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THE BASIC DATA SET PROJECT FOR GARP PLANNING

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INTRODUCTION

The planning of the Global Atmospheric Research Programme (GARP) established by the International Council of Scientific Unions (ICSU) and the World Meteorological Organization (WMO), calls for a series of numerical experiments, the major ones being to examine the relative behaviour of numerical models, investigate the properties of various observational systems and develop four dimensional assimilation techniques.

In order to define and coordinate the various numerical experiments required, the Joint GARP Organizing Committee (JOC) established a Working Group on Numerical Experimentation, and already at its first session (July, 1968) this group realized the need for global data sets as a basic tool for the experiments. Although some of these data sets could be obtained from general circulation simulations, it was considered indispensable to have real data obtained from actual atmospheric observations. On the basis of a plan prepared by the Joint Planning Staff for GARP (JPS), the JOC decided to initiate a project, the Basic Data Set Project, whose main objective would be to collect meteorological data from as many sources as possible in order to obtain the currently best possible global coverage. It was decided that data be collected for two months, November 1969 and June 1970, and that all this information be used for the preparation of global analyses to be presented in digital form as grid point values.

ORGANIZATION OF THE PROJECT

Observational Data

It was decided to base the collection of data on the routine surface and upper air observations that are globally exchanged over the operational telecommunication system. Observations not received through this system should be updated by mail. The Australian Bureau of Meteorology which operates the World Meteorological Centre (WMC) Melbourne accepted the responsibility for collecting data for the Southern Hemisphere, whilst the United States National Oceanic and Atmospheric Administration, which operates the WMC Washington, accepted the responsibility for the Northern Hemisphere data and for the final compilation of the data sets. The two centres would prepare lists of observations that were not received through the telecommunication channels and request these by mail from the responsible collecting centres or national services. All meteorological services of the world were notified through WMO and requested to ensure that their regular stations were operated with the highest efficiency and to contribute, if possible, with observations from temporarily established stations during the two periods of the project.

It was further realized that for areas south of 20°N, where the regular network is very sparse, an additional effort would be required in order to obtain as much data as possible. Special forms were therefore designed for obtaining additional observations from ships and aircraft and distributed to the shipping companies through WMO and to the airlines through the International Air Transport Association (IATA) or directly to those airlines that are not members of IATA. Furthermore, a great effort was made in order to obtain as much data as possible from satellites in the form of tracer-cloud winds, vertical temperature profiles, global cloud pictures, *etc*

Analyses

As it is difficult to present a truly global analysis on one map and as also the analysis technique for the tropics and the extratropics is different, it was decided to divide the analyses into 3 slightly overlapping areas, *ie:*

(i) The Northern Hemisphere from 20°N to 90°N

(ii) The Tropical Belt from 30°N to 30°S

(iii) The Southern Hemisphere from 20°S to 90°S

The WMC Melbourne and the WMC Washington accepted the responsibility for the Southern and Northern Hemisphere analyses respectively. For the Tropical Belt a special centre was established in San José in cooperation with the University of Costa Rica. In this way it was possible to profit from the existence of a WMO training centre at this University and obtain guidance and assistance from the experts attached to this centre. In addition to the tropical analyses the centre at the University of Costa Rica would also be responsible for the merging of the analyses in the overlapping areas 20° - 30°N and S.

EXECUTION OF THE PROJECT

The collection of data through the telecommunication channels proved to be rather incomplete for most of the areas south of 30°N; from Africa and South America, for example, less than 40 per cent of the scheduled upper-air observations reached the collecting centres. The response to the request for updating of the missing observations by mail was very good and, although rather time-consuming, it has been possible to retrieve, from selected data collection centres and national meteorological services, the major portion of the missing data. The basic data sets will thus include far more surface and upper-air observations than could be obtained on a routine basis.

The response to the request for additional observations from ships and aircraft was enthusiastic and about 1200 to 1500 observations per day were received from each of these two sources. Although very important, the usefulness of these observations is unfortunately not always directly proportional to their number as both the ships and the aircraft operate along rather narrow lanes and the observations therefore tend to cluster along these lanes, leaving vast ocean areas without any data at all.

