an expected lifetime of 4-5 years. The newly available colour raster displays will be able to both replace the Tektronix 4014 terminals and also provide new facilities (due to their higher speed and colour display) at a much lower price.

Low Cost Pen Plotter

The Centre produces a considerable amount of graphical output for publication. Much of this publication quality output must either be redrawn by hand using the drafting service, or we must accept the limitations imposed by the Versatec plotters.

Nowadays, good quality, multiple pen plotters can be purchased relatively cheaply. Such a device would allow publication quality output to be produced directly by the user, and would also allow new applications to be accommodated. Such new applications would include the production of high quality overhead projector slides for lecturing purposes, and would allow the Centre's business data to be more easily prepared for documents such as the annual report.

Peter Gray

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*cos 1.11

Testing of COS 1.11 has started and is proceeding satisfactorily. We expect to be able to start user trials by mid-October and to put the system into service within a month.

In this version of COS there are no changes which will directly affect user jobs, apart from the new SUBMIT control statement and the removal of the DISPOSE subroutine from ECLIB. However, users should, by now, have converted to using LAUNCH and STAGE, (see Newsletter 16 page 12). One other point related to this is the use of the DISPOSE control card and $SYSLIB routine to send jobs direct into the CRAY input queue. Although this will still be allowed initially, it will be better if users convert to using the CRAY SUBMIT statement/subroutine once COS 1.11 has become established, as this feature will eventually be removed.

COS 1.11 includes several features which will benefit users indirectly, notably modifications to the job scheduler to stop CPU-bound priority 5 jobs from preventing priority 4 jobs executing. Also, disk error correction will be switched on; this should cut down the number of jobs aborting due to disk errors, and the number of system crashes due to this reason. Other new features will simplify the operation of the CRAY and the maintenance of COS.

The COS 1.11 products will be available for testing by using the NEXT control statement i.e. by placing the statement:

```
NEXT.
```

after your ACCOUNT control statement.

N.B. the CFT compiler under NEXT will still be CFT 1.09. The CFT 1.10 compiler will continue to be available by using the control statement:

```
NEXT(PROD=CFT,ID=CFT110)
```

- Richard Fisker

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*DISPOSING OF MULTIFILE TAPES

File transfers between Cyber and Cray are handled by the Cray Station executing in either Cyber. For each transfer request, the Station generates a separate Cyber job known as a SPOT (SPun Off Task). If a SPOT job fails for any reason, it is automatically rerun by the Station. This can lead to unexpected results in certain situations.

A particular example is that of a Cray job DISPOSEing to multifile tape using a label name to identify the file on the tape. An error condition (such as irrecoverable tape parity error) causes the SPOT job to be rerun. Normally, the label and some data have already been written to the tape so that the rerun generates a second label with the same name but positioned after the original label. Later, when the file is read from the tape, reference by label name accesses the first (partial) file and an incomplete file is processed.

The problem is compounded by the limitation on the number of SPOT dayfile messages printed in the original Cray job logfile. The user may not even be aware that something strange has happened!

There is no completely satisfactory solution to this problem. Users who DISPOSE to multifile tapes are advised to check SPOT dayfile messages carefully and be particularly cautious if the SPOT job is RERUN. If in doubt, run a Cyber job to perform a LISTMF on the tape. This will report the contents of all file labels.

ACQUIREing from a partial file may result in BLOCK NUMBER ERROR in the Cray job which reads the file. A comparison of the number of words transferred during DISPOSE and ACQUIRE is a useful check.

- David Dent

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MESSAGE EXCHANGE BETWEEN MEMBER STATES

One of the conditions attached by the European PTT's when agreeing to ECMWF's telecommunications network was that:

> "the use of the network will be allowed only for the transmission of bi-directional point-to-point data between the Centre at Reading on the one hand and the National Meteorological Centres on the other. Under no circumstances shall the network be used for switching purposes.....".

We wish to draw to the attention of all Member State users that this condition therefore expressly forbids one Member State to exchange messages with another Member State via ECMWF's telecommunications network. This applies to all potential message exchanges, whether it be via the Cybers, or via the Centre's new message facility (EMS), which will be available later this year.

- Andrew Lea

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VISITING ECMWF'S COMPUTER FACILITY

All Member State visitors coming to ECMWF to use the computer facilities are reminded that, on arrival, they must sign the Visitors Book in the Computer Hall user area before beginning to use the facilities. Please also ensure that you contact the Centre in advance, so that we are aware of your visit in the first place.

