European Centre for Medium Range Weather Forecasts

ECMWF NEWSLETTER

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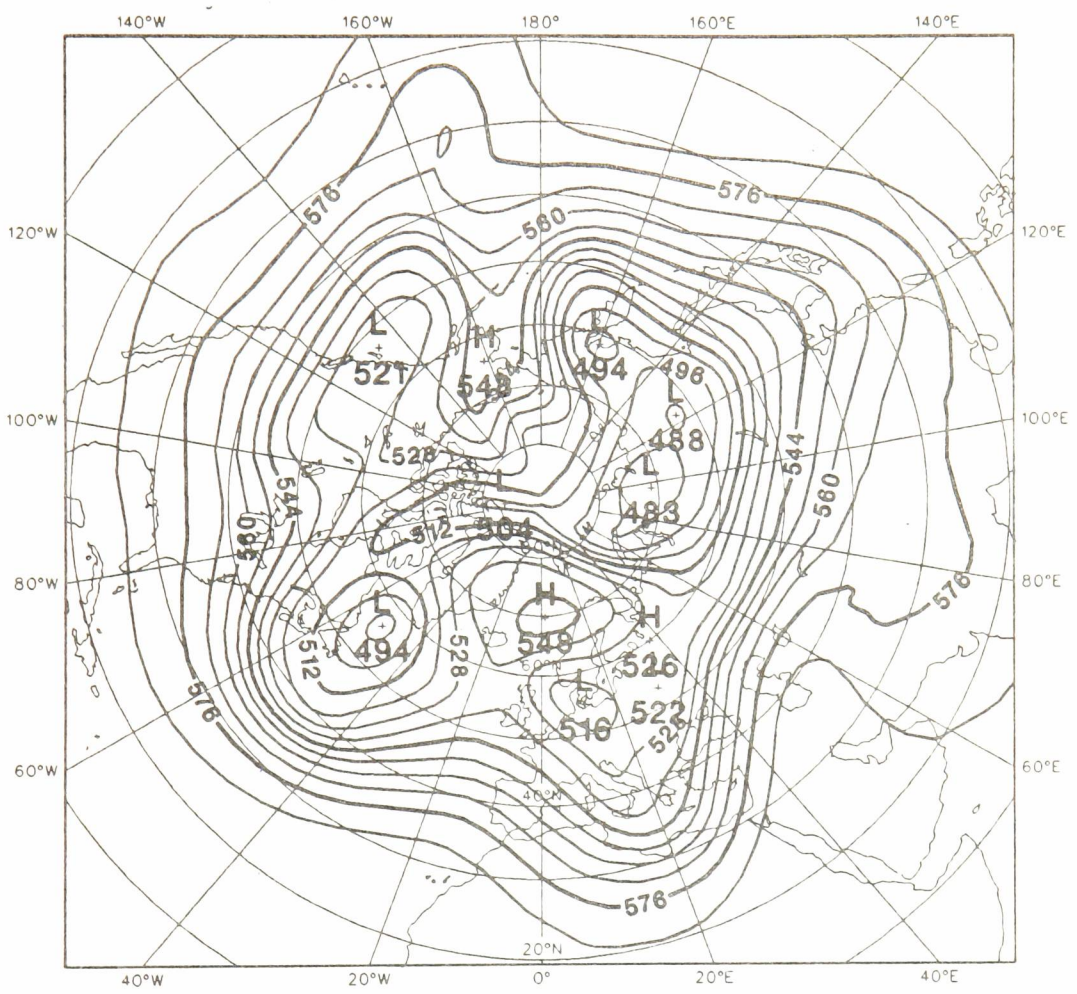

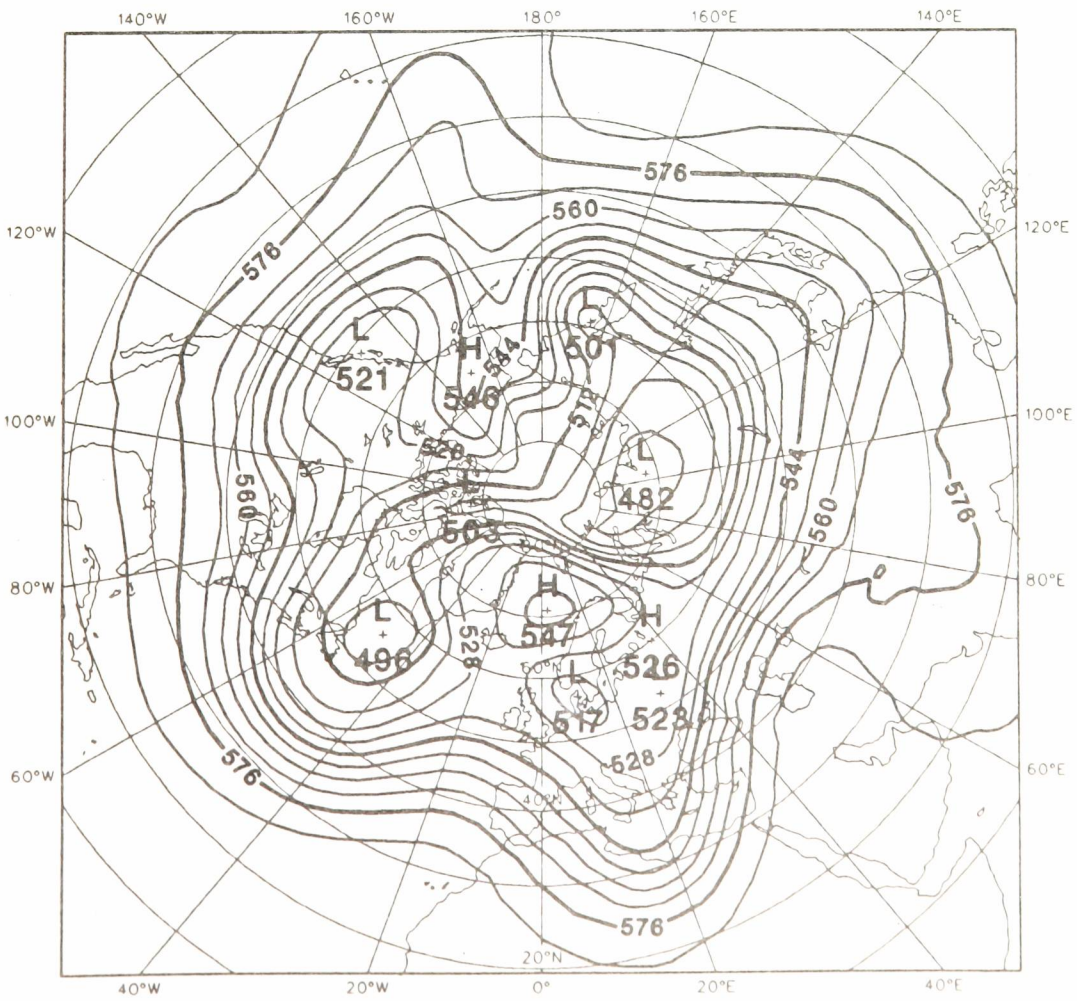

IN THIS ISSUE

COVER: A comparison of 5-day forecasts for 12 February 1979, 500 hPa height field using (top) Eulerian model with a 12 minute timestep and (bottom) semi-Lagrangian model with a 60 minute timestep (see article on page 3).

