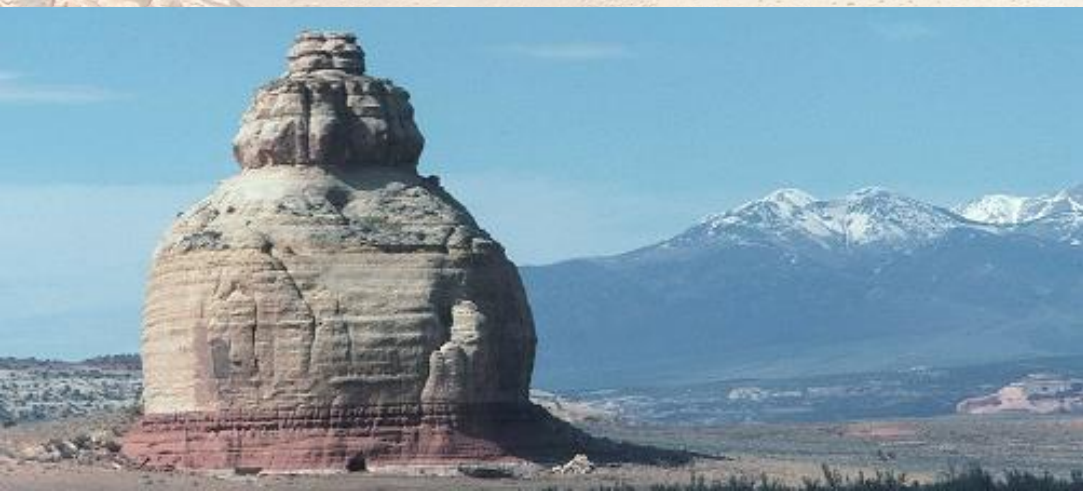
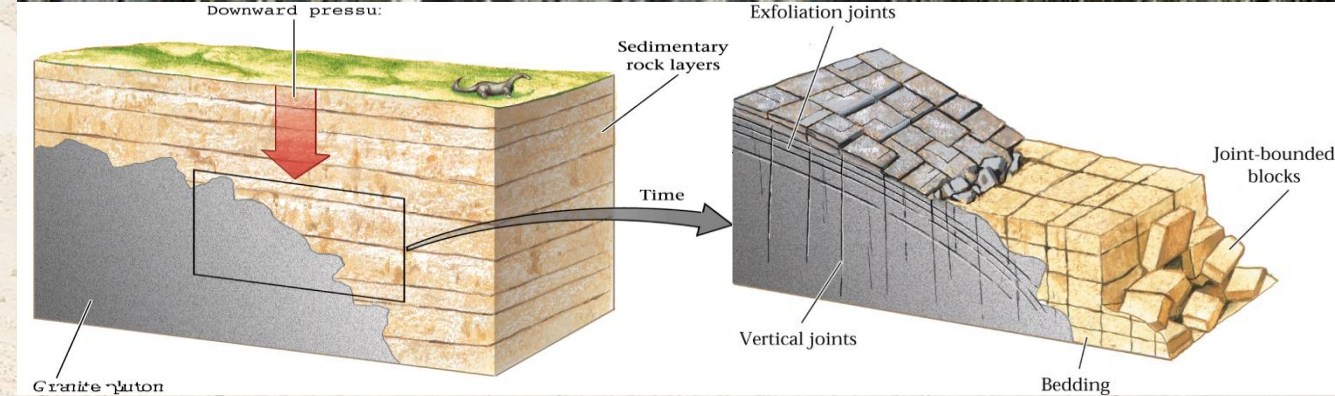
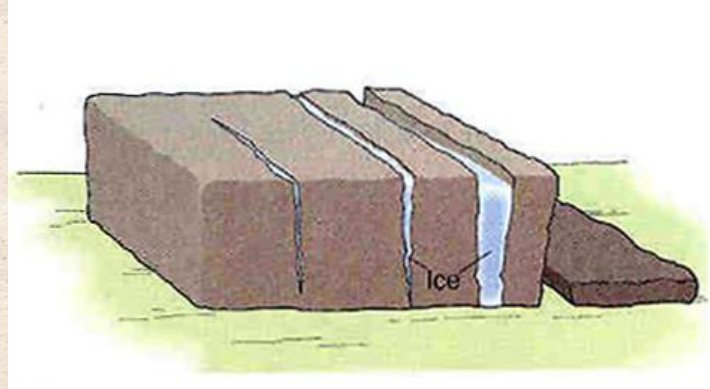
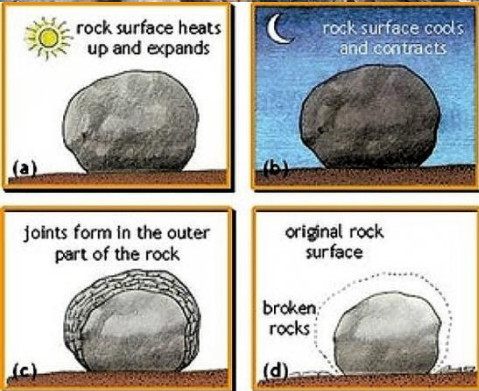


