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D. A. Leckie et S. B. McCann

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Résumé de l'article

On trouve présentement des sols structurés à petite échelle en formation sur la côte sud de Terre-Neuve. De petits cercles et des traînées minérales se développent près de la côte sous l'influence du climat maritime, caractérisé par plusieurs cycles de gel-dégel, une humidité relative élevée, des pluies abondantes et une mince couverture de neige, pendant l'hiver. À l'intérieur des terres, à 15-25 km de la côte tout au plus, l'influence maritime est suffisamment amoindrie pour qu'il n'y ait plus formation de sols structurés.

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Note

ACTIVE, SMALL-SCALE, PERIGLACIAL FEATURES ON THE SOUTH COAST OF NEWFOUNDLAND

D.A. LECKIE* and S.B. McCANN, Department of Geography, McMaster University, Hamilton, Ontario L8S 4M1.

ABSTRACT Small-scale, patterned ground is currently forming on the south coast of Newfoundland. Small, sorted circles and stripes form in the vicinity of the coast under the influence of marine climate with numerous, short duration, freeze-thaw cycles, high humidity, abundant rainfall and a thin snow cover throughout the winter, inland, no more than 15 to 25 km from the coast, the marine influence has decreased sufficiently that the patterned ground is no longer forming.

RÉSUMÉ *Formations périglaciaires sur la côte sud de Terre-Neuve.* On trouve présentement des sols structurés à petite échelle en formation sur la côte sud de Terre-Neuve. De petits cercles et des traînées minérales se développent près de la côte sous l'influence du climat maritime, caractérisé par plusieurs cycles de gel-dégel, une humidité relative élevée, des pluies abondantes et une mince couverture de neige, pendant l'hiver. À l'intérieur des terres, à 15-25 km de la côte tout au plus, l'influence maritime est suffisamment amoindrie pour qu'il n'y ait plus formation de sols structurés.

Traverses throughout the Hermitage Bay area on the south coast of Newfoundland (Fig. 1), undertaken as part of a Quaternary mapping project (LECKIE, 1979), revealed the occurrence of small-scale, active, sorted circles and stripes. They occur at all elevations down to a few meters above sea level in the southern part of the area, but none were observed in the Bay d'Espoir — Little River region to the north.

Individual sorted circles (Fig. 2) range in size from 10-33 cm in diameter. They consist of an outer perimeter of coarse, angular pebbles (median size 4 x 3 x 3 cm, but occasionally as large as 8 x 6 x 5 cm) containing no fine matrix, and a central area of silt and clay, with a surface layer of small (1-5 mm) angular, stone chips. There is a progressive decrease in grain size towards the interior of the circle. Individual circles merge to form networks 0.2 to 2 m wide that may be bounded by larger clasts, which in turn form a larger less distinct circular pattern. Circles are usually constructed in small bedrock depressions in which detritus has accumulated, often to depths of no more than 10 cm. Clast lithologies are both local bedrock and more rounded, erratic pebbles and cobbles. Bedrock lithology does not appear to be a factor in circle formation as they occur on all bedrock types. Circles form on flat surfaces with slope angles less than 3°. No circles were observed in till.

There is a transition from sorted circles to elongate sorted circles to sorted stripes wherever there is a slight increase in slope angle. Small-scale, sorted stripes (Fig. 3) are well developed on slopes as low as 3°. The stripes consist of alternating rows of coarse and fine angular rock fragments. Individual stripes range from 6 to 25 cm wide and form networks 1 to 4 m wide, several meters

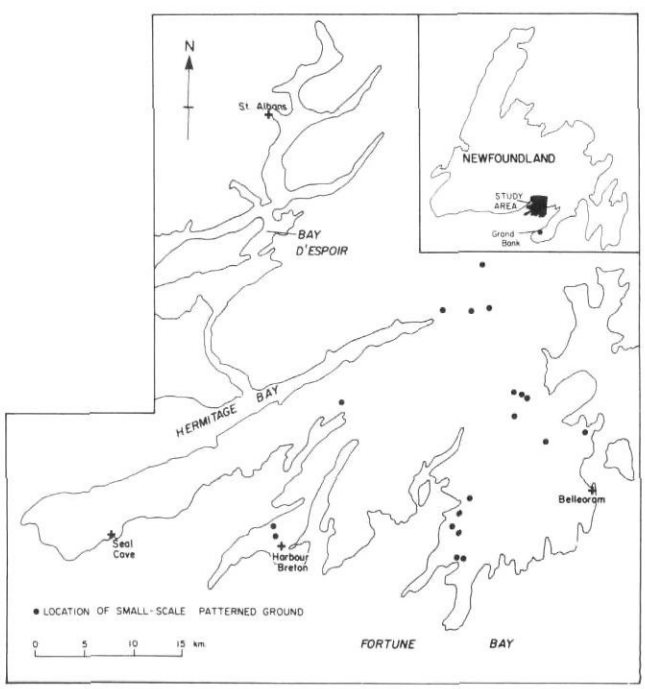

FIGURE 1. Locations of small-scale, patterned ground in the Hermitage area of Newfoundland.

