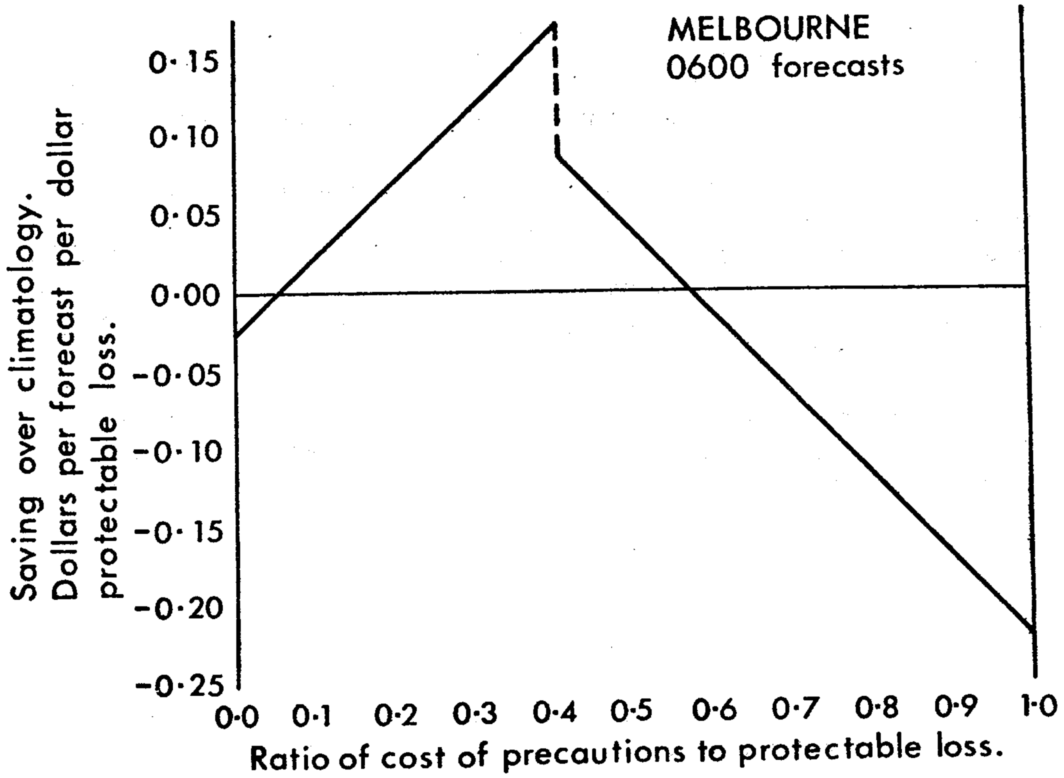
$$S_1 = \frac{(a+c)}{N}\,\frac{C}{L} - \frac{c}{N}\text{, when } P_c > C/L$$

or

$$S_2 = -\frac{(b+d)}{N}\,\frac{C}{L} + \frac{d}{N}\text{, when } P_c < C/L$$

Graphs of S_1 and S_2 as functions of C/L will be presented for the cities listed above. As an example, the graph for Melbourne's 6.00 a.m. forecast is shown below. It is found that in most cases if a uniform distribution of C/L over the set of forecast users is assumed then the average "saving over climatology" over this set is negative. It is arguable that the community as a whole might be better off ignoring the Bureau's forecasts of rain and making decisions on the basis of local climatological expectancy. The merits of probabilistic forecasts will be briefly discussed in this context.



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TRENDS IN THE ACCURACY OF AUSTRALIAN TEMPERATURE FORECASTS

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Many sections of the community are interested in quantitative forecasts of temperature. Examples are:

- manufacturers, distributors and caterers of perishable foodstuffs;
- electricity and gas suppliers;
- fire prevention authorities;
- fruit growers; and,
- the general public.

It is suggested that an increase in the accuracy of the predictions would be reflected in an increase in their value to the user.

Australian temperature forecast verification data are analysed with a view to establishing the existence or otherwise of trends in the accuracy of the predictions. The data examined are for late afternoon forecasts of the next day's maximum and minimum temperatures issued to the public of the six Australian State Capitals and cover the period 1964 to 1977 inclusive. Fig. 1 depicts five year running means of the absolute and square errors of the forecasts.

Forecast accuracy is a function of both forecasting skill and forecast difficulty. Hence, year to year fluctuations and long term trends in the accuracy of temperature predictions may be entirely due to variations in the level of difficulty associated with the prediction of that element.

The relationship between forecast accuracy (A), forecast difficulty (D), and time (T) is assumed to be linear and of the form

$A = C_0 + C_1D + C_2T$ where C_0, C_1, and C_2 are constants.

Temperature forecast errors increase with increasing temperature variability. The mean square inter-diurnal change in temperature (MSI) is therefore selected to represent forecast difficulty. The mean square error of the predictions (MSE) is considered to be a suitable measure of forecast accuracy. For each of the fourteen years from 1964, T is set equal to (Year - 1964), A is set equal to the annual MSE ($°C^2$), and D is set equal to the annual MSI ($°C^2$). The constants C_0, C_1, and C_2 are then found by regression analysis to be respectively +2.6997, +0.2226 and -0.0211.

Using the 't' distribution it is found by means of a two-tail test that the partial regression coefficient C_2 is significant at the 95% level, that is, the probability of the modulus of C_2 being as large as, or larger than, 0.0211 by chance is less than 0.05. It is therefore concluded that the overall skill displayed by late afternoon predictions of the next day's temperatures increased, on the average, over the period 1964 to 1977.

