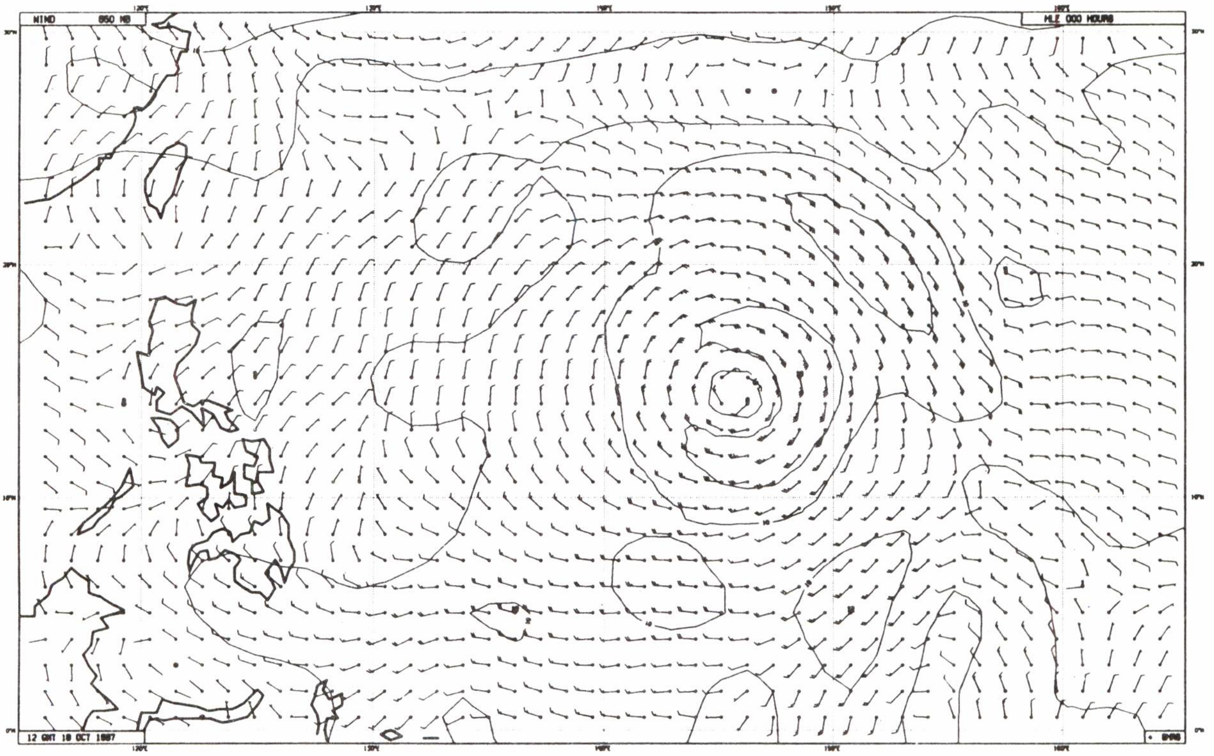
European Centre for Medium Range Weather Forecasts

# ECMWF NEWSLETTER

Shinfield Park, Reading, Berkshire RG2 9AX, England. Tel: U.K. (0734) 876000, Int. (44 734) 876000, Telex: 847908

Number 45 - March 1989



## IN THIS ISSUE

Page

**METEOROLOGICAL**



**COMPUTER USER INFORMATION**



**GENERAL**



---

COVER: 850 hPa analysed wind, 12 UTC, 18.10.87, for tropical cyclone Lynn, including bogus observations, windspeed in m/s. Please see article on page 3.

---


This Newsletter is edited and produced by User Support.

The next issue will appear in June 1989.

On 29 November last year, the Government of Norway notified the Secretary-General of the Council of the European Communities that it wished to accede to the ECMWF Convention. ECMWF was subsequently pleased to welcome Norway as its 18th Member State on 1 January 1989.

A table showing the allocation of computer resources including Norway is to be found on page 20.

Those working in the area of data analysis may be interested to read the article on page 3, giving first results of ECMWF experiments using bogus data in data sparse areas.

The new data acquisition, to be based on a VAX 6210, will be of interest to those involved in running an operational forecast suite and is described on page 15.

* * * * * * * * * * * *

## CHANGES TO THE OPERATIONAL FORECASTING SYSTEM

### Recent changes

On 14 December 1988, a change was made to the analysis, to prevent uncontrolled growth of spurious vortices at the top level of the model.

On 31 January 1989, a set of changes to the use of satellite data was introduced. They include:

(i) a stability check of the temperature profiles deduced from the TOVS. As large errors in the lowest layer of TOVS data tend to be compensated aloft by errors of opposite sign, incorrect data are spotted by checking the difference in temperature between two layers, namely 1000/700 and 500/300 hPa, against the first-guess. The first-guess check is also tightened for certain layers.

(ii) A revision of the observation error statistics for thicknesses: the horizontal correlation function is flattened and the error variances are distributed more evenly to the different layers.

(iii) A change to the SATOB OI-check: as introduced for SATEM in July 1988, SATOB are now checked without influence from neighbouring data of the same type.

(iv) Modifications to the use of Precipitable Water Content data (PWC) from NOAA-10 and NOAA-11. The PWC are not used over land, nor when no thickness data are available in the same report; their observation error has been increased.

Experiments have indicated that the main impact of the changes is in the Northern Hemisphere mid-latitudes: the number of rejections is much increased in the areas with strong horizontal gradient, where satellite data had been found to have a detrimental effect on several occasions. The change has less impact in the Southern Hemisphere and practically no effect in the Tropics.

### Planned changes

(i) The new surface analysis scheme will be replaced by a new one. It is mainly a technical development, the analysis of surface variables is now performed inside the context of the main analysis program (rewritten in September 1986) rather than in a separate step. Little meteorological impact is expected on the SST and snow analysis (the only surface variables currently analysed). However, the SST computations will use as input the 2 degree mesh SST analysis from the NMC (instead of the 5 degree mesh). Thus more details are expected on the initial SST field used to run the ECMWF operational model.

(ii) A revised radiation scheme and a new parametrisation of convection based on a mass-flux approach will be implemented.

(iii) Two additional schemes are currently being tested, a revised scheme for gravity wave drag and a revised boundary layer and surface scheme. These changes will be implemented either at the same time as (ii) or later.