Localisation de sols structurés à petite échelle, en formation dans la région d'Hermitage, Terre-Neuve.

* Present address: Department of Geology, McMaster University, Hamilton, Ontario L8S 4M1.

long. Clast size of the stripes is similar to that of the circles. Each stripe is bracketed by a perimeter of larger, angular clasts which fine inwards to a 3 to 8 cm wide row of pebble size and smaller material (Fig. 3).

In both the circles and stripes, cobbles are not involved in the sorting process. The sorted patterns are often disrupted as the stripes and circles form around these large clasts without affecting them. The patterned ground is currently active as indicated by the freshly broken, non-oxidized stones on their surface. Larger cobbles, as well as debris beyond the sorted perimeters, are lichen covered indicating no movement, or inactivity. One set of stripes at Harbour Breton (Fig. 1) is situated on a road cut and thus must have been formed within the last 20 to 30 years.

Inspection of meteorological data for Grand Bank (Table I) on the Burin Peninsula, 45 km from Harbour Breton, and daily temperature records from Seal Cove for 1978 (Fig. 4), provides an indication of why the active, small-scale patterned ground exists at low elevations at this latitude. Mean daily temperatures fluctuate on either side of the freezing point throughout the

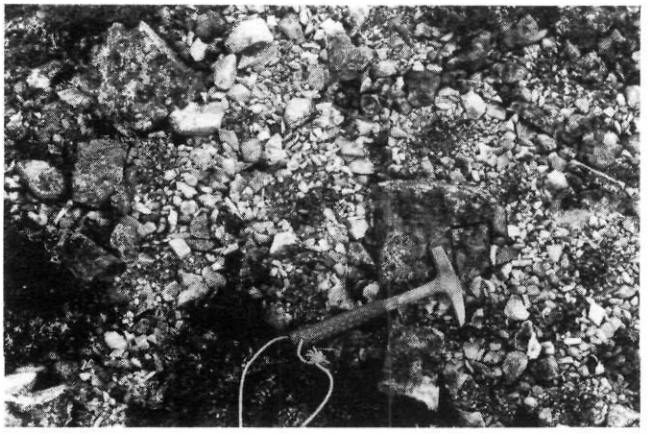

FIGURE 2. Active, small, sorted circles near Harbour Breton. The hammer (35 cm long) rests on one of the inactive, lichen covered, larger clasts, which border the sorted lighter coloured material.

Petits cercles avec triage en formation près de Harbour Breton. Le marteau (35 cm de longueur) repose sur une des roches stationnaires couvertes de lichen. Ces roches encerclent le matériel trié de couleur plus claire.

FIGURE 3. Active, small sorted stripes near Harbour Breton developed on a 3° slope. Darker bands are finer material.

Petites traînées minérales avec triage, en formation sur une pente de 3°, près de Harbour Breton. Les bandes foncées sont composées de matériaux plus fins. Le cahier a 19 cm de longueur.

TABLE I

Climatic data for Grand Bank, Newfounland, 47°06′N, 55°46′W

	Temperature						Precip-itation	Days with			
	Daily mean			Extreme							
Month	Aver. °C	Max. °C	Min. °C	Max. °C	Min. °C	Relative humid. %	Total mm	Rain	Snow	Precip-itation	Fog
January	−2.3	0.6	−5.3	11.1	−20.0	81	130.0	7	11	17	2
February	−2.9	0.1	−6.1	11.1	−18.9	80	123.4	6	10	15	2
March	−1.3	1.6	−4.0	15.0	−18.3	81	102.5	7	8	13	2
April	2.1	5.1	−0.9	16.7	−9.4	83	84.8	9	4	12	4
May	6.0	9.7	2.2	22.2	−5.6	81	97.3	11	0	12	6
June	9.9	13.9	5.9	25.0	−1.7	82	88.9	12	0	12	6
July	14.7	18.7	10.8	28.9	3.3	87	82.0	11	0	11	9
August	15.8	19.3	12.3	30.0	1.7	85	84.1	11	0	11	5
September	12.7	16.3	9.2	25.0	0.6	82	93.2	11	0	11	4
October	8.2	11.5	4.7	21.7	−3.9	82	121.4	13	0	13	3
November	4.4	7.2	1.6	18.3	−8.9	83	156.2	14	2	16	2
December	−0.2	2.4	−2.9	12.8	−15.0	81	141.2	9	10	16	2
Means	5.6	8.9	2.3								
Totals							1304.9	121	45	159	47