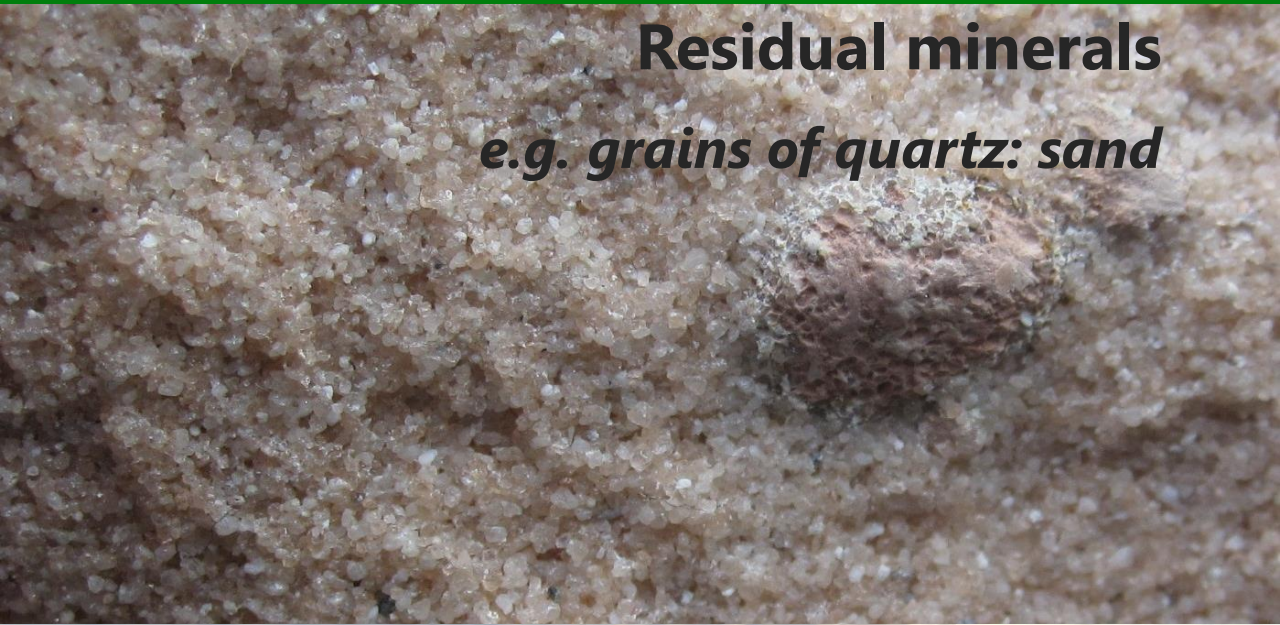


Landscape Evolution

Glacial Landscapes