- Bernard Strauss

* * * * * * * * * * * *

## USE OF BOGUS OBSERVATIONS TO IMPROVE THE ANALYSIS AND FORECAST OF TROPICAL CYCLONES

### Introduction

The position and intensity of tropical cyclones are often known with high accuracy in near real-time from non-conventional data types, such as satellite imagery and reconnaissance flights. In experiments at ECMWF we have applied a technique to improve the analysis of tropical cyclones in data void areas by incorporating this information into the analysis in the form of bogus observations.

Surface prognostic charts quite often show a low pressure centre near the position of the cyclone. Similarly, on the 850 hPa wind forecast charts, a cyclonic circulation can usually be identified. However, the real intensity of the storm core cannot be represented with the resolution of global models: the strongest winds and the sharpest drop in pressure often occur within 50 km of the storm centre.

An assessment of the ECMWF performance in predicting tropical storms was carried out by Reed et al. (1988). They found that the position of storms in the Atlantic was predicted well in cases when the analysed initial position was accurate. They also pointed out two important shortcomings in the analysis system, both of which have been dealt with since: the very low resolution of the tropical analysis was increased in July 1988 and analysis of the divergent wind component was introduced in January 1988.

The upgraded analysis scheme manages tropical storms well in areas with sufficient observations, but not in most oceanic parts of the Tropics. There, the analysed tropical cyclones appear too large and weak and often with a large positional error.

PILOTs and TEMPs are usually the most reliable data, but they are widely separated in the tropics. The most important data types for the machine analysis of tropical cyclones are SATEMs and SATOBs and to a lesser extent SYNOPs. SATEMs, temperature profiles retrieved from satellite measured radiances, have a resolution of approximately 200 km, but are less reliable than radiosondes. Heavy precipitation, too, deteriorates the quality. Recent studies have shown that the yield of low-level SATOBs, satellite cloud-track winds, is much lower in the vicinity of active systems than for example in the trade wind areas.

## Description of the method

The main data source for the bogus data would be satellite images. In the experiments described below it is assumed that there are a number of parameters describing the size, intensity and wind distribution of the storms, disseminated from the regional tropical weather centres in real-time on the GTS. The messages would be decoded automatically and used to create a number of bogus observations.
The bogus observations of ECMWF are generated with a simple, idealized tropical cyclone model and consist of two parts: (1) an idealized symmetric vortex and (2) a background field. The two parts are superimposed.

The symmetric vortex at all levels is modelled by a so called 'Rankine Vortex' in which the wind speed increases linearly with distance from the storm centre until its maximum and decays thereafter assymptotically towards zero. Winds from 850 to 300 hPa are created and their strength is allowed to decrease with height, in accordance with climatological radiosonde composites of tropical cyclones. Geopotential at 1000 hPa is calculated in gradient balance with the winds.

Asymmetry in a tropical cyclone is here assumed to arise from the addition of a large scale background field to the idealized vortex. In order to get a balanced background field, we use the previous six hour forecast (the first guess field of the analysis), truncated at T20. This is added to the idealized vortex at the bogus observation points.

The total number of bogus observations varies with the size of the storm from 20 to about 40. They are positioned along concentric circles surrounding the centre.

The technique above is designed in concordance with the resolution of the global data assimilation system. Real observations reflecting structures on a smaller scale will conflict with the bogus data and they will most likely be rejected by the automatic quality control procedures of the analysis.

## Impact on analyses and forecasts

In the Tropics, the horizontal length scale of the analysis structure functions is about 520 km. This means that the largest impact on the height field from a single wind observation is at 520 km distance perpendicular to the wind direction, either side of the wind observation. In a tropical cyclone, the distance from the highest wind speed to the lowest pressure is typically between 30 and 80 km. Hence, even the higher resolution structure functions are an order of magnitude too large for a typhoon. The problem is illustrated in Fig.1 which shows the analysis response to the bogus wind and pressure data, and the effect of the initialisation. The initialisation mainly adjusts the massfield towards gradient wind balance, which makes the cyclone deeper.

The technique was developed using an AMEX case (Australian Monsoon Experiment) of 8-11 February 1987 (JASON) and the LYNN case of 16-20 October 1987 was used for evaluation. The tropical cyclone LYNN was an unusually large storm. It formed in the central Pacific near the Marshall Islands and moved rapidly towards the Philippines. The cyclone developed and moved mainly over ocean areas, data-void except for a few SYNOP/SHIP observations on or near the Mariana Islands and the radiosonde station on Guam, which it passed at 140 km to the northeast at 12 UTC on the 18th. SATEMs were available through the developing stages of the cyclone but after it had matured there were no SATEMs for two and a half days.

In addition to the conventional data the Guam forecast centre has satellite imagery, radar and aircraft observations available. Their 'best-track' documentation of LYNN was used as input for generating six-hourly bogus observations by the procedure described above. Four consecutive 3-day forecasts from the 17th to the 20th at 12 UTC were run and compared with the operational forecasts.

The operational analysis was able to catch the development reasonably well, probably because of the good coverage of satellite data on the 16th. Through the 5-day period, the mean positional error in the operational analyses was 170 km . The provision of bogus observations corrected the position within 40 km and made the cyclone better defined. The maximum wind speeds came closer to the centre, at a distance of about 360 km, and the surface pressure went down to 987 hPa at its lowest, compared to 600 km and 995 hPa respectively. (See Figs. 2a and 2b for the analyses of the 18th). The bogused analysis had slightly higher maximum wind speeds than the operational one later in the assimilation, but it never exceeded 32 m/s (70 m/s was observed), as a result of the limited resolution.

The ensemble of predicted 3-day storm tracks is plotted in Fig. 3 for the experimental and the operational forecasts. The operational forecast moves the system too slowly and the first three forecasts take it too far to the north. The analyses with the bogus data produce significantly better forecasts in terms of position, speed and direction of motion. The table gives a summary of the positional errors (in km) in forecasts of the centre of the storm, averaged over the four cases.

| | Analysis | + 24 | + 48 | + 72 hours |
|---|---|---|---|---|
| Bogus | 30 | 180 | 200 | 210 |
| Operational | 170 | 250 | 370 | 410 |

The forecast development does not reflect the true rapid intensification of the storm. The operational forecast from the 17th deepened the cyclone by 3 hPa in 2 days and the other forecasts, operational or bogus, kept the intensity constant in time. Further details can be found in Andersson and Hollingsworth (1988).