This Newsletter is edited and produced by User Support.

The next issue will appear in March 1990.

Users of ECMWF computing facilities should, by now, be well aware that the NOS/BE operating system will terminate on 31 December 1989. An article on page 10 covers miscellaneous aspects of the transfer of services and the following article (page 11) gives details of future arrangements for handling Stranger Tapes at ECMWF. Both articles are of importance to all computer users.

Development of the ECMWF forecasting model continues and an article on page 3 describes early experimentation with a semi-Lagrangian treatment of the advection terms in a spectral model.

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CHANGES TO THE OPERATIONAL FORECASTING SYSTEM

Recent changes

A change to the analysis was implemented on 13 November 1989:

(i) The SST analysis received from NMC Washington and used in the analysis now has a 2° x 2° resolution instead of 5° x 5°. This gives a more detailed description of the SST, particularly in the vicinity of ice and coastal areas. No significant impact is expected on the forecast.

(ii) The use of SATOB wind data was revised:

(a) the following data are now excluded from the analysis (in addition to the current exclusion of all SATOB over land poleward of 20°):

- high level GOES winds (P < 500 hPa) north of 20°N,
- HIMAWARI winds (all levels) poleward of 20°;

(b) the asymmetric first-guess check was tightened.

The average impact of this change will be small, but it may prove important in specific situations where the sensitivity of the forecast to inaccurate wind data is high.

Planned changes

Within the next six months, modifications will be made to the surface albedo, surface roughness and convective cloud cover for radiation.

- Bernard Strauss

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TOWARDS A SEMI-LAGRANGIAN VERSION OF THE ECMWF MODEL

Introduction

A long-standing problem in the integration of numerical weather prediction models is that the maximum permissible timestep has always been governed by considerations of stability rather than accuracy; for the integration to be stable, the timestep has to be so small that the time truncation error is much smaller than the spatial truncation error.

The situation improved considerably following the development of semi-implicit time integration schemes (for example Robert et al., 1972). By treating the linear terms responsible for high frequency oscillations in an implicit fashion, it became possible to use timesteps six times longer than for the earlier explicit leapfrog schemes, without degrading the accuracy of the forecast (the Centre's operational models have always used semi-implicit time integration schemes). Nevertheless, the maximum stable timestep remained significantly smaller than seemed necessary from considerations of accuracy alone.

Robert (1981, 1982) proposed combining the semi-implicit integration scheme with a semi-Lagrangian treatment of the advection terms in a finite difference model of the shallow water equations and this scheme was extended by Robert et al. (1985) to a multi-level model. They found that the timestep could be increased by a further factor of six over that for the basic semi-implicit scheme. Meanwhile, in Ireland, Bates and McDonald (1982) were exploring other variants of the semi-Lagrangian approach in a gridpoint model; indeed, the operational models of the Irish Meteorological Service have been based on semi-Lagrangian techniques for several years now. Semi-implicit, semi-Lagrangian schemes have also been successfully applied to finite element models, including the Canadian operational regional forecast model (Tanguay et al., 1989).

At first sight, it is perhaps not obvious that semi-Lagrangian schemes can also be applied to spectral models, but by taking advantage of the fact that most of their calculation is still done in gridpoint space, this too can be achieved. Ritchie (1988) presented the first such application, to a spectral model of the shallow water equations on a sphere.

There is now great interest in extending this work to multi-level spectral models. Recently, the first successful integrations (to 5 days) have been performed using a semi-Lagrangian version of the spectral model from Recherche en Prévision Numérique (Canada); some results will be presented later in this article. In the meantime, the operational ECMWF spectral model has been adapted in preparation for incorporating a semi-Lagrangian technique and it is hoped to run the first integrations by the end of 1989.

The basic idea

The idea behind the semi-Lagrangian treatment of advection can be explained simply by considering a one dimensional advection equation:

$$\frac{\partial Q}{\partial t} = - U \frac{\partial Q}{\partial x}$$

In a conventional (Eulerian) treatment, we multiply the local derivative $\partial Q/\partial x$ (estimated by finite differencing, or perhaps spectrally) by the advecting wind U, and thus obtain the local time derivative $\partial Q/\partial t$ which is used to update the gridpoint value of Q. It is well known that such a scheme is stable only if the timestep is small enough - basically the quantity Q should not be advected more than one gridlength per timestep.

In a semi-Lagrangian treatment, on the other hand, we rewrite the equation in terms of a total derivative:

$$\frac{dQ}{dt} = 0 ,$$

which says that as a particle is carried around in the flow, the value of Q associated with it does not change. So, to find the value of Q at a given gridpoint at the end of a timestep, all we have to do is to consider a particle which is just arriving there, to find out where that particle would have been at the start of the timestep, and to evaluate Q at this "departure point" at that time (by interpolation between the gridpoint values). Such a scheme is stable for any length of timestep, though the accuracy is limited by the need to approximate trajectories by straight lines (or great circles on the sphere) during each timestep.

Of course, there is much more to numerical weather prediction models than simple advection, and the interested reader is referred to the papers cited above to see what else has to be done!