Residual minerals
e.g. grains of quartz: sand

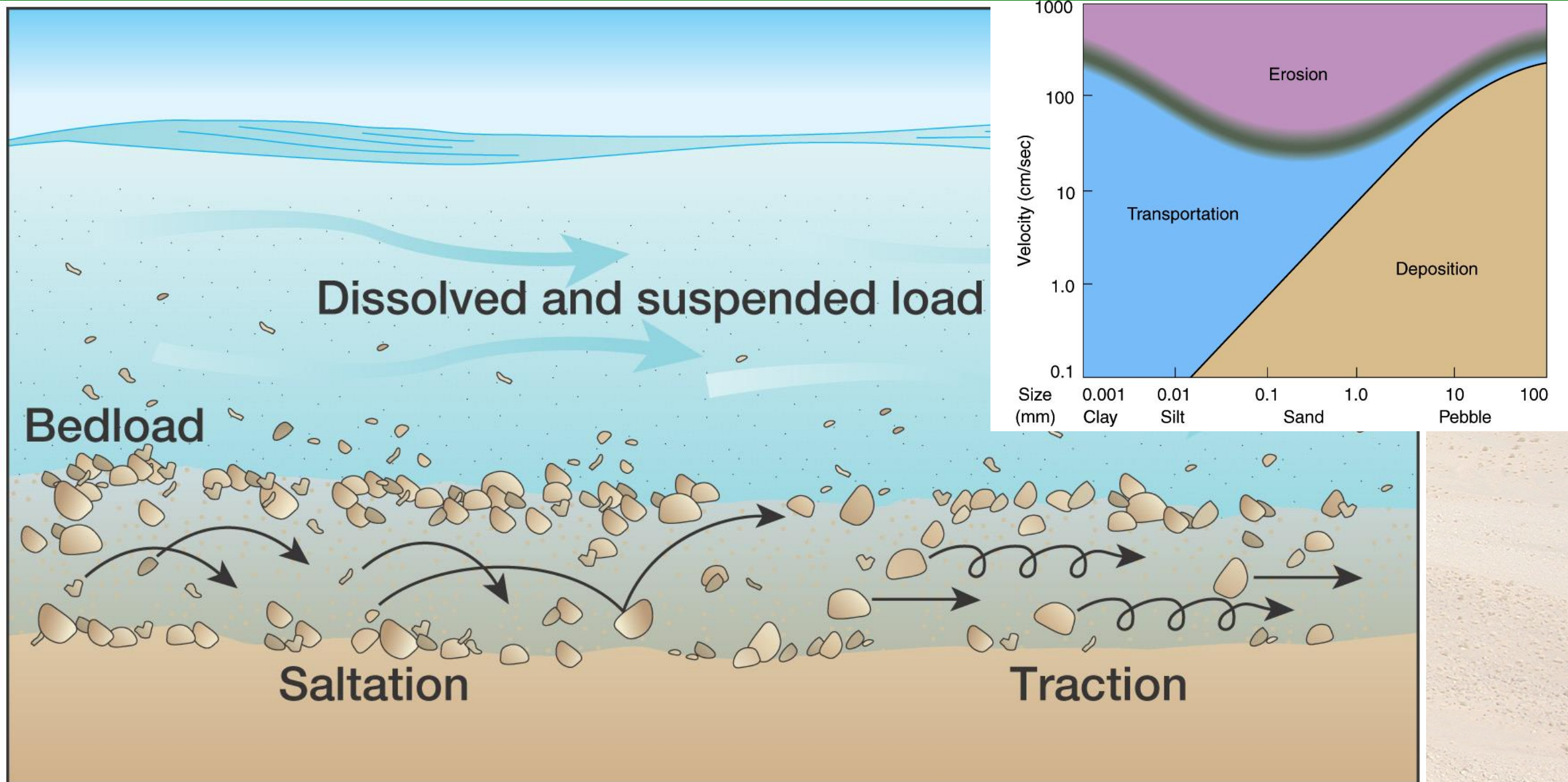