## Conclusion

The bogus observations are designed to reflect conditions in the outer area of the storm which the global model can resolve. The outer wind structure is known to be very important for a good prediction of tropical storm tracks. The results from four consecutive forecasts of the LYNN case show an improvement in predicted speed and direction of the storm motion.

It is hoped that the necessary input data will be made available on the GTS and it has been suggested a two-way exchange of data between the regional tropical weather centres and ECMWF.

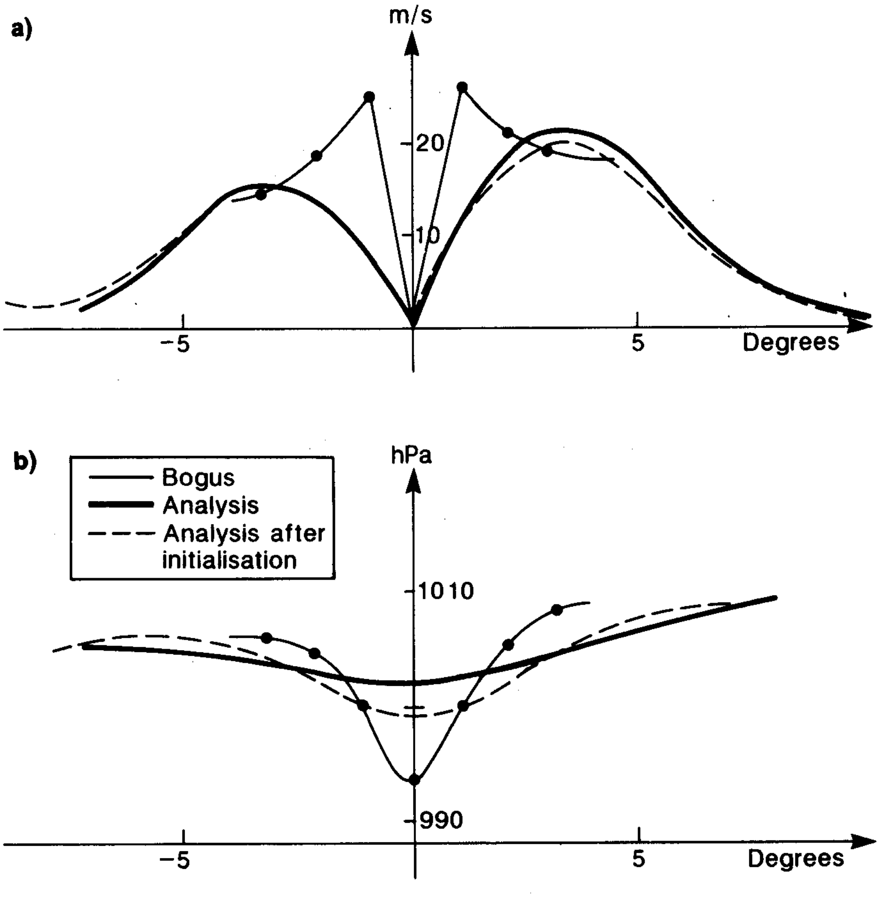



Fig.1: The response of the analysis and initialization to the typhoon bogus observations along 14S for the JASON case, a: 850 hPa tangential wind speed in m/s and b: sea level pressure in hPa. Abscissa is west-east distance in degrees of latitude. The dots indicate bogus observations which were provided as input to the analysis (thick line). Initialized analysis is shown as a broken line.

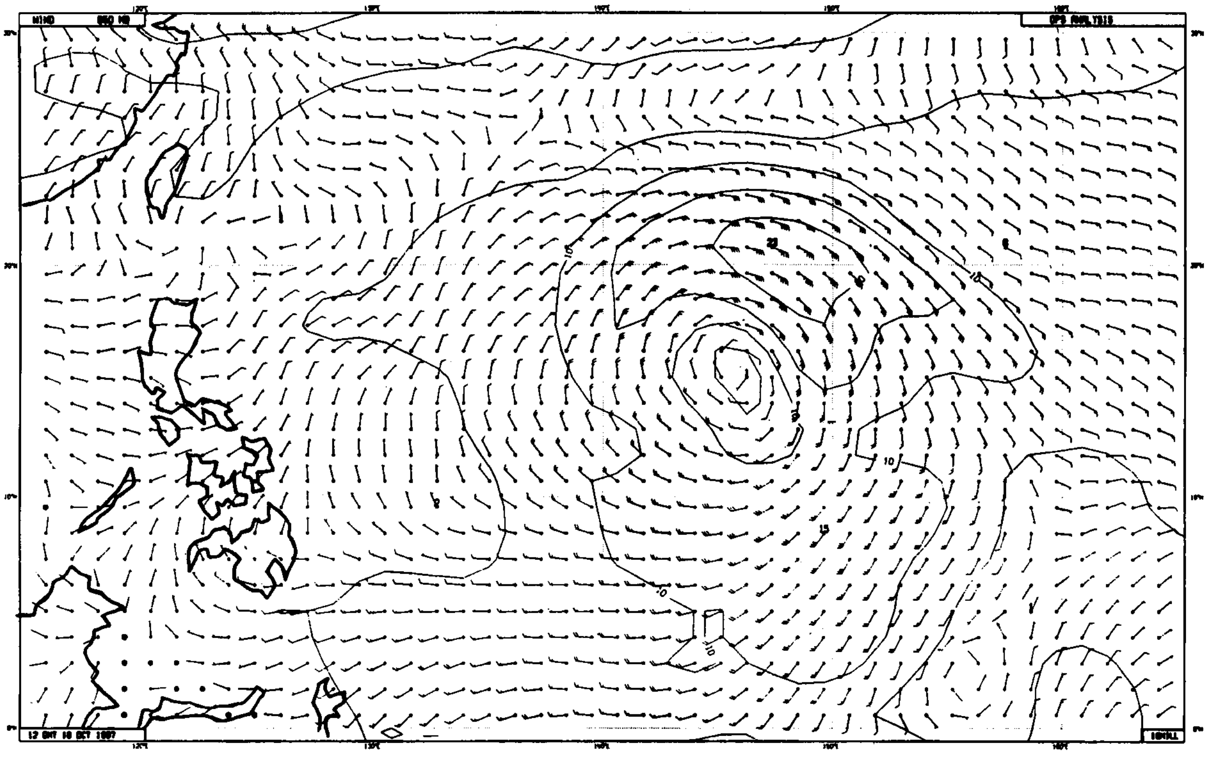


Fig.2a: 850 hPa analysed wind, 871018-12 UTC, tropical cyclone LYNN, operational analysis. Windspeed in m/s.