Tests with the RPN model

The spectral model from Recherche en Prévision Numérique is described by Béland and Beaudoin (1985); its most significant difference from the ECMWF model is perhaps that it uses a finite element discretisation in the vertical. For the tests described here it was run hemispherically, with 20 equally spaced levels in the vertical and a horizontal resolution of T79. Starting from initial data at 12Z on 12 February 1979, five-day forecasts were run using first a conventional (Eulerian) semi-implicit version of the model with a timestep of 12 minutes, and second, a semi-Lagrangian, semi-implicit version with a timestep of 60 minutes, which far exceeds the usual limit imposed by stability requirements. The 1-day, 3-day and 5-day forecasts of the 500 hPa height fields from the two models are shown in Figs. 1, 2 and 3. The two forecasts are very similar and it is clearly demonstrated that the semi-Lagrangian method can be applied to multi-level spectral models to give stable and accurate forecasts with much larger timesteps than in conventional models. The details of this study are presented by Ritchie (1990).

Application to the ECMWF model.

It is planned that the horizontal resolution of the ECMWF operational model should be upgraded in 1991 to T159, and later to T213, with a corresponding increase in the vertical resolution to around 31 levels. For the operational forecast to be completed in a reasonable time, it is clear that a gain in efficiency will be required, and the introduction of a semi-Lagrangian scheme is regarded as an important contribution towards realising this goal. We have already completed most of the coding necessary to start testing a semi-Lagrangian reformulation of the Centre's model and are eagerly awaiting the first results.

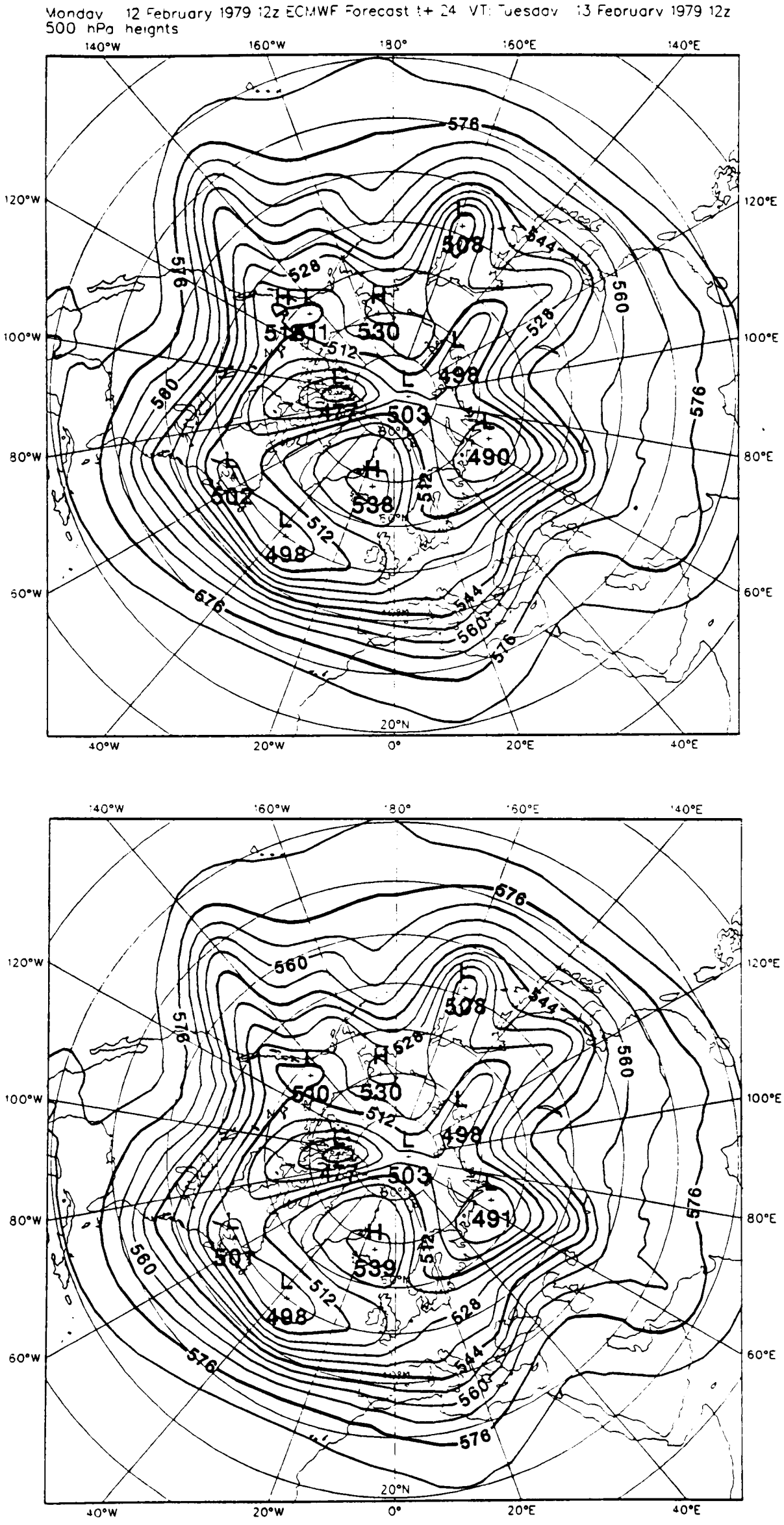
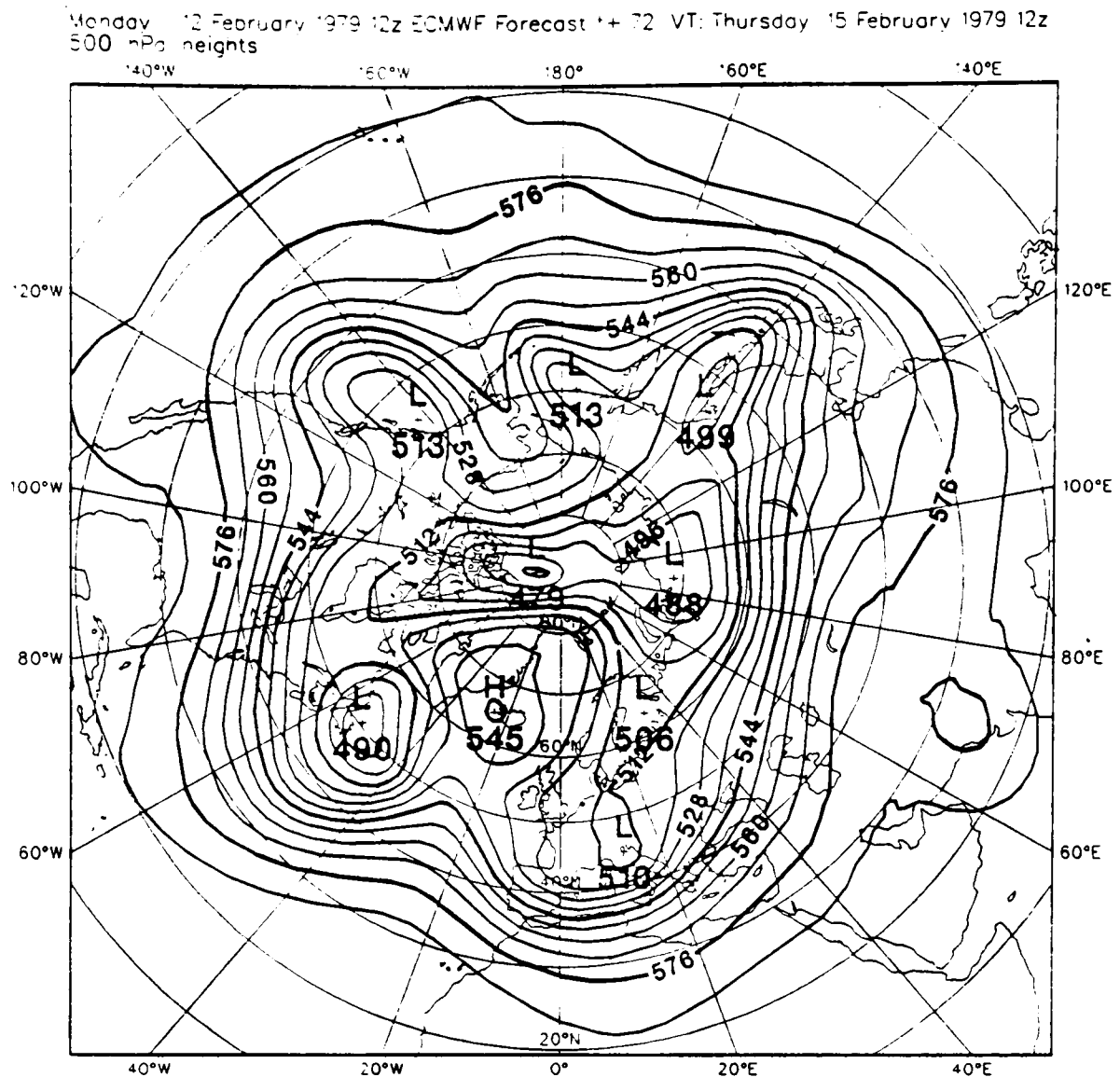


