Lecture 8 -Melt out tills and their preservation

What is a till?

"direct agency of glacier ice which does not undergo subsequent disaggregation and redeposition"

Are there any true tills?

Processes

Heat transfer to melt the ice (geothermal, water, air sources)

Superglacial formation - heat from above

Subglacial formation - heat from below

Setting

Stagnant ice mass (no new material introduced)

Ice marginal - thicker because stacking possible

limited amount of material involved

Why not more observed?

Paul and Eyles argue that preservation unlikely

Shear Stress - will move them

hydraulic instability - will make them mush

Classification into four zones (Fig. 1)

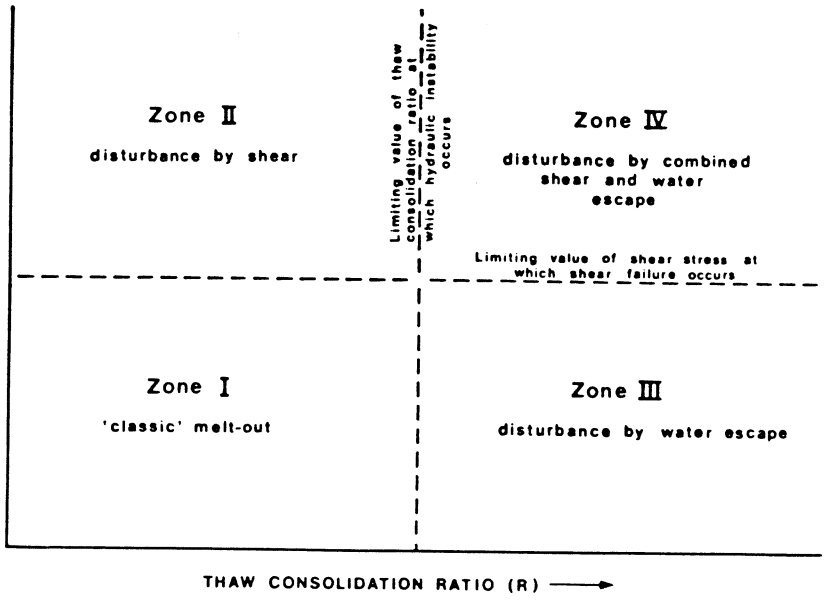

Fig 1. Schematic representation of deformation zones based on the occurrence of shear instability and/or hydraulic instability during melt-out from stagnant ice. After Paul and eyles (1990)

Landscape implications

Melt-out tills can be destroyed easily

Only present in ideal, specialized topographic setting (Fig. 2)

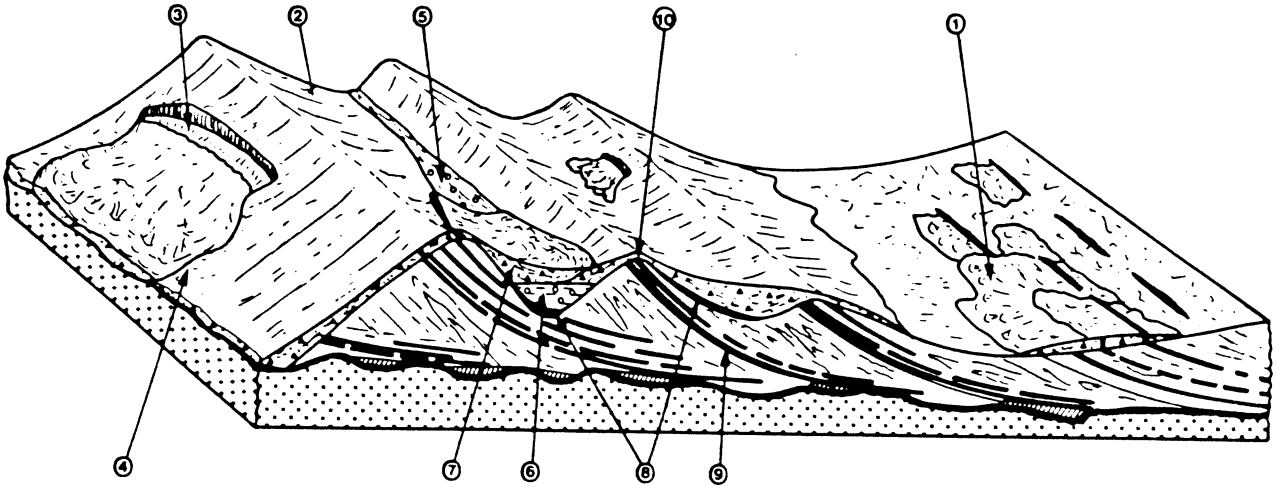

Fig 2. Schematic block diagram to show typical processes and morphological features associated with supraglacial deposition. 1) Carpet of superimposed sediment gravity flows derived from debris outcrops. 2) Continuous carpet concealing large volumes of buried ice. 3) Local failure of the carpet exposing the ice-core. 4) Remobilization of the carpet by undrained loading. 5) Glaciofluvial sediment in trough, grading laterally into 6) glaciolacustrine sediment and buried 7) by further sediment gravity flows. 8) Accumulation of melted-out sediments on the proximal flanks from 9) englacial debris. On the distal flanks, the carpet is derived at depth from debris which crops out as linear bands and has moved downslope 10). After Paul and Eyles, 1990.