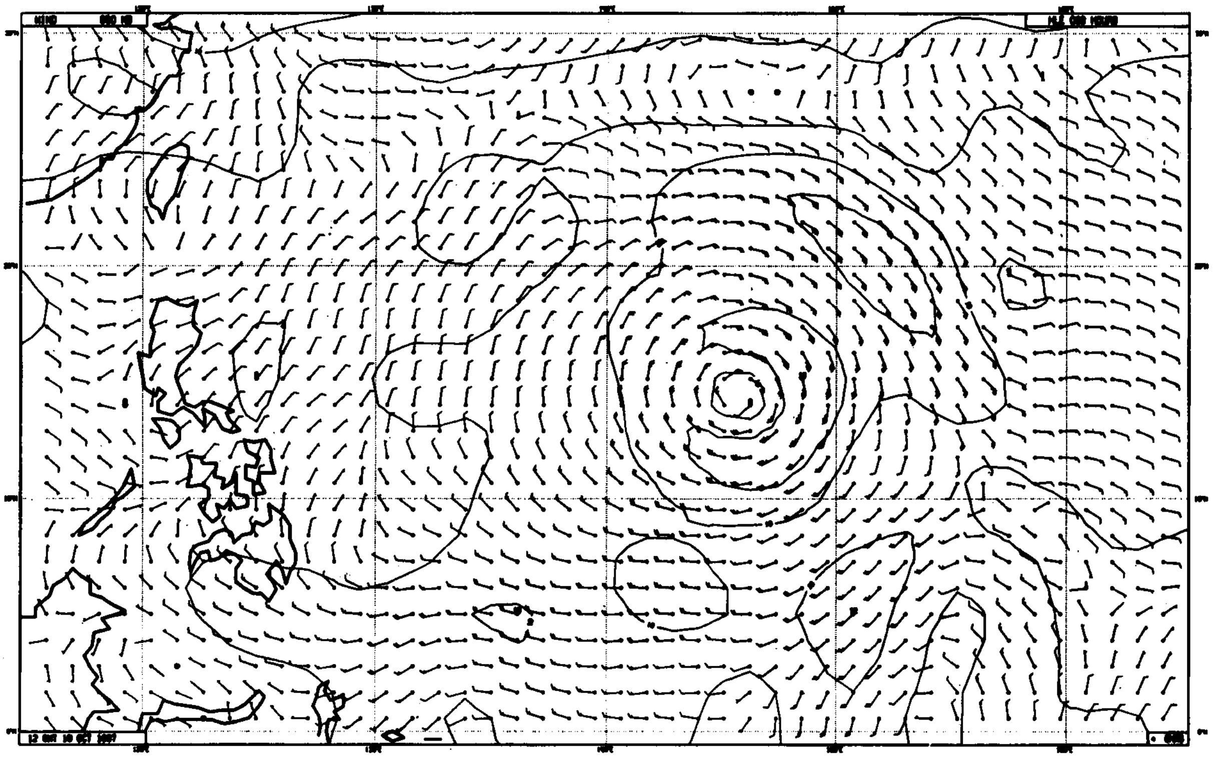


Fig.2b: Bogus observations used, otherwise as Fig. 2a.

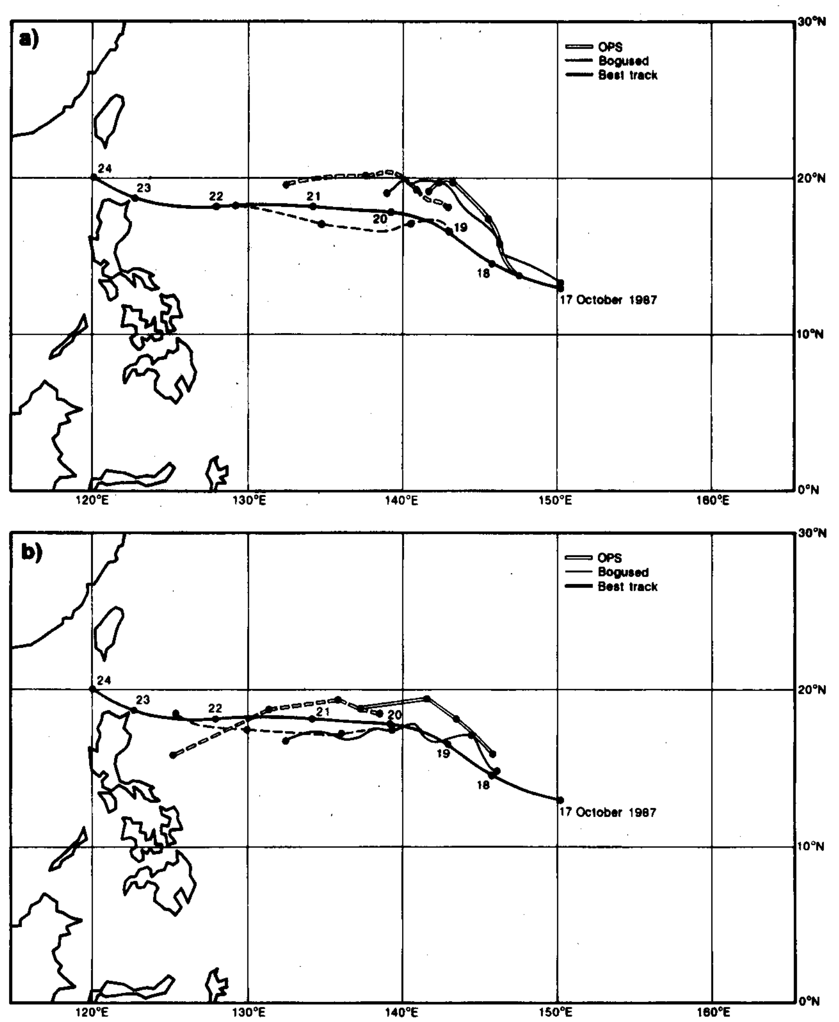



Fig.3: Estimated best track of tropical cyclone LYNN together with 3-day forecasts from bogus and operational analyses, a: forecasts from the 17th and the 19th, b: forecasts from the 18th and the 20th of October 1987. 24 hours between dots along the trajectories.