Fig. 1. 1-day forecasts of the 500 hPa height field.
Top: Eulerian model, 12-minute timestep.
Bottom: Semi-Lagrangian model, 60-minute timestep.



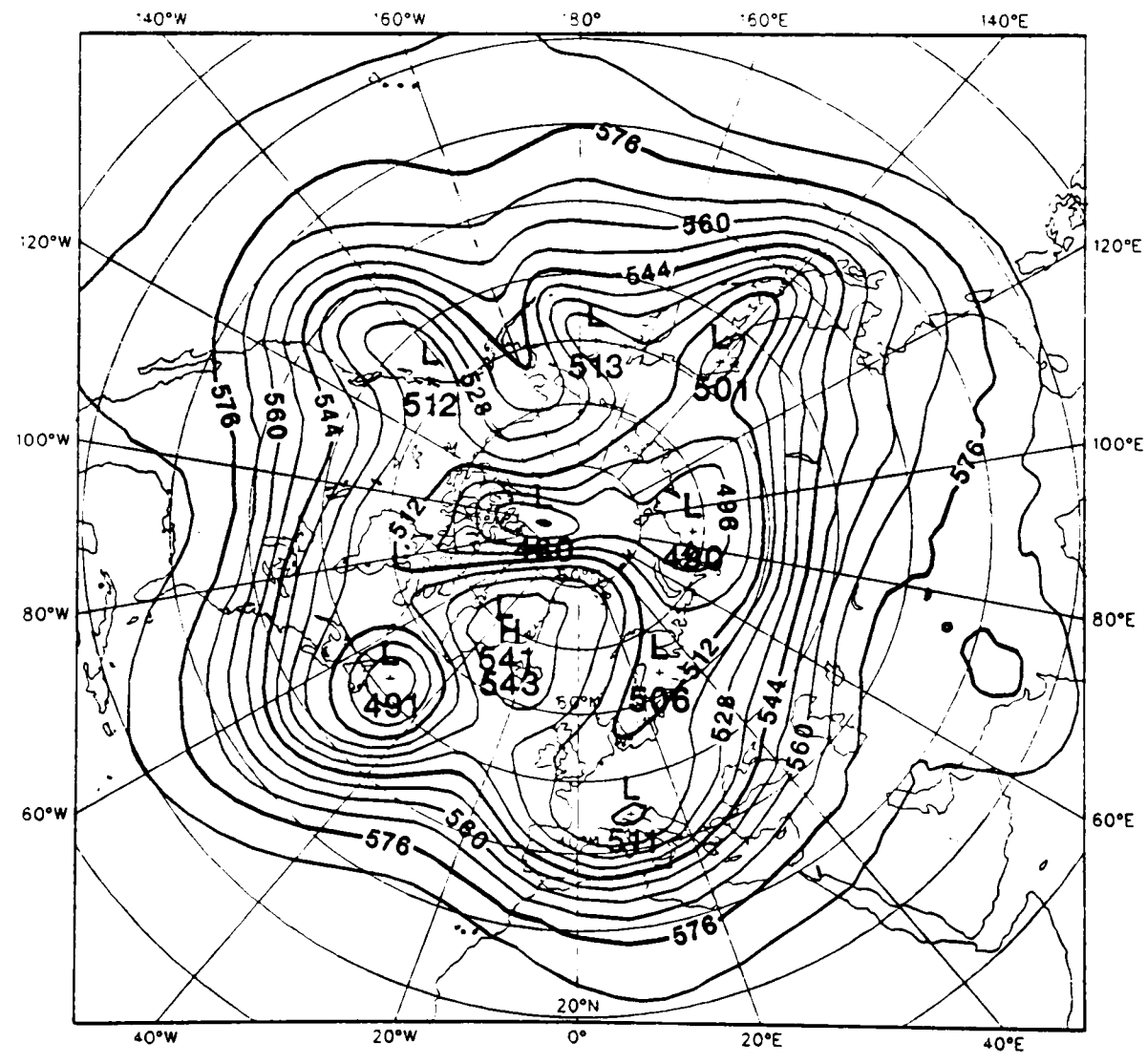


Fig. 2. As in Fig. 1, but for 3-day forecasts.