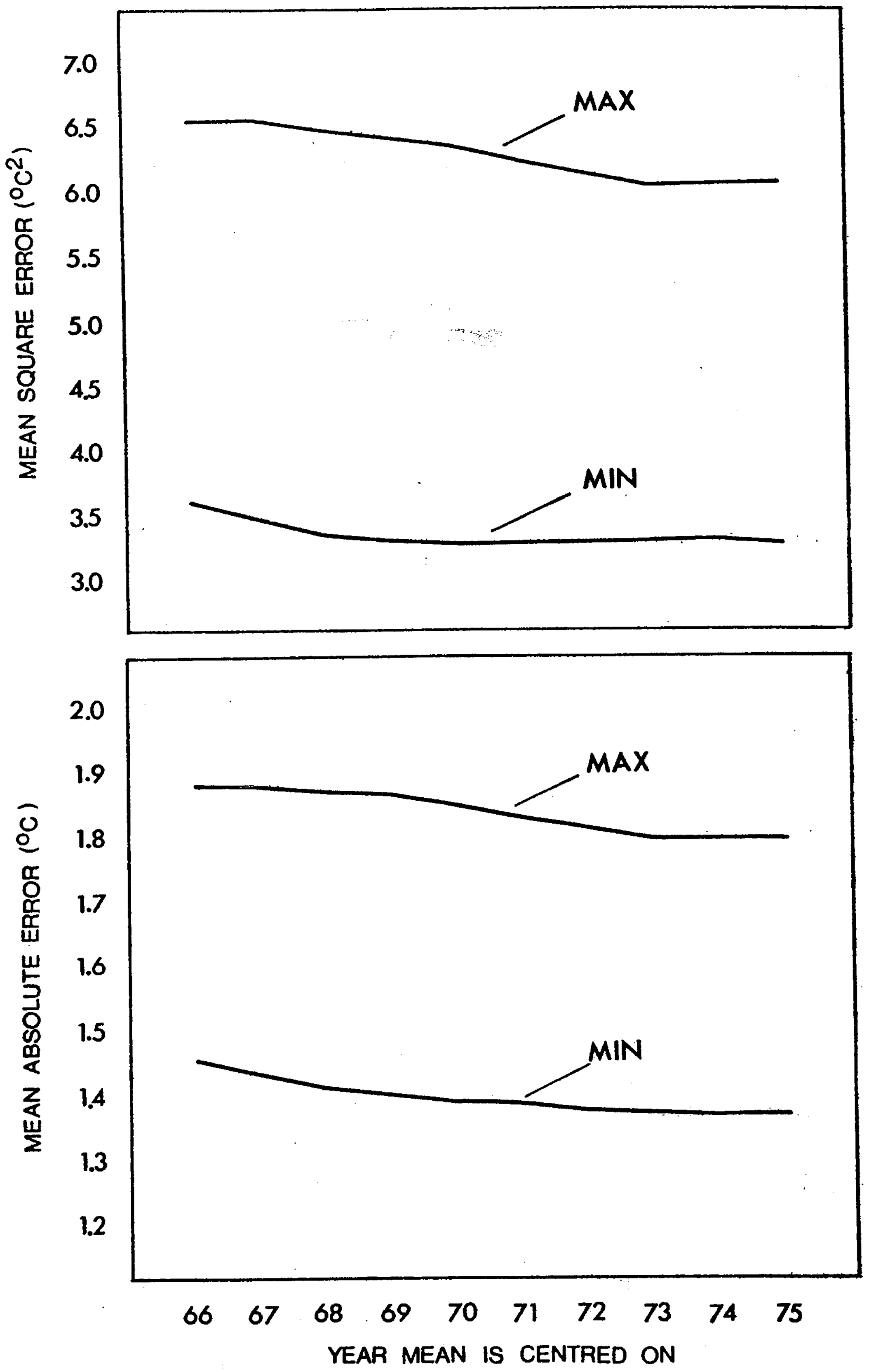

Fig. 1 Trends in the accuracy of late afternoon forecasts of the next day's maximum and minimum temperatures at the six Australian State Capitals.
Top - Five year running means (1:1:1:1:1) of the square errors of the predictions.
Bottom - Five year running means (1:1:1:1:1) of the absolute errors of the predictions.

THE DEMAND FOR CLIMATOLOGICAL DATA

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Statistics released by the Bureau of Meteorology (Annual Reports) on the number of forecasts issued each year attest to the implicit demand for short-term weather forecasts. While it is somewhat more difficult to assess the explicit demand and hence the value placed on the forecasts, it is probably fair to say that the demand is real. The value or true worth of such forecasts is no doubt a subject for discussion elsewhere in this Conference.

There are, however, other services provided by the Bureau of Meteorology apart from weather forecasting. The provision of climatological data as carried out by the Bureau is briefly surveyed in this presentation.

According to the annual reports mentioned above, the number of job requests for climatic data received by the Bureau's Meteorological Information Services Section (MISS) rose from about 600 in 1961 to nearly 9000 in 1975 and slipped back to around 5000 in 1978. These job requests are made up of three classes:

		Figures for 1978
(a)	Standing or routine - Manual and Computer Processing	329
(b)	Ad Hoc Manual	3772
(c)	Ad Hoc Computer Processing	1045

The above numbers include requests received by MISS from the Bureau's Regional Offices and also the Bureau's Head Office Sections. In the following discussions these requests are not considered since it was not possible to follow up and identify for this brief survey the ultimate 'customer'.

In addition, the Regional Offices are equipped to handle a great number of the simpler requests for data without recourse to MISS. As such this survey is identifying probably only a fraction of the Bureau's users of the data service as a whole.

STANDING OR ROUTINE REQUESTS

The number of separate requests for the routine processing of climatological data directly by MISS is surprisingly small, amounting to around 30 external users plus a smaller number from Regional Offices and Head Office Sections.