placed on IBM punched cards and are on file in the Data Processing Section of the Meteorological Branch, Toronto. Data from other levels have been abstracted in part but are not on punched cards. In particular, the $(T_{40} - T_{6.4})$ differences are questionable despite the calibration in 1960.

The diurnal temperature difference pattern

Fig. 2 shows average hourly temperature differences between 100 ft. and 6.4 ft. for each month of the year. The period of record is from August 1957 to February 1961, inclusive. Curves for sunrise and sunset have been added for reference.

An inversion (defined as a rise of temperature with height) is usual during the hours of darkness, or when the sun is just above the horizon. At such times heat is being transferred from the 100-ft. level down to the 6.4-ft. level by the exchange processes of radiation, turbulence, and conduction.

When the sun is well above the horizon, temperature usually falls with increasing height. In June and July, for example, there were 17 hours daily of negative temperature differences, as can be seen in Fig. 2. Heat is then being propagated upward, largely by turbulent mixing.

In April, May, and June there is a distortion in mid-afternoon of the isopleths in Fig. 2. The phenomenon is believed to be real, although no satisfactory explanation has been put forward.

Conclusion

A detailed inversion climatology of Resolute is being prepared by Mr. D. Champ of the Meteorological Branch. The present note is only preliminary but it does illustrate the diurnal and seasonal character of the vertical temperature gradient near the ground.

It should be added that inversions are of importance in atmospheric pollution studies. The natural cleansing capacity of the air is reduced on such occasions and high concentrations of smoke and waste gases may develop. An inversion that persists for 2 to 3 days is a rare event in temperate latitudes. However, spells of 2 to 3 weeks are to be expected during the arctic winter. It follows that when industrial activity expands northward, careful consideration will have to be given to the control of air pollution.

R. E. MUNN

A THERMOGRAPH FOR USE IN THE ARCTIC*

An instrument has been designed to obtain records of long-term temperature variation of the permafrost in the Arctic. The device is portable, battery operated, and will record temperatures at six points for approximately 4 minutes at each point. It records the data twice during a pre-selected hour every day and can be left unattended for about 8 months. It has four temperature ranges between −25°C. and +25°C. and any range can be selected according to the soil temperatures. The complete unit is shown in Fig. 1.

Description:

The general principles of the thermograph, using a thermistor in a wheatstone bridge network, have been outlined by McLean[1]. The unit consists mainly of four parts: (1) a twenty-four hour timing motor and half-hour cycling motor with cams and micro-switches; (2) bridge network with calibrated potentiometer, operation selector switch, and temperature range switch; (3) recorder; (4) battery. Power to the circuit is provided by a 6-v., 30-amp.-hr. nickel-cadmium battery. A 100 microampere galvanometric recorder is used to record the values. A power switch applies battery voltage to the 24-hour timing motor, half-hour cycling motor, recorder motor, and to the bridge circuits. A manual timer switch is provided to operate the unit on a continuous basis ('off' position) or

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1-hour-per-day basis ('on' position).

On the continuous basis, the unit will record temperature for a period of 240 hours without appreciable battery drift and therefore without the need for recalibration. On the 1-hour-per-day basis, the unit will record temperatures for 240 days without appreciable battery drift. The 1-hour temperature recording period is controlled by a continuous timing motor which activates the half-hour cycling motor, the recorder motor, and the bridge circuit. At the end of the 1-hour temperature recording period, the chart drive is allowed to operate for a short period to provide space between daily recordings.

Four temperature ranges −25°C. to −5°C., −15°C. to +5°C., −5°C. to +15°C., and −25°C. to +25°C. are provided by four bridge circuits. The temperature range switch is used to select one of the four ranges, depending upon the permafrost temperature range.

The operation selector switch performs one of the following functions:

Position 1. Calibrate, a resistance equal to that of a thermistor to give full-scale deflection of the recorder is substituted for a thermistor. The recorder pen is set at 100 scale divisions by adjusting the battery voltage to the bridge. This is achieved by a ten-turn potentiometer, acting as a calibrating control.

Position 2. Automatic thermistor selection, all six thermistors and a calibration resistance for the required range are automatically selected for each operation of the half-hour cycling motor. This cycle is repeated every half-hour of the operation. In the 'on' position of the manual timer switch, two cycles of half-hour period are made every day. Each thermistor therefore gives the values for 4 minutes and 17 seconds, which is longer than the time constant of the thermistor.