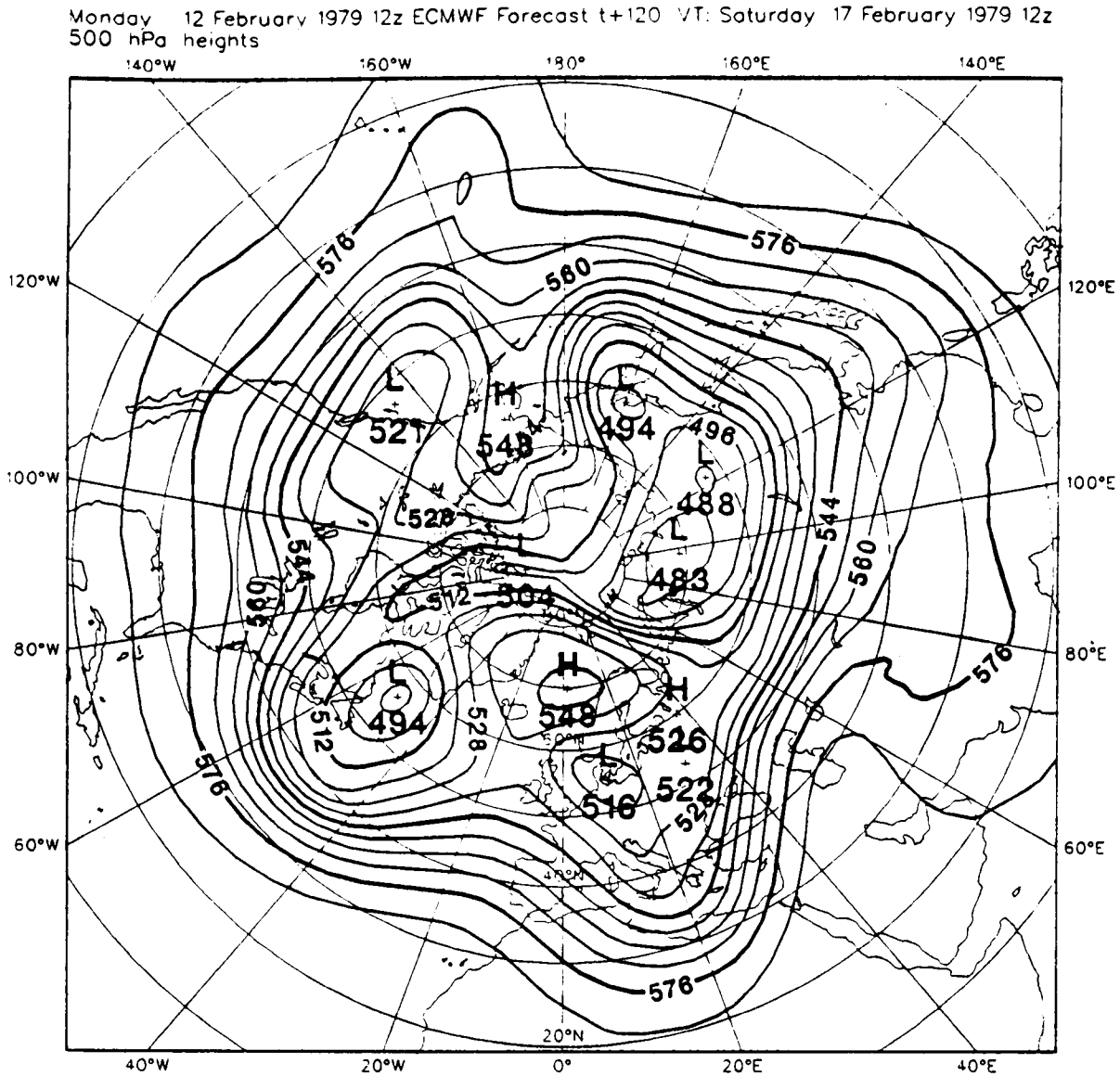


Fig. 3. As in Fig. 1, but for 5-day forecasts.

References

Bates, J.R., and A. McDonald, 1982: Multiply-upstream semi-Lagrangian advection schemes: analysis and applications to a multilevel primitive equation model. Mon. Wea. Rev., 110, 1831-1842.

Béland, M., and C. Beaudoin, 1985: A global spectral model with a finite element formulation for the vertical discretization: adiabatic formulation. Mon. Wea. Rev., 113, 1910-1919.

Ritchie, H., 1988: Application of the semi-Lagrangian method to a spectral model of the shallow water equations. Mon. Wea. Rev., 116, 1587-1598.

Ritchie, H., 1990: Application of the semi-Lagrangian method to a multilevel spectral primitive equations model. To be submitted to Quart. J. Roy. Met. Soc.

Robert, A., J. Henderson and C. Turnbull, 1972: An implicit time integration scheme for baroclinic models of the atmosphere. Mon. Wea. Rev., 100, 329-335.

Robert, A., 1981: A stable numerical integration scheme for the primitive meteorological equations. Atmos.-Ocean, 19, 35-46.

Robert, A., 1982: A semi-Lagrangian and semi-implicit numerical integration scheme for the primitive meteorological equations. J. Meteor. Soc. Japan, 60, 319-325.

Robert, A., T.L. Yee and H. Ritce, 1985: A semi-Lagrangian and semi-implicit numerical integration scheme for multilevel atmospheric models. Mon. Wea. Rev., 113, 388-394.

Tanguay, M., A. Simard and A. Staniforth, 1989: A three-dimensional semi-Lagrangian scheme for the Canadian regional finite-element forecast model. Mon. Wea. Rev., 117, 1861-1871.

- Clive Temperton, Hal Ritchie

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MicroMAGICS - VISUALISATION OF MODEL OUTPUT ON PCs

MicroMAGICS has been developed as an adaptation of the MAGICS/GKS software package. Through an agreement between CPTEC (Centre for Weather Forecasts and Climate Studies, Institute for Space Research in Brazil) and ECMWF, CPTEC was responsible for making the conversion to microcomputers with technical assistance from ECMWF.

MicroMAGICS is a software system to visualise meteorological fields on micro-computers. It includes a user friendly interface and an animation module. MicroMAGICS permits the interactive plotting and animation of meteorological 2-D scalar and vector fields in WMO GRIB format. The graphical functions available enable the plotting of contours, wind fields, streamlines and isotachs.

