

Entrainment/Transport/Deposition

GES-441

Entrainment

Due to balance between forces from ice that move particle and friction that holds it in place.

Occurs by:

- 1) local freeze - due to lee side of obstacle or changing local conditions (results in rafts)
- 2) drag between ice and bedrock may dislodge particles
- 3) loose debris swept away by ice or water
- 4) rock fall
- 5) wind

Transport

Subglacial - generally thin layer due to constant melting at bed; clasts undergo intense abrasion and crushing at bed - result is they are more rounded, faceted, and can show a bi- or poly-modal distribution (rock fragments, mineral grains, rock flour)

Englacial - large amount moved this way

Supraglacial - material that falls onto the ice in the ablation zone or material brought to the surface in the ablation zone by melt; generally more angular than basal debris, particularly if rockfall is a large component; highly irregular topography due to the protection from melt thick debris affords ice.

Transfer by thrusting

Can occur in polythermal glaciers or in places where the glacier rides up on a large subglacial obstacle; also occurs in surging glaciers

Most common in polythermal glaciers where ice changes along flowline from warm to cold - get deceleration and intense compressive flow. Warm, fast ice rides up over cold, slow ice.

Subglacial Deposition

Needs melting bed and basal debris. Basal debris content within 1 m of the ice is commonly quite high - up to 50%.

Lodgment - the plastering of debris onto the bed; caused by very high friction that prevents forward movement. Materials formed under these conditions of high stress and little water are compact, firm, fine-grained (matrix) and display fabric.

Melt-out - wet-melting ice releases debris onto bed

Glaciofluvial - deposition of fluvial sediments in channels and interlinked cavities

Supraglacial Deposition

Most englacial debris ends up on glacier surface during ablation. Glacier surface becomes very dirty as ice melts away, leaving debris. Material can be highly mobile, flowing off the ice margin or into hollows, and slumping. During sublimation, in particular, debris on the ice surface can be gradually let down onto the bed. Supraglacial material generally lacks a well-defined fabric and shows evidence of reworking.

Proglacial Deposition

Deposition by or in water in front of the ice; generally sorted sediments, ranging from boulders to rock flour, depending on environment

Peripheral Deposition

Material flows or slumps off the ice margin; as the result of the conveyor process, material is brought to the snout and dumped at the glacier margin. If the margin is stable, a moraine will form.