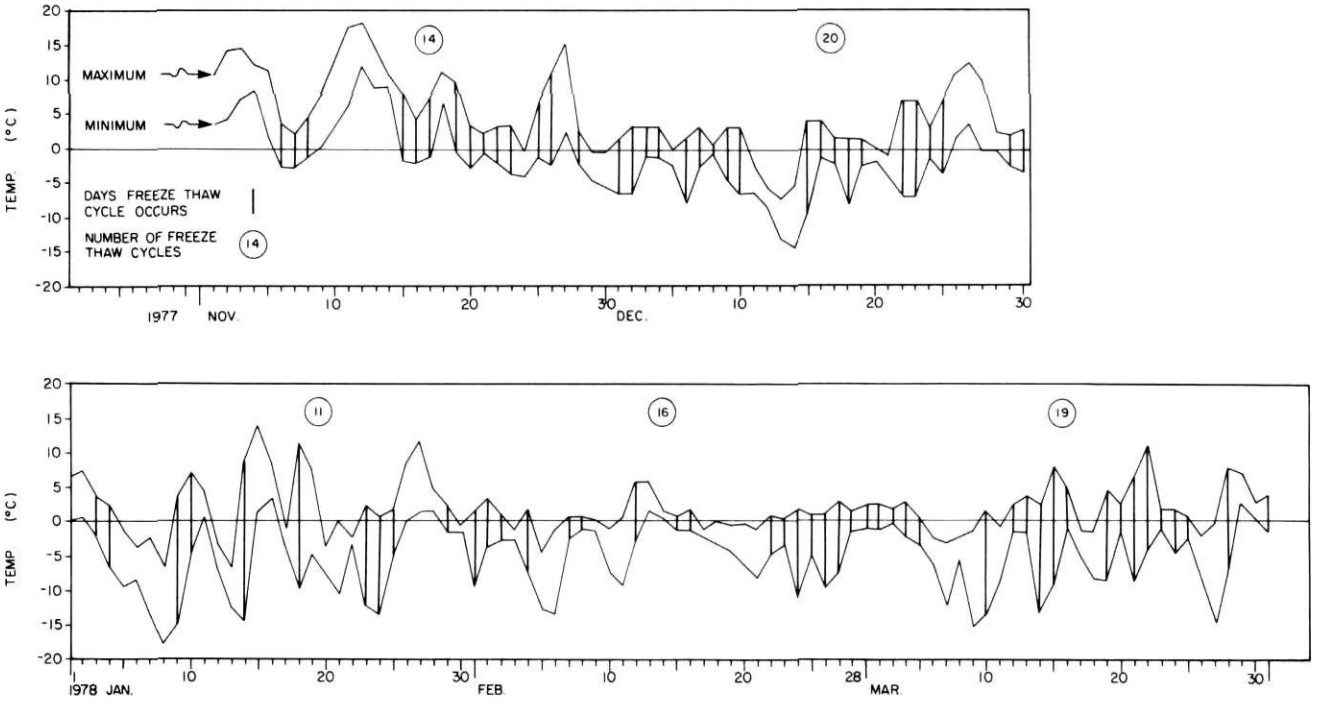

FIGURE 4. Temperature conditions at Sea Cove, Hermitage area, Newfoundland, winter 1977-78 (Source: Monthly Station Records, Atmospheric Environment Service, Environment Canada).

Les températures à Sea Cove, Terre-Neuve, hiver 1977-78 (source: rapports mensuels des stations, Service de l'environnement atmosphérique, Environnement Canada).

winter permitting repeated freeze-thaw cycles. During the winter of 1977-1978, prior to the summer traverses across the area, maximum temperatures were above freezing and minimum temperatures were below freezing at Seal Cove on 70 days in the period November 1 — March 31. On 7 of these days minimum temperature was below −10°C and daily temperature range exceeded 12.5°C. The largest diurnal range of temperature, from +8.5°C to −14.5°C, occurred on January 13. Moisture content in the form of fog, rain and snow is high, providing the source of water for frost action. Snow falls can be heavy but frequent rain and heavy winds prevent significant accumulations. During reconnaissance observations in February, 1978, there was less than 3 cm of patchy, snow cover in the immediate coastal areas. This thin, wet, winter snow has poor insulative properties and permits maximum frost penetration when temperatures drop below freezing. Further inland, away from the shore, the small scale patterned ground was not observed (Fig. 1). Snow cover is much thicker and more persistent throughout the winter, providing an insulative cover over the surface. Temperatures are probably somewhat lower and fluctuations above and below the freezing point less common.

Using the monthly summary data for Grand Bank (Table I) as a general indicator of the regional climate it is difficult to classify the area according to TRICART'S (1967, 1969) scheme of world periglacial climates, though it could be considered a variant of the high latitude island type. Mean annual temperature is 5.6°, annual range is 18.7°C (−2.9°C in February; 15.8° in August), and mean annual precipitation is 1300 mm, with 50 percent occurring in the winter months, November to March. Freezing temperatures generally occur from December to April, but the mean monthly maximum is above freezing in all months.

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