cannot concentrate on a regional area. On the other hand a regional analyst is often pressed with warning or other duties but may have the advantage of local experience or forecasting aids. Furthermore, as the latter gives higher priority to the precise placement of fronts or troughlines rather than to a pressure distribution a comparison of local and central products based on a pressure distribution may not be entirely appropriate. Nevertheless Fig. 4 attempts to provide an answer. A comparison is made between the 24-hour manual MSL prognosis issued at 00 GMT by NMAC in May-July 1979 with that issued by Perth RFC issued about 04 GMT. The latter incorporates data 3 hours more recent including on some occasions more recent drifting buoy data and a later GMS picture; the local analyst also has the advantage of having inspected the central product using this either as his 'first guess' or as a second opinion.

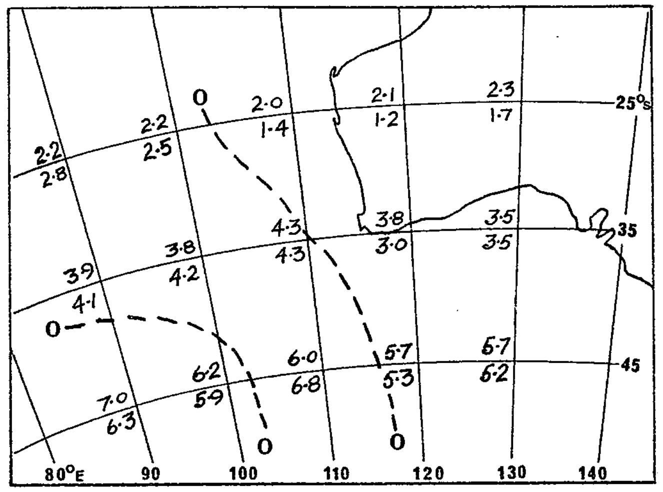

Figure 4. Mean daily prognosis errors (mb) May to July 1979 by NMAC (above line) and Perth RFC (below line) - see text.

Fig. 4 shows that the Perth RFC reduced the prognosis error of Melbourne NMAC east of long. 110°E whereas west of long. 110°E the central product appeared marginally superior with the exception of the far southwest of the area. The Melbourne NMAC manual analysis and not the Perth RFC analysis was used for the verification which could be said to slightly favour the apparent performance of the former product. It should be noted that a selection of buoy data received in NMAC is subsequently transmitted to Perth RFC and other Regional Offices, after decoding, for incorporation in regional analyses. However staff and communication difficulties sometimes affect this procedure. In general NMAC has earlier use of a more comprehensive buoy data network than the region.

The evidence suggests that the Perth RFC prognosis is a little superior to that of NMAC in the WA Region. In practice, the discussion which evolves between the two offices probably enhances both products.

5. SUMMARY

(a) Verification of 24-hour MSL prognoses prepared manually by NMAC, Melbourne, during May to July 1978 and 1979 shows that the availability of drifting buoy data during 1979 has apparently contributed to a noticeable reduction in mean daily errors and the number of unacceptable errors (measured at 10° grid points) over the southwest of Australia and adjacent ocean areas.

This result has been achieved despite a higher natural pressure variability, or mobility of pressure systems, during 1979 - which may have accounted for the greater extreme errors at numerous grid points.

(b) This improvement in prognosis did not apply in the western higher-latitude sections of the area under test and where numerous buoys were located : it is possible that the rate of low pressure development and recovery measured in 1979 for the first time, but undetected in 1978 and earlier years, may have contributed to this result.

(c) The 24-hour MSL prognoses prepared manually by Perth RFC, 3 hours later than the NMAC product, showed an additional improvement over the latter near and over the continent thus further enhancing the usefulness of the buoy data.

(d) The introduction of this important component of the Global Weather Experiment should contribute to improved skill in weather forecasting in Western Australia and higher confidence in prediction of significant synoptic events.

THE IMPACT OF FGGE ON FORECASTING IN THE VICTORIAN REGION

R.A. Hicks, R.J. Keith, and H. Stern

Victorian Regional Office,
Bureau of Meteorology,
Melbourne, Australia

1. INTRODUCTION

Since the beginning of 1979, operational meteorologists have received considerable data, hitherto not available, as a result of the First Garp Global Experiment (FGGE). The purpose of presenting this paper is to outline what forecasters in the Victorian Regional Forecasting Centre consider has been the impact of FGGE on services provided by the Centre.

2. METHOD OF ANALYSIS

The authors have examined additional data made available as a result of FGGE. In examining these data, consideration was given to the impact the data had on forecasts.

Examples of synoptic situations where FGGE data <u>may</u> have had an impact on the forecast are now presented. The authors recognise that it is not possible to say with certainty what forecast the duty meteorologist would have issued without the FGGE data.