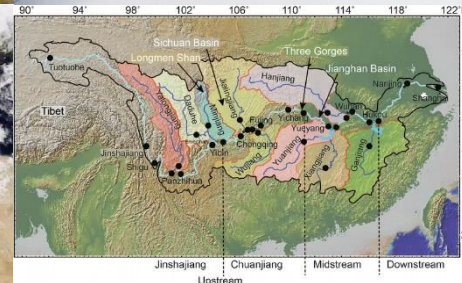
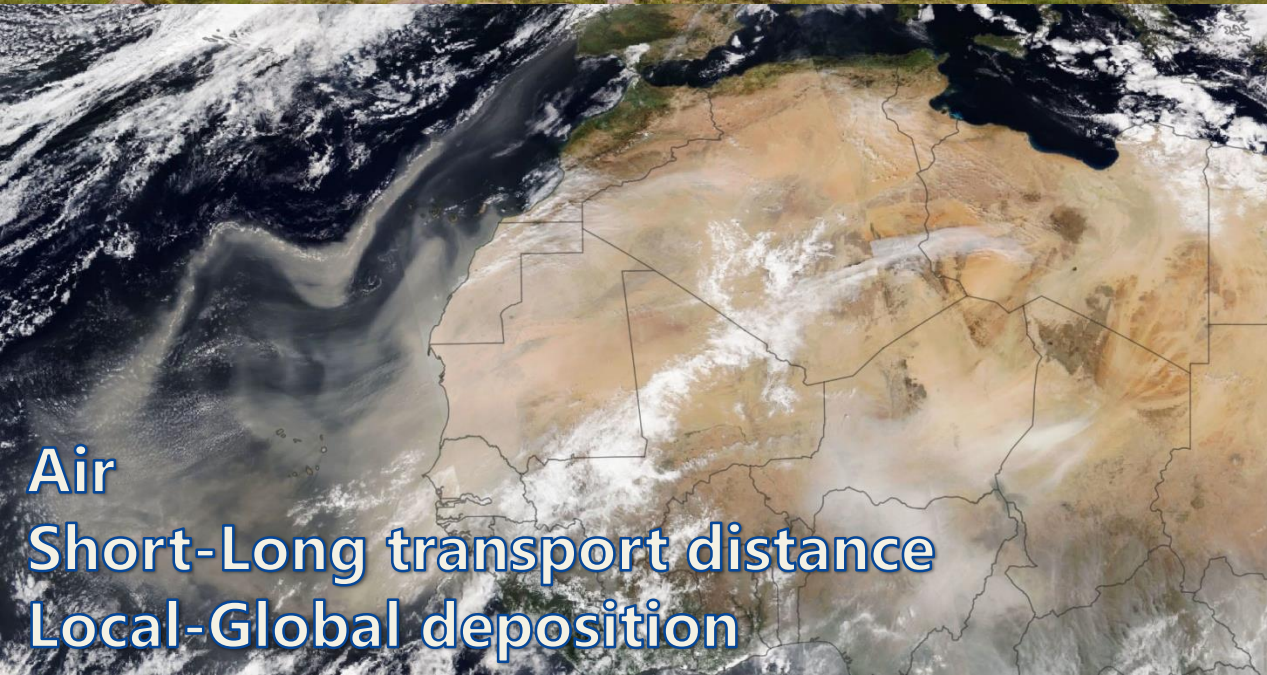