The envisaged working environment of MicroMAGICS consists of an IBM PC or compatible (286 or 386) using MS-DOS operating system with an EGA graphics board. Output in HPGL and GKSM format can also be produced. The PC should have a mathematical co-processor (this will become optional) and a hard disk. The present memory requirement for MicroMAGICS is 480 Kbytes of free memory plus 140 Kbytes of extended memory (RAM disk). To install MicroMAGICS, 6 Mbytes of disk space is required.

The input data are composed of meteorological fields for graphical plots on standard formats already resident on the microcomputer. It is the user's responsibility to make the fields available on the microcomputer. The fields are in WMO GRIB format. Fields in the WMO GRID format can be converted to GRIB by a utility which will be provided in a future release of MicroMAGICS.

A typical usage would be to generate and animate a sequence of plots. In normal operational mode the user first selects a sequence of fields for examination, establishing which graphical function and geographical area are desired for each field. He can then generate the plots on the screen and save them for creating an animation sequence.

A trial version of MicroMAGICS is currently being tested by a number of Member States. Further information, including details of availability, will be given in the next issue of this Newsletter (March 1990).

- Jens Daabeck

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TERMINATION OF THE CYBER NOS/BE SERVICE

All users of the ECMWF computing facilities will be aware that the NOS/BE service terminates on 31 December 1989. A previous article (ECMWF Newsletter No. 44, December 1988, pp. 17-19) detailed the major aspects of this shutdown. The present article deals with some additional aspects. If you have any queries regarding the termination of NOS/BE, please contact User Support as soon as possible.

COMFILE

This system of passing messages to User Support is based on a NOS/BE fileset and as such will not be ported to another machine when NOS/BE terminates. This "fileset" method was created in the days before electronic mail systems were available. The alternative now is to use VAX MAIL, either by

- a direct link from your own VAX system(s), if you have a DECNET link
- logging on to the ECMWF VAX system, if you have an X29 or PSS link
- the console operator menu for those with an ECNET protocol link

or the EARN Message Service, details of the ECMWF address may be found on the back cover of this Newsletter.

ROUTEDF

ROUTEDF is a facility which provided a means of transferring a file to a Member State site. A replacement utility, which uses the recently available direct CRAY-VAX link to provide the same service, is now being created. This new utility will be more sophisticated than its predecessor in that it can handle files whose record size is greater than 32 Kbytes (a limitation imposed by the VAXes). This is achieved by breaking up long records into pieces of less than 32 Kbytes and reassembling them at the Member State end. A bulletin describing this replacement facility is in preparation.

Alternatively, and until the ROUTEDF replacement is available, character files may be transferred using a Cray DISPOSE with a text routing field. For example, the following Cray DISPOSE statement will send a character file to Member State 'abc':

```
DISPOSE,DN=dn,MF=NT,DC=IN,TEXT='ROUTE/REMOTE=abc ftpfilename/APPLICATION=ff'
```

where dn = local Cray dataset name
abc = Member State 3 character identifier (e.g. BEL - Belgium)
ftpfilename = name of file in VAX queue
ff = BO for batch output queue
or PF for permanent file queue.

Stranger tapes

There are currently about 900 tapes in the stranger tape library. Some time in early 1990, these tapes will be automatically returned to their owners.

SYSSET dump tapes

The tapes for all years up to and including 1986 have been destroyed. The tapes for 1987/8/9 will be retained until the end of the NOS/BE service, then they too will be destroyed. If you want any files recovered from these tapes, please contact User Support immediately.

Observation data

With the termination of the NOS/BE service by the end of 1989, the access to the observation archive through GETDATA will not longer be available. In future, observations will be archived in MARS using the standard binary data representation (BUFR). The previous GETDATA archive will be converted to BUFR data. However, it will take several months into 1990 before the full MARS service for observations will become available. Interim access methods will be provided but will be cumbersome to use.

- Andrew Lea

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USER TAPE HANDLING AT ECMWF FROM JANUARY 1990

Introduction

Once the NOS/BE service terminates at the end of 1989, it is intended that the IBM system will be used for all user tape processing at ECMWF. However, there are limitations to the formats of tapes and data that will be supported; these are explained below.

As previously advised in the December 1988 ECMWF Newsletter, all users are urged to copy any data they have on their Pool Tapes into CFS using CRAY ECFILE before the end of 1989 and then return the tapes to the Tape Library.

From 1 January 1990, any remaining Pool Tapes will be processed on the IBM as Stranger Tapes, so the content of this article will apply equally to such tapes. Any Pool Tapes remaining in the Tape Library after 31 March 1990 will be removed and destroyed.

The Tape Library will provide a service to copy data from Stranger Tapes into CFS and similarly copy CFS data to Stranger Tapes using a set of standard utilities. It is also possible to transfer data directly between COS and Stranger Tapes using SUPERLINK, but this should be used with caution.

Users who have Stranger Tapes that do not conform to the standards outlined below are therefore urged to contact User Support and arrange to copy the data in a 'machine-independent' format into CFS via ECFILE as soon as possible before the end of December 1989.

Similarly, users who are currently producing non-standard Stranger Tapes should arrange to produce tapes that comply with the ECMWF standards before the end of 1989.

The Centre will NOT in future provide a tape storage service. Any Stranger Tapes brought into the Centre must be copied to CFS as soon as possible and they will then be returned to the owner.

Future ECMWF tape standards

From January 1990 ECMWF will support the following types of tape:

9-track tapes (6250 bpi and 1600 bpi densities)

WRITING

unlabelled: maximum physical block size is 32760 bytes
multiple files separated by a single tape mark
any IBM Standard Blocking format OR Undefined Blocking

IBM Standard labelled: maximum physical block size is 32760 bytes
multiple files separated by IBM Standard labels
any IBM Standard Blocking format OR Undefined Blocking

ANSI Standard labelled: maximum physical block size is 2048 bytes
multiple files separated by standard ANSI labels
only ASCII characters which will be translated to EBCDIC
(no binary data)

READING

unlabelled: maximum physical block size is 32760 bytes
multiple files separated by a single tape mark
any IBM Standard Blocking format OR Undefined Blocking

IBM Standard labelled: maximum physical block size is 32760 bytes
multiple files separated by IBM Standard labels
any IBM Standard Blocking format OR Undefined Blocking

