NEW ZEALAND METEOROLOGICAL OFFICE CIRCULAR NOTE No 6

TEMPERATURE FORECASTING BY MEANS OF THE TEPHIGRAM

By
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The tables below constitute an adaption for New Zealand conditions of the corresponding tables in "Maximum Temperatures and the Tephigram" by E. Gold (M.O. Professional Notes No 63). Several quantities involved in the necessary equations are known only within wide limits; round numbers have therefore been retained in the approximations. Small refinements included by M. Neinburger in his calculations for Washington and Chicago ("Insolation and the Prediction of Maximum Temperatures, "B.A.M.S, Vol. 22, No. 3, March 1941) have not been considered necessary in an approximation of this type. These calculations have been made for latitude 40°S, i.e. for the Nelson-Wellington-Ohakea region:-

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Jan.	1020	9½	110	140	65	100	3·0	180	355	155
Feb.	860	9	100	120	55	85	3·0	180	330	100
Mar.	670	8	80	100	50	65	2·5	150	265	70
Apr.	500	7½	70	85	40	50	1·5	90	185	65
May	400	7	60	80	35	35	1·0	60	140	60
June	300	6½	50	65	30	30	0·7	40	105	45
July	340	6½	50	65	30	35	0·7	40	110	60
Aug.	450	7	60	80	35	45	1·0	60	150	75
Sept.	650	8	70	90	45	65	1·5	90	200	125
Oct.	860	9	100	120	55	85	2·5	150	300	130
Nov.	1000	9½	110	140	60	100	3·0	180	360	140
Dec.	1030	10	110	140	65	100	3·0	180	355	160

	(11)	(12)	(13)	(14)	(15)
Jan.	7·8	120	3500	10½	19
Feb.	5·0	100	2800	8½	15
Mar.	3·5	80	2300	7	13
Apr.	3·3	75	2200	6½	12
May	3·0	70	2200	6½	12
June	2·3	65	1900	5½	10
July	3·0	70	2200	6½	12
Aug.	3·8	85	2400	7½	13
Sept.	6·3	110	3100	9½	17
Oct.	6·5	115	3200	9½	18
Nov.	7·0	115	3300	10	18
Dec.	8·0	125	3500	10½	19

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(1) Approx. amount of solar radiation in gm. cal./sq.cm. received in one day near the middle of each month.

(2) No. of hours during which radiative processes considered to act, i.e., 1 hour after sunrise until 3 p.m.

(3) Assumed temperature (°F) of radiating surface of earth.

(4) Radiation from earth's surface (gm.cal/sq.cm).

(5) Diffuse short-wave radiation from sky (gm.cal./sq.cm).

(6) Reflected solar radiation (gm.cal/sq.cm).

(7) Estimated amount of evaporation (mm) during portion of day considered.

(8) Heat used in effecting evaporation (gm.cal/sq.cm).

(9) Total of (4) + (6) + (8) - (5) in gm.cal/sq.cm.

(10) Nett available energy in gm.cal/sq.cm. = $\frac{1}{2}$ (1) - (9)

(11) Corresponding area (sq.cm) on Tephigram in use at Wellington (based on U.S.W.B. Form 1125 Aer.)

(12) Thickness of layer (in mb.) which would be changed from isothermal to adiabatic state during day.

(13) Thickness of same layer in feet.

(14) Rise in temperature at surface (°C) corresponding to (12)

(15) Rise in temperature at surface (°F) corresponding to (12)

Column (11) gives the areas in sq.cm. included between the initial and final pressure-temperature curves under favourable conditions. It should be noted that an early morning surface inversion may allow a greater daily range of temperature than that indicated in Columns (14) and (15).

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