

# TURF HUMMOCKS ALONG THE ARCTIC BIOCLIMATE GRADIENT: THEIR CHARACTERISTICS AND DEVELOPMENT

Summary of the July 2003 field activities

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## Background

Turf hummocks are small, 11–20 cm high, 18–50 cm diameter mounds. They commonly occur on gently to steeply sloping Arctic terrain (Figures 1 and 2).

## Description of activities

The turf hummock sub-study is part of the soil study portion of the Biocomplexity of Frost Boils Ecosystem project. Its purpose is to study the characteristics and genesis of turf hummocks in Arctic Bioclimate subzones A, B and C (Walker, unpublished manuscript).

The objectives of this turf hummock sub-study are:

1. To examine their internal and external characteristics on the basis of soil analytical data, and moisture and temperature measurements.
2. To determine their age and genesis.
3. To establish the role they play in the Arctic ecosystems.

During this fieldwork turf hummocks were studied at five locations on Banks Island in bioclimate subzone C (Table 1).

Table 1. Locations of turf hummock study sites.

Site no.	Lat. (N)	Long. (W)	Elevation (m)	Slope (%)	Dominant vegetation
1A	73° 13' 43"	119° 32' 52"	32	28	<i>Dryas integrifolia</i> – moss
1B	73° 13' 43"	119° 32' 52"	32	28	<i>Dryas integrifolia</i> – moss
2	73° 13' 21"	119° 33' 09"	47	8	<i>Cassiope tetragona</i> – moss
3A	73° 13' 22"	119° 33' 13"	62	14	<i>Cassiope tetragona</i> – moss
3B	73° 13' 22"	119° 33' 13"	65	12	<i>Cassiope tetragona</i> – moss
4*	73° 13' 24"	119° 33' 14"	55	6	<i>Dryas</i> , crust and bare soil
5	73° 13' 27"	119° 33' 21"	50	20	<i>Dryas integrifolia</i> – moss

\* Small polygons with frost cracks

## Information collected

Hummocks with two types of dominant vegetation were studied – those with *Dryas integrifolia* cover and those with *Cassiope tetragona*. Initially, pits were dug diagonally across the hummock to the adjacent interhummock troughs to expose the internal morphology (Figure 3). Detailed

cross section diagrams were prepared and the various soil horizons and layers were identified. Soil samples were collected for laboratory analysis to determine their chemical and physical properties. Additional samples were collected for bulk density determinations and samples also were collected from organic-rich horizons for radiocarbon dating (Table 2).

Table 2. Types and numbers of samples collected.

Site no.	Soil	Bulk Density	Radiocarbon
1A	3	3	3
1B	8	4	2
2	n	n	n
3A	4	n	n
3B	5	2	2
4	3	1	n
5	4	4	1

n: no sample collected

At each site, the heights and diameters of five hummocks were measured. In addition, soil temperature measurements were taken at depths of 2.5 and 5 cm on the tops of three hummocks and under the adjacent interhummock troughs.

The 28–36 cm diameter polygons at site 4 were also examined and sampled as described above. Some of these polygons were covered with bare soil, some were partially vegetated with *Dryas integrifolia* and some were completely vegetated (Figure 4). A thin layer of sandy materials was found under the *Dryas* mat and, as a result, these *Dryas*-covered polygons were elevated as much as 6 cm. It appears that site 4 represents the initial state of turf hummock development.

### Non-technical summary

Turf hummocks, which are commonly found on gently or steeply sloping Arctic terrain, were examined at seven sites in the Green Cabin area of Aulavik National Park on Banks Island. All seven hummocks were excavated, their cross sections were examined, and soil samples were collected for laboratory analysis and radiocarbon dating. Turf hummocks represent a unique ecosystem. They provide a nutritious and warm soil environment for plant growth, and a habitat and readily available food source for small mammals and insects.

### Reference

Walker, D.A. and others. Unpublished manuscript. Biocomplexity of frost-boil ecosystems: a conceptual model of frost-boil development in relationship to vegetation along the Arctic bioclimate gradient.

## Figures



Figure 1. Turf hummocks on slope.



Figure 2. Close-up of turf hummocks.



Figure 3. Cross section of a turf hummock at site 1B.

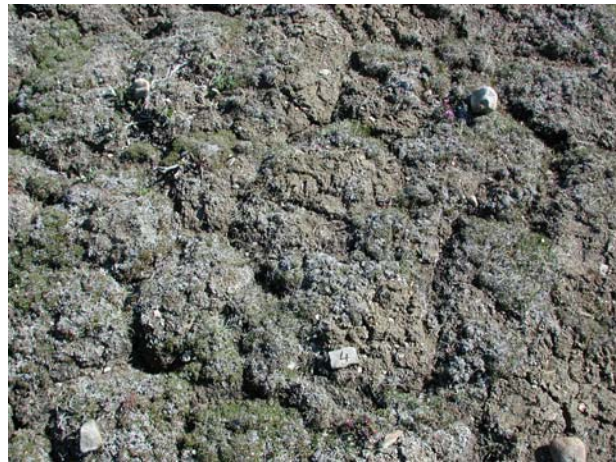


Figure 4. Small polygons with patchy *Dryas integrifolia* vegetation.