A great amount of satellite data has been provided by the USA and has proved extremely useful in covering the above mentioned data sparse areas. Of particular importance were the tracer-cloud winds from ATS-I (covering the Pacific) and ATS-III (covering the Atlantic) and the vertical temperature profiles from NIMBUS-3 For the June period winds from ATS-III could unfortunately not be made available. Visible and IR cloud mosaics on appropriate chart scales and projections were provided for both periods and these have proved to be extremely useful as an aid in the analysis work.

The punching and compilation of the observational data for the November period is expected to be ready by the middle of 1971, while the June period is expected to be ready by the end of 1971.

The analysis work is progressing satisfactorily after a slow start mainly caused by the time taken to update the missing routine observations. The completion of the manual analyses for the tropics and the Southern Hemisphere is however a formidable task and as the merging and digitizing of these analyses have also proved time-consuming, highest priority has been given to the 0000 GMT charts, so that a complete series of analyses will be available as soon as possible. The 0000 GMT analyses for November are expected to be ready in digital form by the end of 1971 and those for June, early in 1972.

In addition to the digitized forms it is also envisaged that a selection of the analyses, including plotted data, will be published in chart form. For the Northern and Southern Hemispheres these will be surface and 500 mb and for the tropics 850 and 200 mb, which are expected to be ready early in 1972.

TYPE OF DATA THAT WILL BE AVAILABLE

The following summarizes the main types of data that are included in the Basic Data Sets.

Observational Data

(i) Routine synoptic surface observations from land stations.

- Received through the operational telecommunication channels
- Missing observations updated by mail.

Hours 0000, 0600, 1200 and 1800 GMT.

(ii) Routine upper-air observations (radiosonde, radiowind, pilot balloon) from land stations and ocean weather stations

- Received through the operational telecommunication channels
- Missing observations updated by mail.

Hours 0000, 0600, 1200 and 1800 GMT

(iii) Meteorological observations from ships

- Routine synoptic surface observations received through the operational telecommunication channels
- Copies of routine observations not transmitted to coastal radio stations, received by mail.

- Special observations from ships not taking part in the regular ship observing programme, received by mail.

  Hours: 0000, 0600, 1200 and 1800 GMT

(iv) Meteorological observations from aircraft

- Routine AIREPS exchanged through operational telecommunication channels
- Special observations received by mail.

  Hours: Asynoptic

(v) Tracer-cloud winds from USA geostationary satellites ATS-I and ATS-III. Three levels (1000, 850 and 200 mb), received by mail.

  Areas covered: Circle with radius 5000 km centred at the equator at 150°W and 50°W respectively.

  Hours: Asynoptic.

(vi) SIRS vertical temperature profiles (for the Southern Hemisphere over ocean areas only), received by mail.

  Hours: Asynoptic.

Analyses

(i) Surface analyses showing isobars, isotherms, fronts and zones of convergence

  Hours 0000 and 1200 GMT

(ii) Upper-air analyses showing contours and isotherms for the Northern and Southern Hemispheres 20° - 90°; streamlines and isotachs for the tropics 30°S - 30°N.

  Levels: 1000, 850, 500 and 200 mb*

  Hours: 0000 and 1200 GMT

  The upper-air analyses will be presented as grid point values using the NMC Washington octagonal grid (grid size 381 km at 60°) for the Northern and Southern Hemispheres and a latitude and longitude parallel grid (grid size 3° by 3°) for the Tropical Belt.

HOW THE DATA CAN BE OBTAINED

All the data to be included in the Basic Data Sets are now being compiled at the WMC Washington and will be placed on standard, 7 track, 1/2 inch, magnetic tape. The WMC Washington and the WMC Melbourne and most probably also the WMC Moscow, will hold the Basic Data Sets, and provide data to interested users on request, at cost price, *ie* the cost of the technical carriers and the cost of placing the requested data on the carriers.

* Note: For the Northern Hemisphere the following additional levels will be available: 700, 400, 300, 250, 150 and 100 mb.

A comprehensive report on the Basic Data Set Project for GARP Planning, including detailed information on the type, distribution and format of all data available as well as the address from where they can be obtained, will be published when the whole project is nearing its completion, probably during the last half of 1971. The report will appear in the GARP Publication Series and will be widely distributed amongst the international scientific community as well as to National Meteorological Services.