## References

Andersson, E., and Hollingsworth, A., 1988: Typhoon bogus observations in the ECMWF data assimilation system. ECMWF Technical Memorandum No. 148.

Reed, R.J., Hollingsworth, A., Heckley, W.A., and Delsol, F., 1988: An evaluation of the performance of the ECMWF operational system in analysing and forecasting tropical easterly wave disturbances over Africa and the Tropical Atlantic. Mon.Wea.Rev., 116, 824-865.

- Erik Andersson

* * * * * * * * * * * *

## MONITORING THE GLOBAL OBSERVING SYSTEM - TWO ISOLATED RADIOSONDE STATIONS

As part of its operational activities, ECMWF undertakes regular monitoring of the availability, completeness and quality of meteorological observations received at the Centre via the Global Telecommunication System (GTS) of the World Meteorological Organisation. Performance statistics from each cycle of the data assimilation system are accumulated in monthly files which may be accessed by a variety of data monitoring software tools.

In its role as the appointed 'lead centre' for monitoring the quality of radiosonde and pilot reports (approved by the WMO Executive Council in June 1988), ECMWF carries out extensive and detailed studies of these observation types in particular. This article demonstrates the method of displaying statistics in the form of monthly trends and its importance in monitoring the quality of radiosonde observations.

The usual method of evaluating data quality is to compare the observed value of a particular parameter with the value of the corresponding ECMWF first-guess field (6-hour forecast), interpolated to the observation point. By averaging the resulting differences over a sufficiently long period (usually one month), a good indication of the quality of the observations may be obtained. It should be remembered, however, that the observed minus first-guess statistics will contain both observation and forecast errors. In data-rich areas, such as the continental regions of the northern hemisphere, the error in the 6-hour forecast can be expected to be low but more care needs to be taken when drawing firm conclusions about the quality of isolated stations. In these circumstances, the examination of monthly trends is a vital part of any data quality study.

Figs. 1 and 2 show the evolution of the mean monthly geopotential height differences (in metres) between observations and the ECMWF first-guess field for two island radiosonde stations operated by the US Navy - Bermuda (78016) in the North Atlantic, and Diego Garcia (61967) in the Indian Ocean. The statistics shown cover the period between December 1987 and December 1988 and refer to 12 UTC observations - the same features are observed in the statistics for 00 UTC. Separate curves for the mean differences at 500 hPa, 100 hPa and 50 hPa are displayed. The number of observations shown above each time graph box are the number of reports received at ECMWF for each of the three levels during each month. The graphs clearly illustrate that both stations had severe quality problems early in the year. The availability of observations at stratospheric levels was also poor, the radiosonde ascents seldom reaching 100 hPa. The sudden change in performance in May (at Bermuda) and June (at Diego Garcia) suggests that some form of corrective action was taken by the radiosonde operations.

Isolated island stations such as Bermuda and Diego Garcia are very important parts of the global radiosonde network, for both routine analysis and climate studies such as in the framework of TOGA. Equally important is the effective monitoring of the performance of all radiosonde stations and the feedback of the

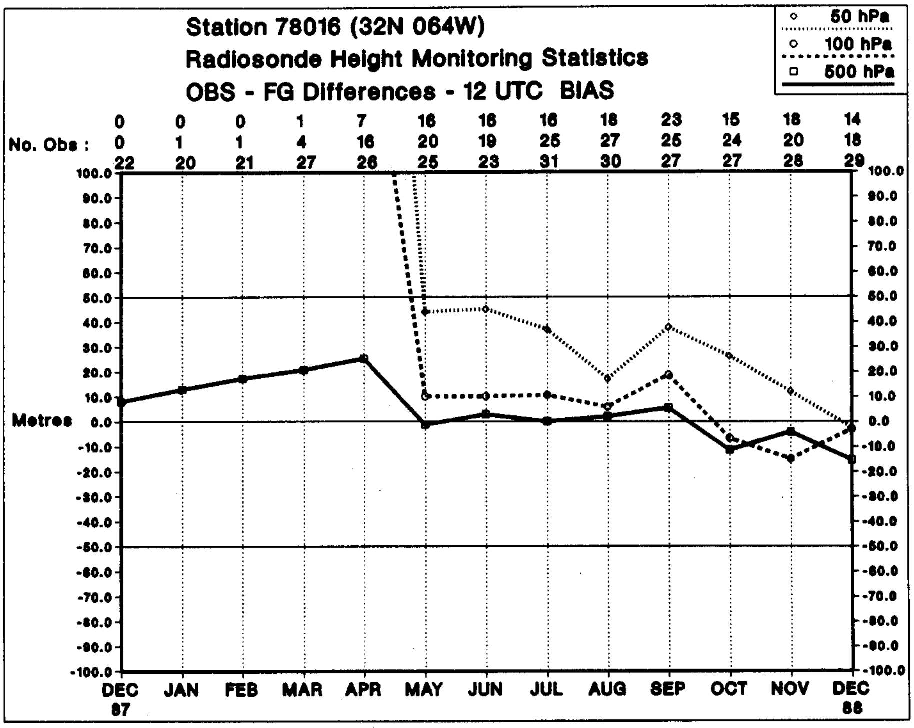



Fig. 1: 13-month trends of monthly mean observed minus first-guess differences for station 78016 (Bermuda).