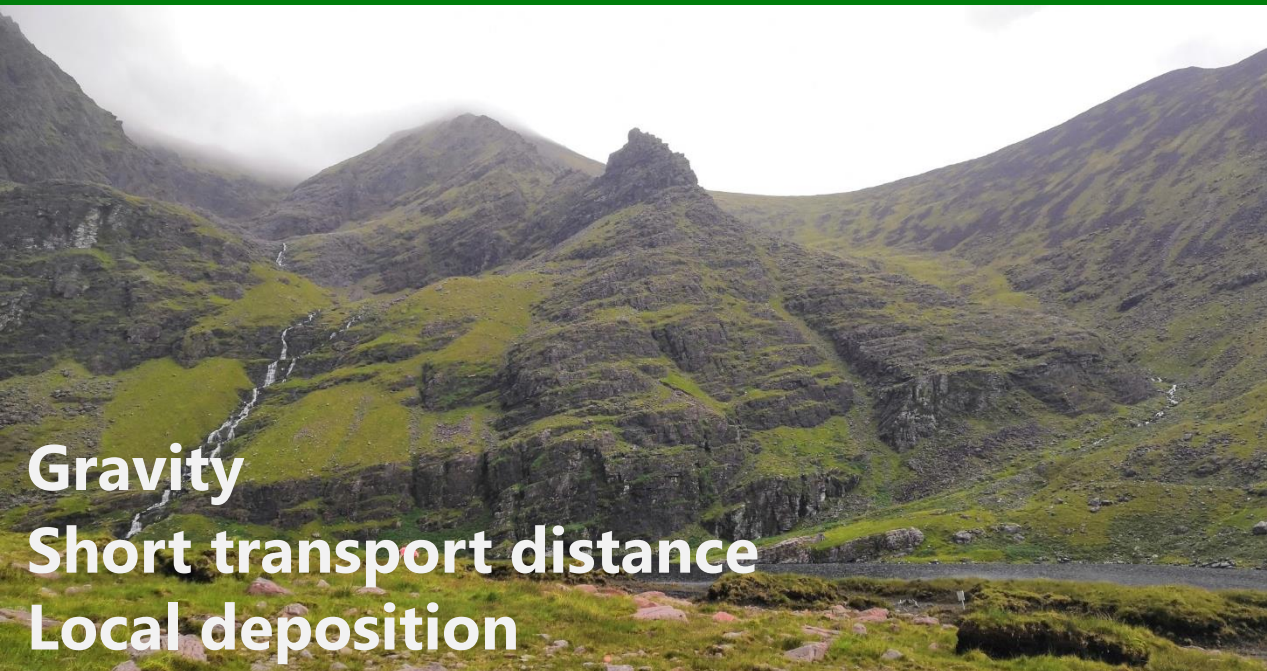
New minerals
e.g. clays