ANSI Standard labelled: maximum physical block size is 32760 bytes
multiple files separated by standard ANSI labels
if read as a labelled tape ASCII characters will be translated to EBCDIC
if read with 'Bypass Label Processing', binary data can be read. In most cases a special conversion program would be required to reformat and/or reblock the data

non-Standard labelled:

maximum physical block size is 32760 bytes

must be read with 'Bypass Label Processing' to skip any non-standard Labels and Tape Marks and read data files directly

in most cases a special conversion program would be required to reformat and/or reblock the data

3480 cartridge tapes

READING and WRITING

IBM Standard labelled:

maximum physical block size is 32760 bytes

multiple files separated by IBM Standard labels

any IBM Standard Blocking format OR Undefined Blocking

(3480 cartridge tapes without IBM Standard labels will not be handled)

ECMWF Preferred Tape Format

3480 cartridge tapes OR 9-track with 6250 bpi density
IBM Standard Labels
Single or Multiple files separated by IBM Standard labels
Fixed Length Blocks (maximum blocksize 32760 bytes)
Character data - UNIX Text File Format OR Fixed Length Records
Binary data - Fixed Length Records
GRIB data - standard GRIB structured files

Use of SUPERLINK for writing/reading Stranger Tapes

SUPERLINK provides a fast connection path between the CRAY and IBM mainframes, and as well as being used for the ECFILE and MARS service, it can be used as a high speed IBM Station for file transfers.

When SUPERLINK is used to read and write Stranger Tape files on the IBM system, it generates for each file an IBM JOB which requests the tape to be mounted and then effects the transfer.

Although the SUPERLINK has been successfully used by some users for processing Stranger Tapes on the IBM system, there are a number of limitations in this facility:

- the tape is dismounted after each file is processed, giving an undesirable overhead in tape mounting and positioning when many files are being copied to/from a tape;

- any error messages that are logged on the IBM system are not returned to the CRAY Job File, and it is necessary to contact User Support to look at the IBM Job Log;

- there is no convenient mechanism for conveying the Stranger Tape slot number to the IBM operator;

- any tapes that are to be written to must first be initialised by the Tape Library (labelled or unlabelled).

The recommendation at this stage is therefore to use SUPERLINK with care. Where possible, have tapes copied into CFS before use rather than attempt to read them directly yourself via SUPERLINK. If it is found necessary to use SUPERLINK, then it is suggested that you contact User Support for advice and initial help.

Use of IBM utilities for reading/writing Stranger Tapes

A set of IBM utilities, which can be used as a more convenient and efficient means than SUPERLINK for processing Stranger Tapes on the IBM system, are being set up.

These utilities will transfer data directly between CFS (the ECFILE store) and the Stranger Tape and will support standard tape formats as outlined above.

There will be no conversion of data structures and it will be the responsibility of the user to do any necessary data restructuring or conversion on a worker machine.

It is recommended that those ECFILE data files which will be transferred to Stranger Tapes should be in a machine-independent format.

The utilities currently planned will transfer the following ECFILE data types to and from Stranger Tapes with 'Fixed length' tape blocking:

UNIX Text File format data

GRIB code data

Fixed length blocked character and binary data.

For security reasons, users will not be able to directly submit IBM jobs to process Stranger Tapes. All such processing will be initiated by the Tape Library upon specific user request.

Foreseen problems for processing existing user tapes

When the NOS/BE service is terminated at the end of 1989, there is no support planned for the following types of tapes, which are currently supported by NOS/BE but do not conform to International Standards :

- NOS/BE System Internal (SI) format tapes
  (the majority of the ECMWF Pool Tapes are of this format and there are no plans to provide utilities on the IBM to process user data on these tapes);

- ANSI labelled tapes with binary data;

- ANSI labelled tapes with character coded data which have physical blocks greater than 32760 bytes (i.e. 4095 CRAY words or 4368 CYBER words);

- L-tapes with physical blocks greater than 32760 bytes (i.e. 4095 CRAY words or 4368 CYBER words);

- NOS Internal (I) format tapes;

- labelled tapes that do not conform to the International ANSI or ISO Standards. In particular those labelled tapes that use as file separators Tape Marks which were simply created by an ENDFILE statement in NOS/BE FORTRAN do not comply with the International Standards and are therefore not supported;

- NOS/BE generated ANSI labelled tapes which were produced with invalid labels due to NOS/BE system errors. In particular, this includes tapes which in the past have been produced with incorrect File Sequence Numbers and null Accessibility Field.

Actions required from users NOW

Any users who have or plan to produce tapes having any of the formats outlined in the previous paragraph, should urgently contact User Support to discuss how best to prepare for the termination of NOS/BE support of those tape formats at the end of 1989.

In general, the recommendation is to copy existing tape data into CFS using the CRAY ECFILE, such that the data is in a suitable format for future processing.

Any users planning to produce Stranger Tapes for exporting to other centres should comply with ECMWF standards as outlined in this article.

- Tony Stanford

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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 or republished in this Newsletter series (up to News Sheet 239). All other News Sheets are redundant and can be thrown away.

No.	Still Valid Article
16	Checkpointing and program termination
67	Attention Cyber BUFFER IN users
73	Minimum Cyber field length
89	Minimum field length for Cray jobs
93	Stranger tapes
120	Non-permanent ACQUIRE to the Cray
121	Cyber job class structure
135	Local print file size limitations
140	PURGE policy change
158	Reduction in maximum print size for AB and AC
176	Archival of Cyber permanent files onto IBM mass storage
178	TIDs on Cray include 2 chara. TID plus 3 chara. source computer ID.
	Caution with ACQUIRE on RERUN jobs
186	PROCLIB changes
187	Maximum memory size for Cray jobs
189	ROUTEDF
190	Using ROUTE to direct RJE output to the Centre
194	Preventive maintenance schedules
198	Using the MOHAWK printer
201	New Cray job classes
203	Magnetic tape problems and hints on avoiding them
204	VAX disk space control
205(8/7)	Mispositioned cursor under NOS/VE full screen editor
207	FORMAL changes under NOS/VE
	Job submission from within a Cray job, using LAUNCH
208	Restriction of Cray JCL statement length
212	MFICHE command from NOS/VE
214	NAG Fortran Library Mark 12
	News Sheets on-line
215	MARS - data retrievals and model changes
219	MARS-Retrieval of most recent fields extraction utility
223	Corrections to ECFILE bulletins B8.3/1 and B8.3/2
	Aborting programs under VAX VMS
224	CRAY deferred class
	Job information cards
226	CRAY Class X
227	Extension of NOS/VE SUBCJ.
229	ECFILE audit facility
230	Access to AB printer via NOS/VE CDCNET
	Replot facility for DISPLOT
231	METGRAM under NOS/VE
232	NOS/VE passwords - how to change
235	VAX public directory - how to create
236	Alternative VAX graphics service for in house users

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JOINT ECMWF/EUMETSAT WORKSHOP

A joint ECMWF/EUMETSAT Workshop was held on 8-12 May 1989, the subject being the use of satellite data in operational weather prediction: 1989-1993.