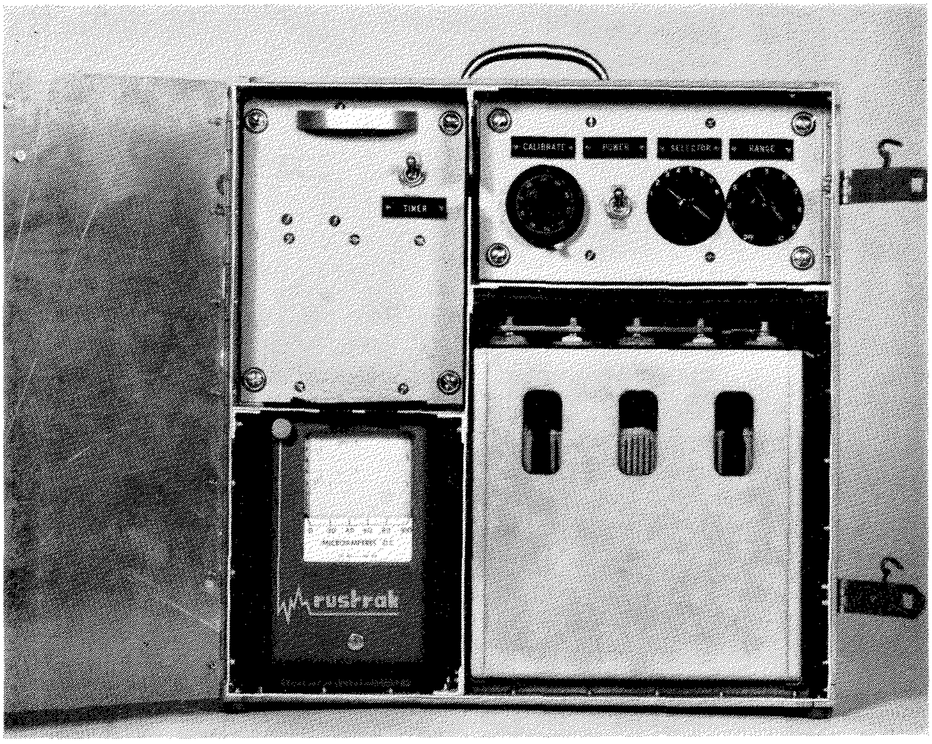

Fig. 1. Front view of thermograph.

Positions 3 to 8. Manual thermistor selection, one of the six thermistors can be selected to monitor separately and is activated for each thirty-minute operation of the half-hour cycling motor.

The accuracy of temperature measurement is 2 per cent of the range. The overall accuracy of time recording is about 3 per cent. The thermograph is housed in an aluminum case and weighs approximately 40 lbs.

For use by geographers who are interested in long-term temperature variation of the permafrost, the timer should be set at the 'on' position and the selector switch should be set at position 2 for obtaining readings at six depths. The instrument can be modified to run unattended for one year and with at least ten thermistors in the circuit. Construction parts and details are available from the Engineering Research Service, Canada Department of Agriculture, Central Experimental Farm, Ottawa, Canada.

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[1]McLean, J. A. 1954. A method of constructing direct reading thermistor thermometer. J. Sci. Instrum. 31:455.

SOME SOIL-INHABITING, FRESHWATER, AND PLANT-PARASITIC NEMATODES FROM THE CANADIAN ARCTIC AND ALASKA†

Canadian Arctic Expedition collection

From 1915 to 16 a nematode collection was made by a member of the Stefansson Expedition in the Canadian Arctic and Alaska. Soil and freshwater samples were taken from Depression Point, Pihumalerksiak Island, Cockburn Point, Bernard Harbour, Cape Bathurst, and Herschel Island in the Canadian Arctic, and from Demarcation Point, Spy Island, Collinson Point, and Teller in Alaska.

The nematode collection was sent for identification to the late Dr. N. A. Cobb, a nematologist, who at that time was employed by the Bureau of Plant Industry, United States Department of Agriculture. Dr. Cobb did not publish a detailed report on the results of his identifications. In 1954, through the courtesy of Dr. F. J. Alcock, then Chief Curator, National Museum of Canada, the Canadian Arctic Expedition collection of nematodes was deposited with the Canadian National Collection of Nematodes, Nematology Section, Entomology Research Institute, Ottawa. The collection, which consists of some 7,500 specimens mounted on Cobb slides, has deteriorated badly.

Dr. Cobb's notes, which accompanied the collection, contained identifications of specimens as follows:

TYLENCHIDAE	
Tylenchus	3 spp.
APHELENCHIDAE	
Aphelenchus	1 sp.
MONONCHIDAE	
Prionchulus	2 spp.
Mononchus	1 sp.
DORYLAIMIDAE	
Dorylaimus	7 spp.
ACTINOLAIMIDAE	
Actinolaimus	1 sp.
PLECTIDAE	
Plectus	5 spp.
Rhabdolaimus	1 sp.
ONCHOLAIMIDAE	
Oncholaimus	1 sp.
AXONOLAIMIDAE	
Cylindrolaimus	1 sp.
MONHYSTERIDAE	
Monhystera	7 spp.
CHROMADORIDAE	
Chromadora	2 spp.
Euchromadora	1 sp.
Hypodontolaimus	1 sp.
CYATHOLAIMIDAE	
Ethmolaimus	2 spp.
Achromadora	2 spp.

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†An investigation associated with the program studies on Arctic insects, Entomology Research Institute, Canada Department of Agriculture (Paper No. 3).