3. EXAMPLES

3.1 2 June 1979

At 0300 EST a 'cut-off' low was located over the northeast Tasman Sea. A ridge of high pressure extended from an anticyclone near Tasmania to the south of New Zealand. Buoy data indicated that the ridge to the south of New Zealand was not as strong as it had been thought to be. It was then realised that the synoptic pattern was not particularly involuted. The anticyclone was therefore expected to move steadily eastward. Fog areas were forming in the Melbourne metropolitan area at the time of issue of the 0515 EST forecast. In view of the expected movement of the anticyclone, the situation was not considered favourable for persistent fog and the official prediction was for the areas of fog to clear fairly early in the day. The forecast proved to be successful.

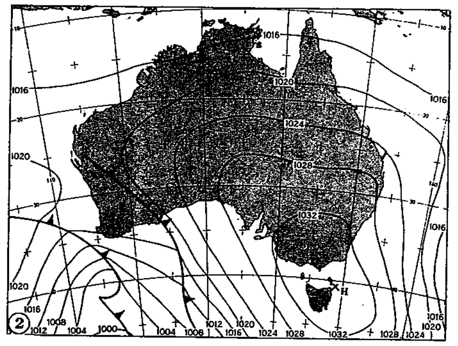

Figure 1. Mean sea level pressure analysis for 0900 EST 2 June 1979.

3.2 4 June 1979

At 0300 EST a trough of low pressure was amplifying over waters to the south of the Bight. An anticyclone was centred over the Tasman Sea. Buoy data indicated that the trough was 'cutting-off' - MSL pressures over waters to the south of the Bight in the area of 45°S to 50°S were shown by the data to be substantially higher than had been indicated on previous analyses. The area of low pressure was therefore expected to be slow moving and dry weather was predicted in the 'Outlook' section of the 0530 EST Regional Forecasts. This prediction proved to be satisfactory. Buoy data enabled the area of high pressure to the south of the Bight to be monitored for the succeeding few days.

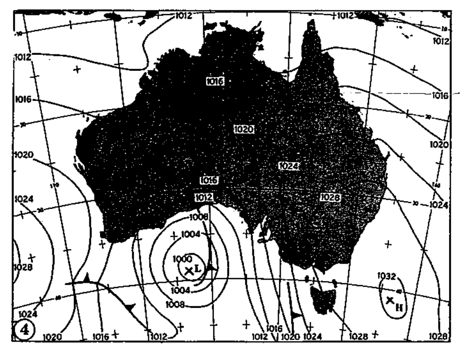

Figure 2. Mean sea level pressure analysis for 0900 EST 4 June 1979.

3.3 13 June 1979

At 0300 EST a cold front was approaching western Victoria while another front was moving across waters to the south of Western Australia. Buoy data indicated that the front to the south of Western Australia was much stronger than had been thought. As a result, the 0515 EST official forecast reflected the duty meteorologist's view that the presence of a strong front to the south of Western Australia would reduce the impact of the one approaching Victoria. The forecast was quite reasonable.

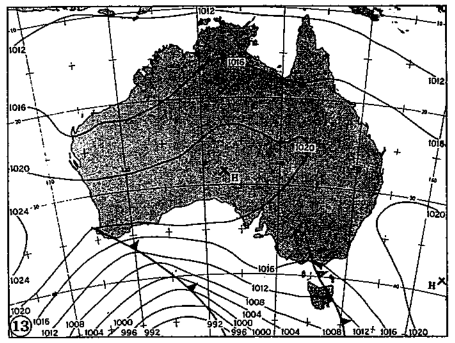

Figure 3. Mean sea level pressure analysis for 0900 EST 13 June 1979.

3.4 26-27 June 1979

At 0600 EST 26 June 1979, a weak frontal system was analysed over waters to the south of the Bight. Two buoy reports in the vicinity of the front showed that there was a tight gradient in the northwesterly stream ahead of the front and, more importantly for Victorian forecasters, that the frontal system was stronger than had been previously analysed.

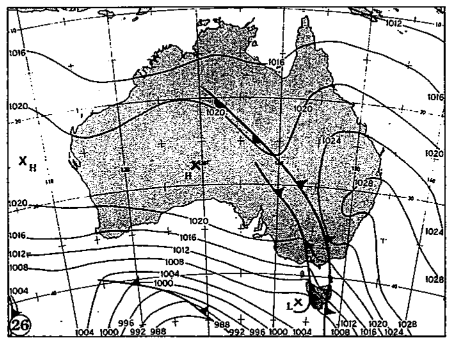

Figure 4. Mean sea level pressure analysis for 0900 EST 26 June 1979.

The following day, a ship to the west of the front at 39°S (not a FGGE ship) reported MSL pressure significantly higher than had been thought, a southerly wind, and a particularly low temperature (9°C). This information, combined with the knowledge that the system had been fairly strong at the surface, suggested to forecasters that the cold trough in the wake of the front was amplifying and fairly intense. As a result, a 'cold outbreak' was forecast for the State. The forecast proved to be correct.