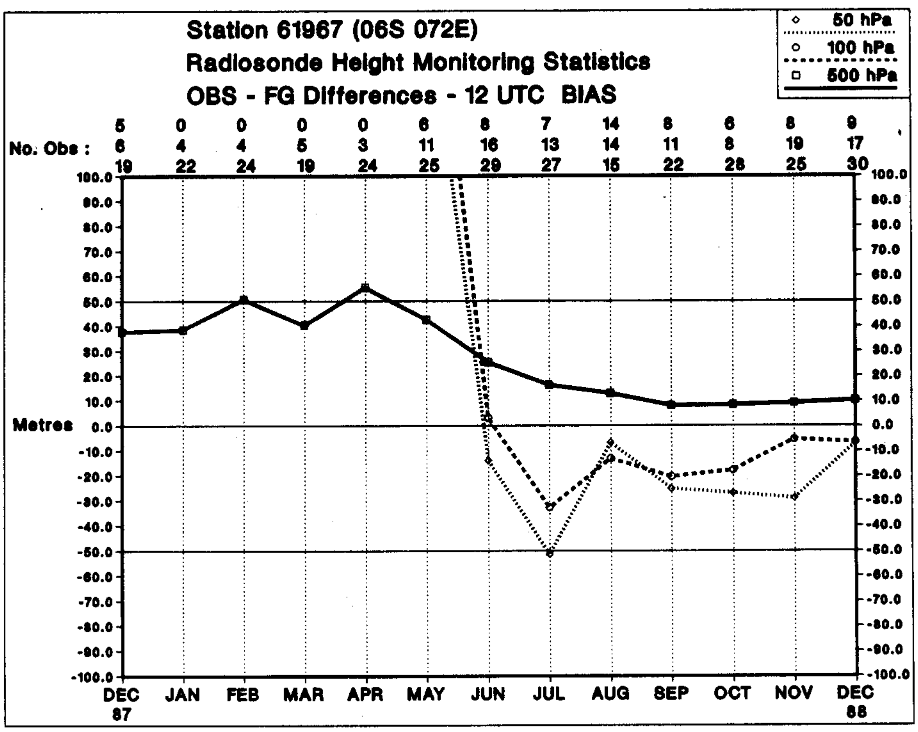



Fig. 2: 13-month trends of monthly mean observed minus first-guess differences for station 61967 (Diego Garcia).

information to the data producers. In this respect, a pilot study to establish the value of regular information exchange between the producers of radiosonde observations and the users has been approved by WMO. The pilot study began in October 1988 and will last for a period of one year with ECMWF acting as the co-ordinating centre.

\- Alan Radford

* * * * * * * * * * * * *

## COMPUTER RESOURCE ALLOCATION TO MEMBER STATES

At its twenty-ninth session, Council approved the allocation of computer resources to Member States for 1989 as shown below. These allocations came into effect on Monday, 2 January 1989.

Details of how a unit is constructed are given in ECMWF Computer Bulletin B1.2/1. For guidance, note that for the "average" job 1500 Cray units equals approximately 1 CP hour.

Table 1: Allocation to Member States of Cray resources and data storage in 1989

| | Cray (Kunits) | Data storage (Gwords) |
|---|---|---|
| Belgium | 359 | 7.7 |
| Denmark | 302 | 6.5 |
| Germany | 1545 | 20.0 |
| Spain | 522 | 11.0 |
| France | 1285 | 35.2 |
| Greece | 260 | 6.0 |
| Ireland | 200 | 4.0 |
| Italy | 400 | 5.0 |
| Yugoslavia | 286 | 6.0 |
| Netherlands | 461 | 10.0 |
| Norway | 305 | 6.3 |
| Austria | 327 | 7.0 |
| Portugal | 228 | 1.0 |
| Switzerland | 398 | 8.5 |
| Finland | 296 | 6.5 |
| Sweden | 388 | 8.7 |
| Turkey | 298 | 6.5 |
| UK | 1140 | 24.1 |
| TOTAL | 9000 | 180.0 |
| Special Projects* | 999 | 20.0 |
| OVERALL TOTAL | 9999 | 200.0 |

* This allocation is distributed between Special Projects as shown in the table overleaf.

TABLE 2: SPECIAL PROJECTS ALLOCATIONS 1989

| Member State | Institution | Project Title | 1989 Resources Allocated | |
|---|---|---|---|---|
| | | | Cray Kunits | Data Storage Gbytes |
| Continuation Projects | | | | |
| France | CNET/CRPE, Issy-les-Moulineux (Eymard) | Determination of ocean surface heat fluxes using satellite data and the ECMWF model | 30 | 1.2 |
| | Laboratory of Atmospheric Optics University of Science and Technology, Lille (Fouquart) | Intercomparison of radiation codes in the ECMWF model | 30 | 1.2 |
| Germany | Institute for Geophysics and Meteorology, Cologne (Speth) | Interpretation and calculation of energy budgets | 15 | 0.4 |
| | Fraunhofer Institut für Atmosphärische Umweltforschung, Garmisch-Partenkirchen (Seiler) | Container Project | 9 | 0.8 |
| | Institute for Geophysics and Meteorology, Cologne (Raschke/Rockel) | Parametrisation of radiation and clouds for use in general circulation models | 30 | 0.2 |
| | Max-Planck-Institut für Meteorologie, Hamburg (Hasselmann) | Assimilation of ocean satellite wind and wave data | 15 | 0.8 |
| Italy | Istituto per lo Studio della Dinamica delle Grandi Masse, Venezia (Cavaleri) | Testing and applications of a third generation wave model in the Mediterranean Sea | 20 | 0.5 |
| | FISBAT-CNR, Istituto di Fisica "A. Righi", Bologna (Speranza) | Statistical properties of a symmetrically forced atmospheric circulation | 30 | 0.2 |
| Netherlands | KNMI, De Bilt (Komen) | Testing and evaluation of a third generation ocean wave model at ECMWF | 275 | 1.7 |
| | KNMI, De Bilt (Siegmund) and UK Met Office, Bracknell (Mitchell) | Analysis of a $CO_2$-experiment performed with a GCM | 30 | 0.1 |
| United Kingdom | Imperial College of Science and Technology, London (Marshall) | A North Atlantic ocean circulation model for WOCE observing system simulation studies | 75 | 1.2 |
| | Meteorological Office, Bracknell (Cullen) | Model intercomparison project | 20 | 1.2 |
| | DAMTP, University of Cambridge, Cambridge (McIntyre) | Dynamical studies using isentropic potential vorticity and high resolution baroclinic models of the stratosphere | 10 | 1.2 |
| | IOSDL, Godalming (Taylor) | Quality of VOS wind and temperature measurements | 15 | 1.2 |
| New Projects | | | | |
| Austria | Institut für Meteorologie und Geophysik, Vienna (Hantel) | Subsynoptic vertical heat fluxes: Comparison diagnosed vs. modelled data | 25 | 1.0 |
| France | LMD, Paris (Courtier/Talagrand) | Application of the adjoint model to numerical weather forecast | 275 | 4.4 |
| Netherlands | KNMI, De Bilt (Kattenberg) | North Atlantic ocean modelling | 20 | 1.2 |
| | KNMI, De Bilt (Haarsma/v Dorland) | $CO_2$ transient atmosphere model | 20 | 0.8 |
| | KNMI, De Bilt (Duynkerke/Cuijpers) | Large eddy simulation of stratocumulus cloud | 25 | 0.8 |
| Yugoslavia | University of Belgrade, Belgrade (Mesinger/Janjic) | Contamination modelling | 30 | 0.1 |
| | | T O T A L | 999 | 20.0 |

