

A FURTHER NOTE ON THE SEA WATER TEMPERATURES AT MACQUARIE ISLAND

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In Australian Meteorological Magazine No. 19 of December 1957 a report was given about sea water temperatures taken at Macquarie Island during 1912-15 and 1951-54. Since then daily morning observations of sea temperatures have been taken at the same location for almost four more years, 1957 and 1962-64. All observations were taken in Buckles Bay, on the eastern side of the northern end of the island, three to six inches below the surface and about three feet from the shore. The nearness of the shore and the shallowness of the water might occasionally render the observations unrepresentative, particularly with calm conditions and sunshine. But at Macquarie calms occur during the daily observations only three to four times in a year (Phillpot, 1967) and even winds of less than 5 knots only 15 to 16 times (ANARE). The sun is not likely to shine during the observations more than 3 to 4 times in a month. The combination of a calm or a very feeble wind with prolonged sunshine which could falsify the observations substantially, will be extremely rare. The observations also fit reasonably well with oceanic temperatures in the region mainly derived from other sources (Atlas Antarktiki, 1966). Moreover, the following discussion deals mainly with deviations from the means, and the absolute values of the temperatures are of minor importance. It appears, therefore, unlikely that the results are in any important way affected by eventual minor unrepresentativeness of the data. The mean temperatures for this period and for all observations, altogether 10-11 years, are given in Table 1.

Table 1. Mean Monthly Sea Temperatures at Macquarie Island

(a) 1957, 1962-64 (b) all observations

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
(a)	<u>44.6</u>	44.1	42.9	41.9	40.4	<u>39.6</u>	<u>39.6</u>	<u>39.6</u>	39.9	40.3	41.8	(41.8)	41.4
(b)	<u>44.4</u>	43.8	42.8	41.7	40.0	38.9	<u>38.7</u>	<u>38.7</u>	39.1	39.4	41.5	43.2	41.0

It had been found that from 1913 to 1952 the summer temperatures had significantly risen. The new values centred around 1962 give the same annual mean as those of 1952. But the range between summer and winter has markedly diminished. The December value of the new series results from only two first halves of the month and is probably too low. The extreme daily readings are 48.8°F and 36.0°F.

The close connection between the deviations of the mean monthly temperatures of water and air has been maintained. The 36 new means give a correlation coefficient of +0.64. The standard mean deviation of the monthly means is for sea water 0.74°F, for the air 0.93°F. As expected, the correlation between the water temperature at Macquarie Island and the air temperature at Campbell Island is high; the 15 seasonal means between 1953 and 1964 give a correlation coefficient of +0.63.

It has repeatedly been suggested (literature in Arousseau (1958)) that the temperature variations of the southern ocean might give a hint concerning conditions at a later time in the inhabited parts of the southern lands. In the earlier series the seasonal water temperatures at Macquarie gave no significant correlation with simultaneous or subsequent air temperatures in

southern Tasmania or New Zealand. In the new series a slight parallelism exists between the nine seasonal water temperatures at Macquarie Is. and the simultaneous and immediately following seasonal air temperatures at Hobart and Invercargill. The correlations are of the order of +0.50 to +0.55. They are too small for any practical application and are moreover not more significant than the positive correlation between the temperature deviations of subsequent seasons at Hobart. The correlation between the 31 seasonal temperatures of the sea at Macquarie Is. and the simultaneous rainfall at Hobart is only +0.34. The correlation with the subsequent rainfall season at Hobart is even smaller. It thus appears unlikely that the sea water temperatures near the Antarctic Convergence can be of appreciable help in medium-scale forecasting in Australia.

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