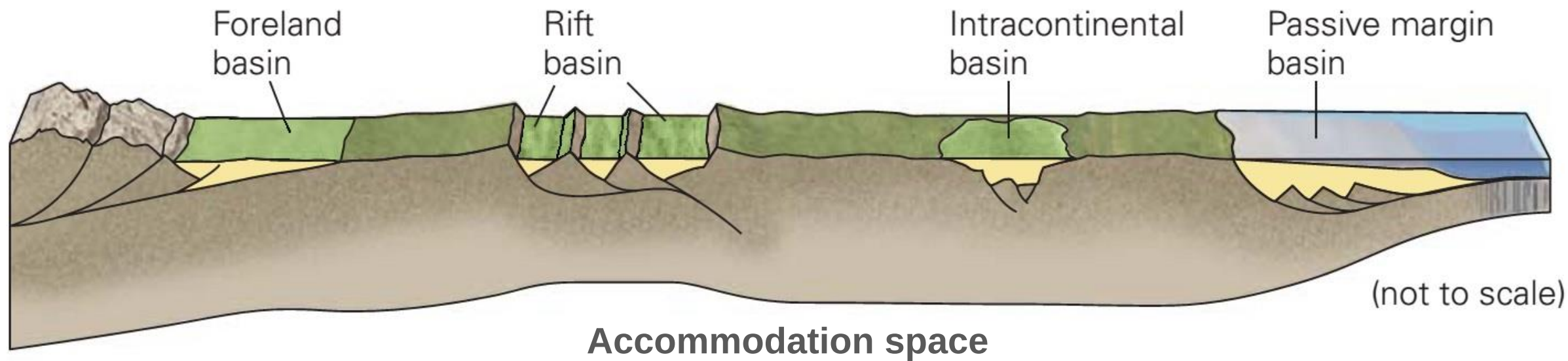


Solutes
e.g. sea salt







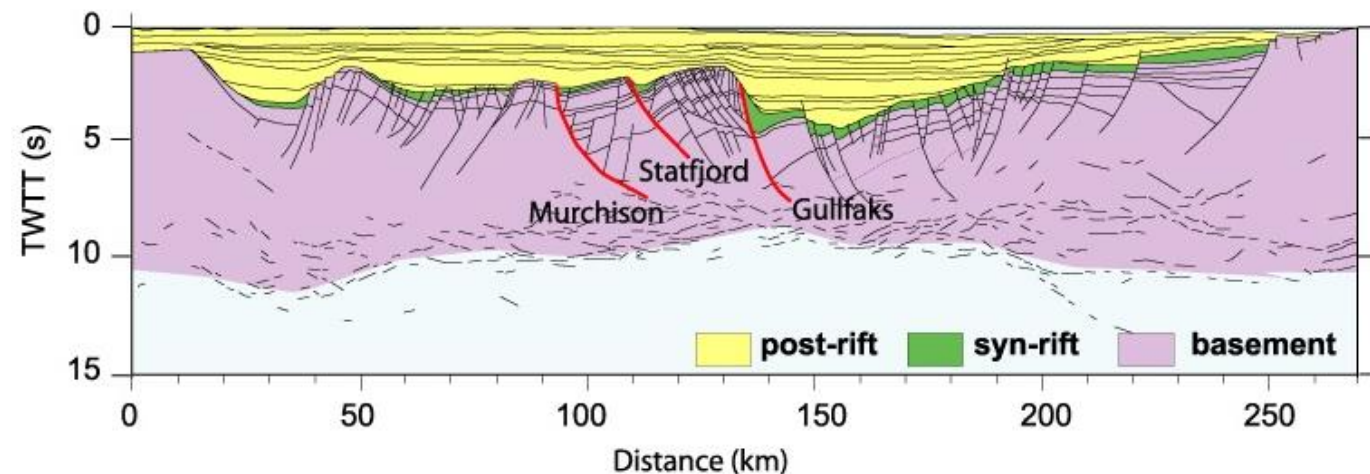
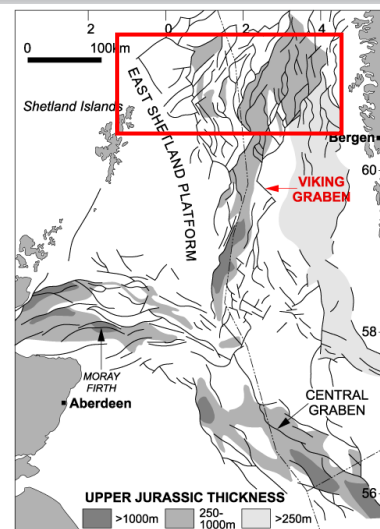


Weight of the mountain belt pushes down the crust's surface.

Downward slip on faults produces narrow troughs.