Incidentally, the ship's 0400 EST, 1000 EST, and 1600 EST observations on the 27th all were received at the Forecasting Centre at 1700 EST on that day. Had the 0400 EST observation been timely and available for the 0515 EST forecast issue, a full 24-30 hours warning of the 'outbreak' could have been given.

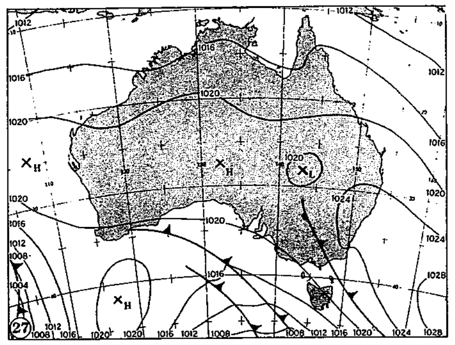

Figure 5. Mean sea level pressure analysis for 0900 EST 27 June 1979.

4. CONCLUSION

It is concluded that FGGE has had a positive impact on services provided by the Victorian Regional Forecasting Centre. In particular, 'real time' data provided by the Southern Hemisphere Drifting Buoy system led to more accurate specification of synoptic scale systems over the data sparse regions to the south and southwest of the Australian continent. This, on a number of occasions increased the quality of forecasts provided by the centre.

THE EFFECT OF DRIFTING BUOY DATA ON THE FORECASTING PROCESS AT THE HOBART REGIONAL FORECASTING CENTRE

Stephen F. Pendlebury

Bureau of Meteorology,
Hobart, Australia

1. INTRODUCTION

This paper describes the way in which the First GARP Global Experiment (FGGE) drifting buoy data have been utilized in the Hobart Regional Forecasting Centre (RFC) - particular emphasis is directed to the impact of the data on operational forecasting. Four case studies are presented in which it is considered that the buoy data made a significant contribution to the timeliness and accuracy of the forecasts.

2. DATA MANAGEMENT

Buoy observations have been received at the Hobart RFC regularly since 12 March 1979. On receipt, the observations are plotted on either, the RFC operational mean sea level (MSL) analysis chart or, on a suitable analysis received from the National Meteorological Analysis Centre (NMAC) Melbourne, depending on the geographical location of the data. The area of interest is bounded by latitudes 30 and 65 degrees south, and longitudes 80 to 180 degrees east.

3. TIMELINESS OF DATA

The data are rarely available for immediate real-time use and are usually received some four to eight hours after observation time. Data received up to about six hours after observation time are of most use. However, older data, even up to twenty-four hours old, still find use in indicating isallabaric trends, and in post analysis.

4. USE OF DATA

4.1 MSL analyses

The data are used primarily to maintain or improve the accuracy of MSL analyses. In operational practice the analyses are adjusted to fit the buoy data, bearing in mind the necessity to maintain continuity wherever possible. Such adjustments occur daily and are generally in the order of two to five millibars.

4.2 Upper air analyses

The increased accuracy of the MSL analyses is reflected in improved estimates of geopotential heights for other pressure levels. The 850, 700, 500 and 300 millibar (mb) levels are analysed routinely in the RFC.

The method used to compute these heights is similar to that described by Guymer (1978), however, the thicknesses between standard pressure levels are obtained, wherever possible, from vertical temperature profile radiometer (VTPR) satellite data.

This method is subject to various inherent errors, not the least of which is the error associated with specification of the MSL pressure: for example, an error of ten millibars at the surface will lead to an error of about eight dekametres at other levels. Hence the buoy data can assist in eliminating, or at least reducing, this source of error.

5. EFFECTS OF FORECASTS

5.1 Qualitative

It is well recognised that analysis is one of the essential steps in the weather forecasting operation, and that analysis, prognosis, and forecasting, are interdependant (refer for example, Phillpot 1979). This author would contend that, chance aside, this interdependence is such that a poor analysis will lead to a poor prognosis.

It should therefore follow that the regular adjustments to MSL analyses, described earlier, would lead to an improvement in prognoses and this should, given a good understanding of the conditions producing the actual weather, lead to improved forecasts. Unfortunately, it has not been possible to test this hypothesis in the Hobart RFC due to the difficulties in conducting a controlled experiment under operational conditions.

There can be no doubt however, that through their contribution to improved analyses, the buoy observations are having beneficial effect operationally. Perusal of explanatory notes accompanying the NMAC Australian region MSL prognoses indicates, for example, that on at least twenty-seven occasions between January and August inclusive, the prognostician thought the data sufficiently significant to comment publicly. On a few occasions these notes implied that the lack of buoy data had reduced