## 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 230). 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. |
| 228 | NOS/VE level 1.4.1 |
| 229 | ECFILE audit facility |
| 230 | Access to AB printer via NOS/VE CDCNET |
| | Replot facility for DISPLOT |

* * * * * * * * * * * *

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

| Member State | TAC Representative | Member State Computing Representative | Meteorological Contact Point |
|---|---|---|---|
| Belgium | Dr. W. Struylaert | Mme. L. Frappez | Dr. J. Nemeghaire |
| Denmark | Dr. A.M. Jørgensen | Mr. P. Henning | Dr. P. Aakjaer |
| Germany | Dr. R. Lamp | Dr. R. Lamp | Dr. Rüge |
| Spain | Mr. A. Labajo | Mr. J. Juega | Mr. R. Font Blasco |
| France | Mr. M. Jarraud | Mr. J.-P. Quinto | Mr. M. Jarraud |
| Greece | Mr. G. Barbounakis/ Mr. D. Katsimardos | Mr. I. Iakovou | Mr. A. Kakouros |
| Ireland | Mr. W.H. Wann | Mr. D. Murphy | Mr. P.M.P. McHugh |
| Italy | Dr. C. Finizio | Dr. S. Pasquini | Dr. M. Conte |
| Yugoslavia | Mr. M. Jovasevic | Mr. M. Gavrilov | Mr. S. Nickovic |
| Netherlands | Mr. S. Kruizinga | Mr. H. van Soest | Mr. G. Haytink |
| Norway | Mr. K. Björheim | Ms. R. Rudsar | Mr. O. Nielsen |
| Austria | Dr. G. Wihl | Dr. G. Wihl | Dr. H. Gmoser |
| Portugal | Mr. A.P. Da Costa Malheiro | To be announced | Mrs. M.I.S.A. Barros Ferreira |
| Switzerland | Mr. M. Haug | Mr. G. Siegwart | Mr. M. Schönbächler |
| Finland | Dr. M. Alestalo | Mr. T. Hopeakoski | Mr. P. Kukkonen |
| Sweden | Mr. G. Ryne | Mr. S. Orrhagen | Mr. R. Joelsson |
| Turkey | Dr. M. Cemil Özgül (Major Gen. Rt.) | Dr. M. Cemil Özgül (Major Gen. Rt.) | Dr. M. Cemil Özgül (Major Gen. Rt.) |
| United Kingdom | Dr. R. Wiley | Dr. A. Dickinson | Mr. R.M. Morris |

* * * * * * * * * * * *

## WORKSHOP ON GRAPHICS IN METEOROLOGY, 30 NOVEMBER-2 DECEMBER 1988

A joint workshop was held by ECMWF and CPTEC Brazil (Centre for Weather Prediction and Climate Studies) 30 November - 2 December 1988. There was a total of 14 presentations on the following topics: MicroMAGICS, future directions in MAGICS and MicroMAGICS, animation and workstations.

### MicroMAGICS

MicroMAGICS is a graphical system for meteorological applications on microcomputers. It is adapted from the ECMWF MAGICS/GKS software system and includes a user-friendly interface and an animation module. MicroMAGICS is being developed by CPTEC, a unit of Brazil's Institute for Space Research (INPE), under guidance from ECMWF. The first release of MicroMAGICS is scheduled to be made to ECMWF and its Member States this year. A prototype of the MicroMAGICS product was demonstrated at the workshop on graphics in meteorology.

### Future directions in MAGICS and MicroMAGICS

Many standard types of meteorological maps can now be produced with MAGICS and most of them will be available in MicroMAGICS. This discussion centred around enhancements proposed by Member States and originating from within ECMWF. Recommendations from the discussion will be listed in the proceedings from the workshop.

### Animation

For the purpose of more detailed analysis and study of model output, the production of animation sequences is the most efficient solution, since this medium allows the flexible combination of various parameters in colour and adds the important dimension of time. The analysis of the vast amounts of data resulting from the model would be beyond human capacity without the aid of such visualisation techniques. In the discussion on this topic it was stated that 2D computer animation of meteorological parameters is considered useful. 3D animation is still in its infancy. It needs further research to find ways of using it, but should be pursued. Flexibility in user interfaces to animation software is considered important (i.e. user control of the selection of meteorological parameters, geographical area etc.). Interactive intervention with a weather forecast model was considered useful as a research tool at the present time.

### Workstations

Recently, many new and powerful workstations have been announced. Workstations, which now span a wide range in performance and cost have become suitable tools on which to implement resource demanding visualisation techniques and systems. In the discussion, it was concluded that workstations have a definite role in the meteorological community but the requirements of different organisations vary considerably. For pioneers, high-powered workstations will lead the way in the development of new techniques which can then be scaled down for use on lower cost systems.

There were a total of 53 participants made up of representatives from 14 Member States, WMO, Brazil, Canada, Israel, USA and six computer and workstation vendors.

- Jens Daabeck

* * * * * * * * * * * * *

## WORKSHOP ON USE OF PARALLEL PROCESSORS IN METEOROLOGY, 5-9 DECEMBER 1988

Two main avenues of exploiting parallel processing have evolved over recent years: conventional vector computers with increasing numbers of powerful processors, e.g. the Cray, and highly parallel machines consisting of a large number of cheaper processors, such as transputer networks and hypercubes.

The question that immediately arises is which type of parallel processor is best suited to the requirements of the meteorological community, and whether the very nature of these applications poses special problems in regard to architectures, topologies, memories and software.

The third workshop on the "Use of parallel processors in meteorology" that was held on 5-9 December 1988 at ECMWF, brought together meteorological users, computer scientists and computer manufacturers who addressed these questions, reviewed the state of the art, presented meteorological applications on parallel processors and assessed developments expected in the future.