- Andrew Lea

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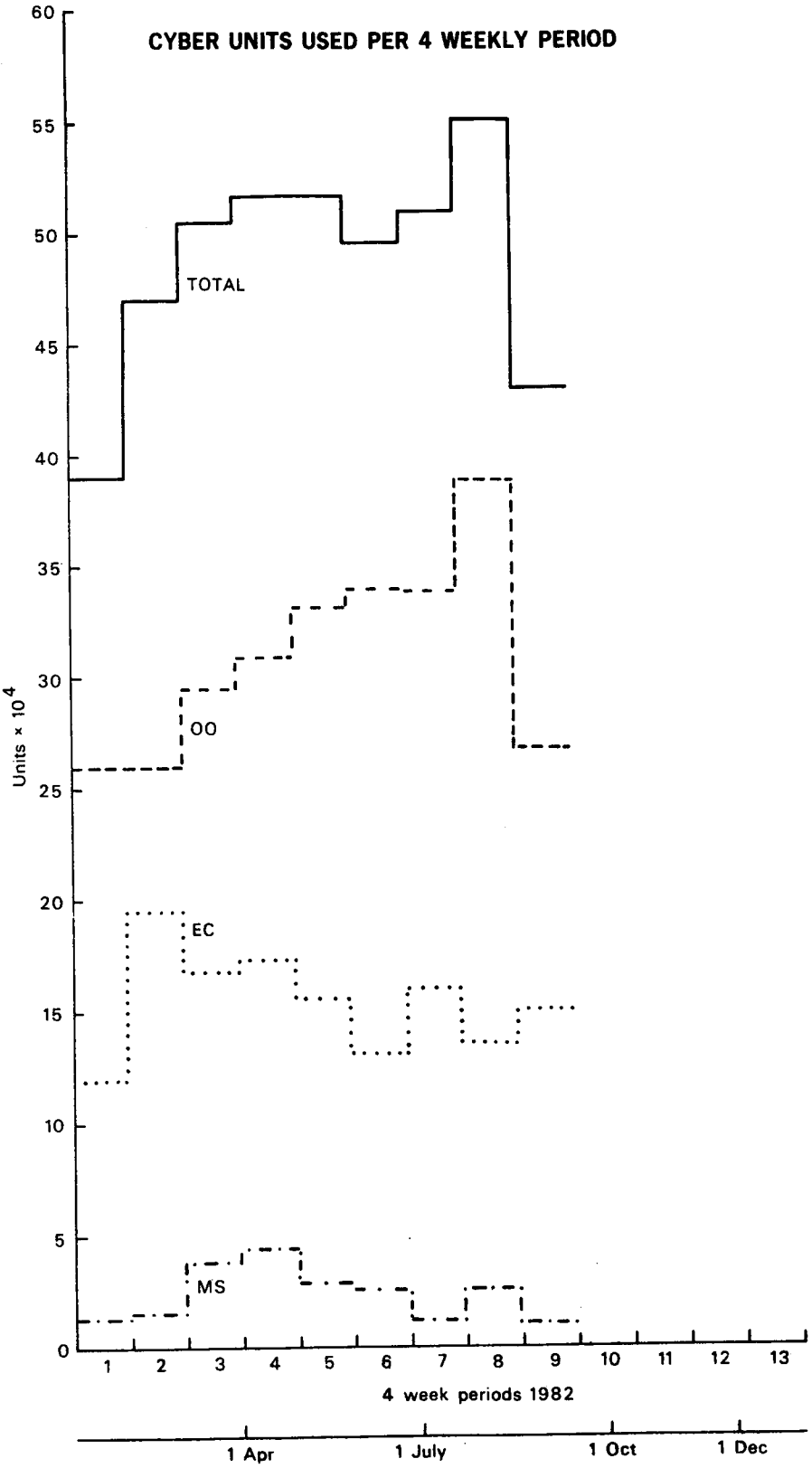
COMPUTER USAGE STATISTICS 1982



Total = total usage less those jobs classed as systems overheads
OO = operational suite running
EC = Centre users
MS = Member State users, including Special Projects

NFEP TERMINAL STATISTICS

From 19.7.82 - 12.9.82

COUNTRY	AVERAGE TOTAL DATA (KCHAR/DAY)		DATA RATE (CH/SEC)	
	INPUT	OUTPUT	INPUT	OUTPUT
Denmark	1.81	1749.9	127.8	241.8
F.R. Germany	4657.5	2678.7	68.8	265.6
Ireland	0.5	2073.6	56.3	198.6
Spain	11.5	562.8	235.8	170.3
France	138.6	1583.5	312.9	251.7
*Greece	0.0	495.9	0.0	13.7
*Italy	0.0	270.9	0.0	13.0
*Yugoslavia	0.0	47.0	0.0	6.5
Netherlands	131.1	1081.7	157.3	164.1
Austria	0.05	1029.6	54.0	171.4
Portugal	0.6	1744.6	134.8	174.6
Finland	1.1	1922.5	285.8	257.8
Sweden	11.8	4129.7	256.4	253.7
*Turkey	0.0	56.7	0.0	6.5
United Kingdom	5238.0	946.9	75.0	229.3

*Low speed line only

Explanations

TOTAL DATA — Input data is data acquisition (UK and Germany only) plus remote job entry (medium speed lines only). Output data is batch output (medium speed lines only) plus dissemination data.

