UNDETERMINING TERRAIN, A NEW SUBGLACIAL BEDFORM ON THE SOUTHEASTERN PLAINS, CANADA

INTRODUCTION
Previously glaciated regions of the Canadian Interior Plains exhibit fields of undulating terrain. These fields of broad, subdued ridges range in relief from a few meters to 10s of meters and are typically spaced 10s of kilometers apart. Although these undulations resemble subaerial ridges, subglacial landforms on southeastern Manitoba and southwestern Saskatchewan, similar in morphology and spacing, have not been observed in the latter region. This study presents the first documentation of undulating terrain in southwestern Saskatchewan. By addressing the formation processes of this landform, the research expands our knowledge of subglacial ice sheet processes on the Canadian Interior Plain.

OBJECTIVES OF THE RESEARCH
- Document the morphology and complexity of undulating terrain
- Infer the processes responsible for the formation of this terrain
- Explore the implications of these processes for the behavior of the Laurentide Ice Sheet

METHODOLOGY
Undulating terrain was mapped using aerial photography, digital elevation, and digital structure-from-motion (DSFM) image acquisition. Subglacial landforms were described and the data integrated into this manuscript.

UNDETERMINING TERRAIN ON THE SOUTHEASTERN PLAINS
The study area is a glacially sedimented region of the Canadian Interior Plains. The terrain is characterized by fields of undulating ridges that range in relief from a few meters to 10s of meters and are typically spaced 10s of kilometers apart. These fields are distinct from the subaerial ridges in the southeastern part of the study area.

LANDFORM ASSOCIATIONS
1. Undulating terrain (UT) is characterized by subaerial ridge-like forms that are spaced from 10s to 100s of meters apart. Each ridge is up to 50 meters wide and typically 1-2 meters in relief.
2. Undulating terrain is associated with subglacial landforms, which include drumlins, drumlin complexes, and ridge complexes.
3. Undulating terrain is also associated with eroded and mantled ridges, which are morphologically similar to drumlins.

SUMMARY OF INTERPRETATIONS
1. Undulating terrain is a subglacial landform.
   • UT is composed of mega-scale structures
   • Fluvial channels and subglacial channels are superimposed on undulating terrain.
2. Undulating terrain is not a glacial landform.
   • The apparent shore face was elevated to edge erosional remnants.
3. Undulating terrain has an original origin.
   • Ice and depositional units are composed of bedrock and sedimentary units
   • Composition and position of undulating terrain vary.
4. Ice was not the agent of erosion.
   • Flow structures within the ice could not account for the creation of ridges in intact ice.
5. Undulating terrain was buried by subglacial till during deglaciation.
   • Undulating terrain is the product of differential erosion and deposition.

THE LARGER PICTURE
From NGRIP to JENA and southeastern Alberta, the undulations suggest the formation of undulating terrain. The undulations are hypothesized to have formed as follows:
- Subglacial meltwater eroded the subglacial ice, forming a depression.
- The depression was then filled with subglacial sediment, creating the undulating terrain.
- The undulations were preserved as the ice sheet withdrew.

REFERENCES