Based on today's knowledge, it seems that conventional vector systems with shared memory and containing a small number of powerful processors still best meet the computational needs of numerical weather prediction. Highly parallel, distributed memory systems, on the other hand, provide economic advantages, as well as the possibility of adapting the number of processors and the topology to any particular problem. However, despite the development efforts in recent years, the technical problems in using massively parallel architectures remain. It is still difficult to distribute the work among the available processors efficiently. Acceptable solutions to the problem of communication between the processors and the transfer of data have not yet been developed, and the porting of existing applications from one architecture to another, and even between different topologies of the same machine, is a non-trivial task.

During the discussion on the last day of the workshop, the participants had the opportunity to review the presentations, put forward users' computational needs and expectations and discuss the manufacturers' development plans. They all agreed that it is desirable to develop systems which demonstrate good performance across a range of applications, and that it is imperative to design and implement good software tools as a part of a parallel programming environment.

In summary, the workshop was a stimulating event that benefited from the lively discussions and the wide range of viewpoints represented among the speakers and participants. Vector processors still seem to have an advantage, but future developments of massively parallel architectures should be monitored carefully.

It is planned that the proceedings will again be published in book form.

- Dimitris Maretis

* * * * * * * * * * * * 

## THE ECMWF ANNUAL SEMINAR

**4-8 September 1989**

Preliminary announcement

The 1989 ECMWF Seminar is entitled "Ten Years of Medium-Range Weather Forecasting". On the occasion of the 10th anniversary of operational forecasting at ECMWF, its aim is to provide, in a tutorial context, an overview of the present status of techniques and achievements in the various fields covered by the Centre's main activity. This includes the use and assimilation of meteorological data, techniques of numerical discretisation and physical parametrisation, the performance of current global forecasting models and applications of medium-range forecasting with, in addition,more insight into the problem of predictability of the atmosphere.

The format of the seminar will be the same as in previous years: formal lectures by invited speakers and staff from the Centre, followed by publication of the proceedings.

* * * * * * * * * * * *

## ECMWF CALENDAR

| | |
|---|---|
| 6-10 March | Workshop - Observation quality control procedures |
| 8-9 March | Finance Committee - 42nd session |
| 23(pm)-27 March | *ECMWF holiday* |
| 11-14 April | ECMWF Computer Representatives meeting |
| 17 April-16 June | Meteorological Training Courses |
| | Met 1 Numerical methods, data assimilation, adiabatic formulation of models (17 April-5 May) |
| | Met 2A Parametrization (8-19 May) |
| | Met 2B General circulation, systematic model errors & predictability (22-25 May) |
| | Met 3 Use & interpretation of ECMWF products (5-16 June) |
| 1 May | *ECMWF holiday* |
| 3-4 May | Council - 30th session |
| 8-12 May | Workshop - Use of satellite data |
| 26-29 May | *ECMWF holiday* |
| 18-19 July | Finance Committee - 43rd session |
| 28 August | *ECMWF holiday* |
| 4-8 September | Seminar - Ten years of medium-range forecasting |
| 25-27 September | Scientific Advisory Committee - 17th session |
| 27-29 September | Technical Advisory Committee - 14th session |
| 3-5 October | Finance Committee - 44th session |
| 29-30 November | Council - 31st session |
| 4-8 December | Second workshop - Meteorological operational systems |
| 25-27 December | *ECMWF holiday* |

* * * * * * * * * * * *

## ECMWF PUBLICATIONS

| | |
|---|---|
| WORKSHOP PROCEEDINGS: | Predictability in the medium and extended range 16-18 May 1989 |
| TECHNICAL MEMORANDUM No. 149: | Data assimilation and anomalous lows |
| TECHNICAL MEMORANDUM No. 150: | Design of variational analysis: organisation and main scientific points. Computation of the distance to the observations. |

* * * * * * * * * * * *

# 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.

* * * * * * * * * * * * *

* T indicates the original Technical Newsletter series

## USEFUL NAMES AND 'PHONE NUMBERS WITHIN ECMWF

| | | | Room* | Ext.** |
|---|---|---|---|---|
| Director | - | Lennart Bengtsson | OB 202 | 2001 |
| Head of Operations Department | - | Daniel Söderman | OB 010A | 2003 |
| ADVISORY OFFICE - Open 9-12, 14-17 daily | | | CB Hall | 2801 |
| Other methods of quick contact: | - | Telex (No. 847908) (Bleeper 139) | | |
| | - | Telefax (No. 869450) | | |
| | - | COMFILE (See Bulletin B1.5/1) | | |
| | - | VMS MAIL adressed to ADVISORY | | |
| Contact scientific and technical staff via | | VMS MAIL, addressed to surname | | |
| 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 )<br>Tape Requests ) | - | Tape Librarian | CB Hall | 2315 |
| Terminal Queries | - | Norman Wiggins | CB 028 | 2308 |
| Operations Section Head | - | Peter Gray | CB 023 | 2370 |
| Telecoms Fault Reporting | - | Michael O'Brien | CB 035 | 2306 |
| DOCUMENTATION | - | Pam Prior | OB 225 | 2384 |
| Distribution | - | Els Kooij-Connally | OB 316 | 2752 |
| LIBRARIES (ECLIB, NAG, CERN, etc.) | - | John Greenaway | OB 226 | 2385 |
| METEOROLOGICAL DIVISION | | | | |
| 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 | - | Taskin Tuna | OB 005 | 2424 |
| | - | Alan Radford | OB 002 | 2421 |
| | - | Alex Rubli | OB 003 | 2425 |
| Meteorological Operations Room | - | | CB Hall | 2426/2427 |
| COMPUTER DIVISION | | | | |
| Division Head | - | Geerd Hoffmann | OB 009A | 2050 |
| Operating Systems Section Head | - | Claus Hilberg | CB 018 | 2350 |
| User Support Section Head | - | Andrew Lea | OB 227 | 2380 |
| GRAPHICS GROUP | | | | |
| Group Leader | - | Jens Daabeck | OB 016 | 2375 |
| RESEARCH DEPARTMENT | | | | |
| Head of Research Department | - | David Burridge | OB 119A | 2005 |
| Computer Co-ordinator | - | David Dent | OB 123 | 2702 |

* CB - Computer Block
OB - Office Block

** The ECMWF telephone number is READING (0734) 876000, international +44 734 876000, or direct dial to (0734) 499 + last three digits of individual extension number.