Errors in weather forecasts frequently arise from lack of observational data in critical areas, particularly over the oceans. Quantitative satellite-based observations represent the best means for improving the accuracy of the initial state in Numerical Weather Prediction (NWP). ECMWF and EUMETSAT have a common interest in ensuring that the most accurate data are provided for weather analysis and that the data are used effectively. Satellite data find many applications in now-casting and very short-range forecasting; these applications were not discussed. Instead, the purpose of the workshop was to review the quantitative use of satellite data for NWP, particularly in the medium-range.

The decade of the 80's has been a period of relative stability in the operational systems monitoring the global atmosphere, with cloud track winds provided from five geostationary satellites, and temperature/humidity soundings provided by the NOAA polar orbiters. By contrast, the 90's will see many developments in the availability of satellite data for operational meteorology.

A prime motivation for the workshop was the need to review the possibilities for better exploitation of wind, temperature, and humidity data from current and imminent satellite systems.

There is a need for two main lines of development in the use of sounding data. There is still considerable room for improvement in conventional sounding retrieval methods which do not use a model first-guess, through better cloud treatment, better air-mass classification, better radiance tuning and so on. These retrieval methods are independent of a forecast model and are likely to be most valuable in areas where the model first-guess is inaccurate and where the relative information content of the satellite data is high.

In areas where the model first-guess is rather accurate but the relative information content of the radiance satellite data is lower, new variational assimilation methods for radiance data are needed to extract useful information from the satellite measurements.

For both these lines of development, the workshop demonstrated how close co-operation and feedback between the satellite and NWP communities can bring about important improvements in the performance of both.

Discussions and recommendations

The workshop consisted of three days of intensive presentations, followed by a day and a half of discussions, first in working groups and then in a plenary session. The working groups were assigned the following areas for consideration:

Current sounding retrieval methods
Assimilation methods for soundings
Effect of planned changes in satellite sounding on NWP
Satellite wind data
Satellite products for analysis and model validation

The working group documents were reviewed by the plenary session.

- Robert Mureau

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THE METEOROLOGICAL TRAINING COURSE, 23 April - 15 June 1990

The ECMWF meteorological training course will take place again in spring 1990. The objective of the course is to assist Member States in advanced training in the field of numerical weather forecasting. Students attending the course should have a good meteorological background. Some practical experience in numerical weather prediction is an advantage.

The course is divided into three modules:

Numerical Weather Prediction I
Met 1 - (23 April - 11 May 1990).
Data assimilation, numerical methods and adiabatic formulation of models

Numerical Weather Prediction II
Met 2A - (14 - 24 May 1990).
Parametrisation of diabatic processes

Met 2B - (29 May - 1 June 1990).
General circulation, systematic model errors and predictability

ECMWF Products
Met 3 - (4 - 15 June 1990).
Use and interpretation of ECMWF products

Modules Met1 and Met2 will be of most interest to young scientists who are involved in the development of numerical models for operational forecasting or research. Module 3 is more directed towards those staff in the meteorological services who are (or will be) using ECMWF products, either directly as forecasting staff, or in development work aimed at maximising the benefits to users of the Centre's products.

Students can attend any combination of the modules. However, those attending only Met2 are expected to have a good knowledge of the topics covered in Met1. The modules Met2A and 2B can be taken independently. Participation in Met3 does not require attendance at the other modules.

In case of oversubscription, module Met3 will be separated into 2 parts of one week each. The maximum number of participants for the second week is 24, whilst the first week can be attended by a larger number of students.

In each module there will be lectures, exercises and problem or laboratory sessions. There will also be some computing, though no computing experience will be assumed. Participants are encouraged to take an interest in the work of ECMWF and to discuss their own work and interests with the staff of the Centre. All the lectures will be given in English and a comprehensive set of lecture notes will be provided.

Application forms and booklets will be mailed to the meteorological services of Member States and many universities and institutions by the beginning of January 1990. If you do not have access to one of these, copies can be obtained from Els Kooij-Connally at ECMWF.

The Centre does not charge a course fee for participants from Member States.

Applications from within Member States should be channelled through the relevant national meteorological service, but those from non-Member States should be sent to the Secretary-General of WMO.

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ECMWF PUBLICATIONS

TECHNICAL MEMORANDUM	No. 151:	Extended-range predictions with ECMWF models. I: Interannual variability in operational model integrations
	No. 152:	Extended-range predictions with ECMWF models. II: Influence of horizontal resolution on systematic error and forecast skill
	No. 153:	Extended-range predictions with ECMWF models. III: Time-lagged ensemble forecasting
	No. 154:	Tropical-extratropical interaction associated with the 30-60 day oscillation and its impact on medium- and extended-range predictability
	No. 155:	First studies with a prognostic cloud generation scheme
	No. 156:	Data assimilation and forecast experiments at ECMWF using the '3I' retrieval scheme for satellite soundings
	No. 157:	Observing system experiments on NESDIS statistical retrievals of TOVS satellite data using the 1988 ECMWF data assimilation system
	No. 158:	Quality control of NESDIS physical retrievals of TOVS satellite data
	No. 159:	Research and operational developments related to the use of satellite data in the ECMWF assimilation system
	No. 160:	Evaluation and development of the ECMWF humidity analysis
	No. 161:	Changes in the ECMWF analysis-forecasting scheme and the systematic error of the model
	No. 162:	Synoptic characteristics of the ECMWF Chernobyl data set
	No. 163:	Report on fifth meeting of Member State Computing Representatives, 11-14 April 1989
WORKSHOP PROCEEDINGS:		Meteorological operations systems 7-11 December 1987
		Radiosonde data quality and monitoring (ECMWF/WMO), 14-16 December 1987

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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.

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* T indicates the original Technical Newsletter series

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	-	Telefax (No. 869450)		
	-	COMFILE (See Bulletin B1.5/1)		
	-	VMS MAIL adressed to ADVISORY		
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* CB - Computer Block OB - Office Block

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