DATA RATE — gives the average transmission speed in characters per second for an input or output file respectively, including overheads at all levels per protocol.

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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 136). All other News Sheets are redundant and can be thrown away.

No.	Still Valid Article
16	Checkpointing and program termination
19	CRAY UPDATE (temporary datasets used)
47	Libraries on the Cray-1
53	Writing 6250 bpi tapes (EEC parameter)
54	Things not to do to the Station
56	DISP
67	Attention Cyber BUFFER IN users
73	Minimum Cyber field length
89	Minimum field length for Cray jobs
93	Stranger tapes
98	Cray symmetric multiply (rounding factors)
108	SUBMIT
114	Cray jobcard memory parameter
118	Terminal timeout
120	Non-permanent ACQUIRE to the Cray
	Local terminal line speeds
121	Cyber job class structure
122	Cyber FORTRAN News (level 538, FTN4 & FTN5)
126	Unnecessary waiting for permanent files
127	(25.1.82) Cyber 730E introduction- user interface advice
	IMSL Library
129	Optimisation problems with CFT 1.09
	Terminal fault reporting and testing
130	Cyber software: PACKS; SPACE
	Contouring package: addition of highs and lows
131	File storage on TEMP
132	(21 June 1982) NOS/BE level 552, including SORT/MERGE5.
134	CFT1.10
135	Local print file size limitations
136	Use of TEMP disk space

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ECMWF PUBLICATIONS

Technical Report	No. 31:	An Investigation of the Impact of Middle and High Latitudes of Tropical Forecast Errors.
Technical Report	No. 32:	Short and medium-range forecast differences between a spectral and grid point model.
Technical Memorandum	No. 59:	A GKS Implementation for Meteorological Applications.
Technical Memorandum	No. 60:	Some comparisons between linear and non-linear horizontal diffusion schemes.
Technical Memorandum	No. 61:	Report on a study of the E.C. Radiation Scheme.
Technical Memorandum	No. 62:	An introduction to GKS, the Graphical Kernel System.
Technical Memorandum	No. 63:	A Screening Multiple Discriminant Analysis Program.

ECMWF Forecast and Verification: to 31 July 1982
to 31 August 1982

Workshop 1981 on planetary boundary layer parameterisation (25-27 November)

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CALENDAR OF EVENTS AT ECMWF

11-15 October	1982	Course B: Basic Usage)	
18-22 October	1982	Course C: Cray user)	Computer user training courses
25-29 October	1982	Course D: Cyber user)	
18-19 November	1982	Council 16th session	

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INDEX OF STILL VALID NEWSLETTER ARTICLES

This is an index of the major articles published in the ECMWF Newsletter plus those in the original ECMWF Technical 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.

GENERAL

METEOROLOGY

* T indicates the original Technical Newsletter series

USEFUL NAMES AND 'PHONE NUMBERS WITHIN ECMWF

		Room*	Ext**
Head of Operations Department	- Daniel Söderman	OB 010A	373
ADVISORY OFFICE - Open 9-12, 14-17 daily Other methods of quick contact: - telex (No. 847908) - COMFILE (see Bulletin B1.5/1)		CB 037	308/309
Computer Division Head	- Geerd Hoffmann	OB 009A	340/342
Communications & Graphics Section Head	- Peter Gray	OB 227	448
COMPUTER OPERATIONS			
Console	- Shift Leaders	CB Hall	334
Reception Counter) Terminal Queries) Tape Requests)	- Judy Pearce	CB Hall	332
Operations Section Head	- Eric Walton	CB 023	351
Deputy Ops. Section Head	- Graham Holt	CB 035	209
DOCUMENTATION	- Pam Prior	OB 016	355
Libraries (ECMWF,NAG,CERN,etc.)	- John Greenaway	OB 017	354
METEOROLOGICAL DIVISION			
Division Head	- Frédéric Delsol	OB 008	343
Applications Section Head	- John Chambers	OB 007	344
Operations Section Head	- Austin Woods	OB 107	406
Meteorological Analysts	- Ove Åkesson	OB 106	380
	- Veli Akyildiz	OB 104A	379
	- Horst Böttger	OB 130	310
	- Rauno Nieminen	OB 104A	378
	- Herbert Pümpel	OB 106	380
Meteorological Operations Room		CB Hall	328/443
REGISTRATION (User and Project Identifiers, INTERCOM)	- Pam Prior	OB 016	355
Research Department Computer Co-ordinator	- Rex Gibson	OB 126	384
Systems Software Section Head	- Claus Hilberg	CB 133	323
TELECOMMUNICATIONS			
Fault Reporting	- Stuart Andell	CB 024	306
User Support Section Head	- Andrew Lea	OB 003	348

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* CB - Computer Block
OB - Office Block

**The ECMWF telephone number is READING (0734) 876000
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