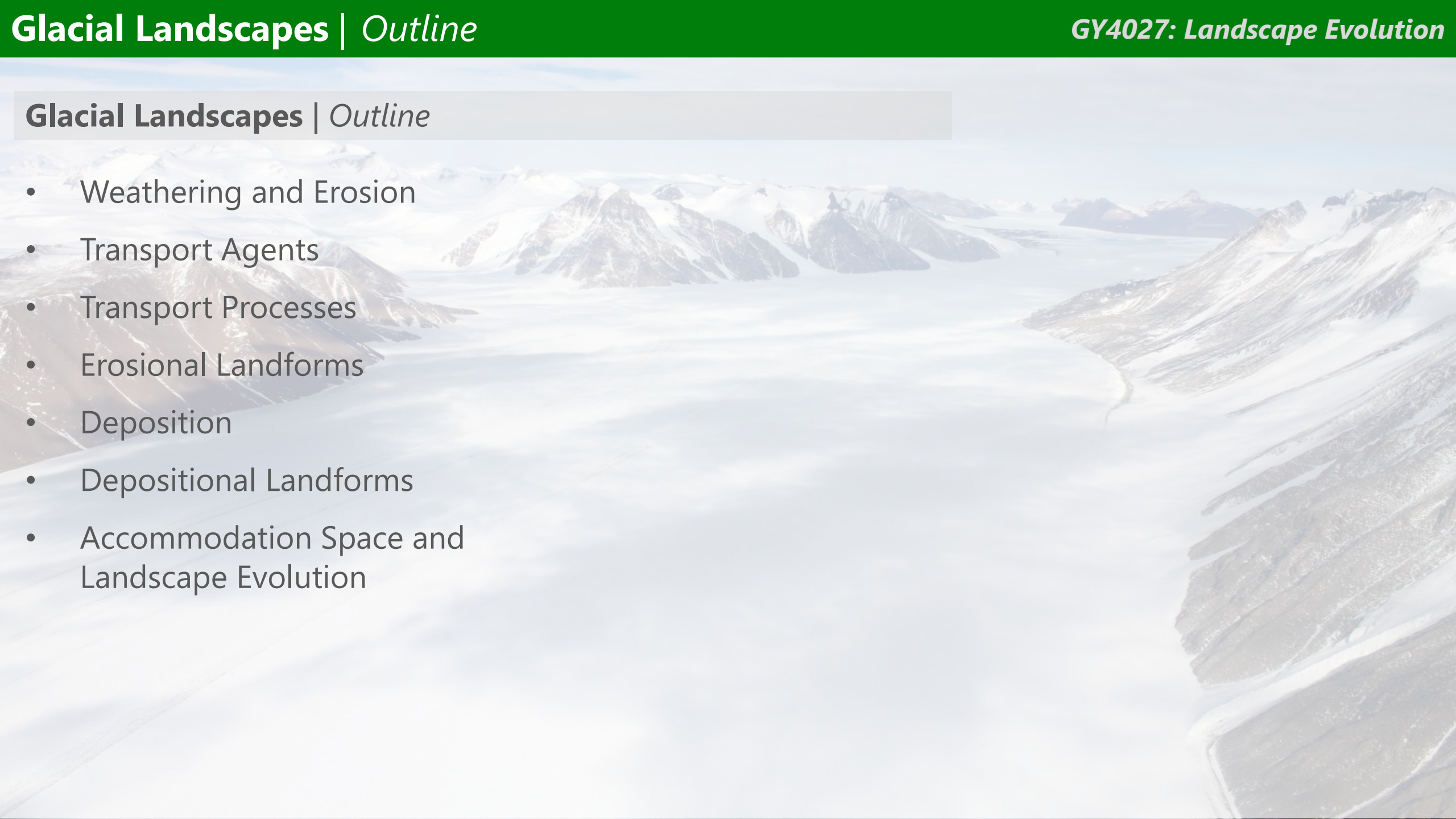
The basin forms in the interior of a continent, perhaps over an old rift.

Subsidence occurs over thinned crust at the edge of an ocean basin.



Glacial Landscapes | *Outline*

- Weathering and Erosion
- Transport Agents
- Transport Processes
- Erosional Landforms
- Deposition
- Depositional Landforms
- Accommodation Space and Landscape Evolution



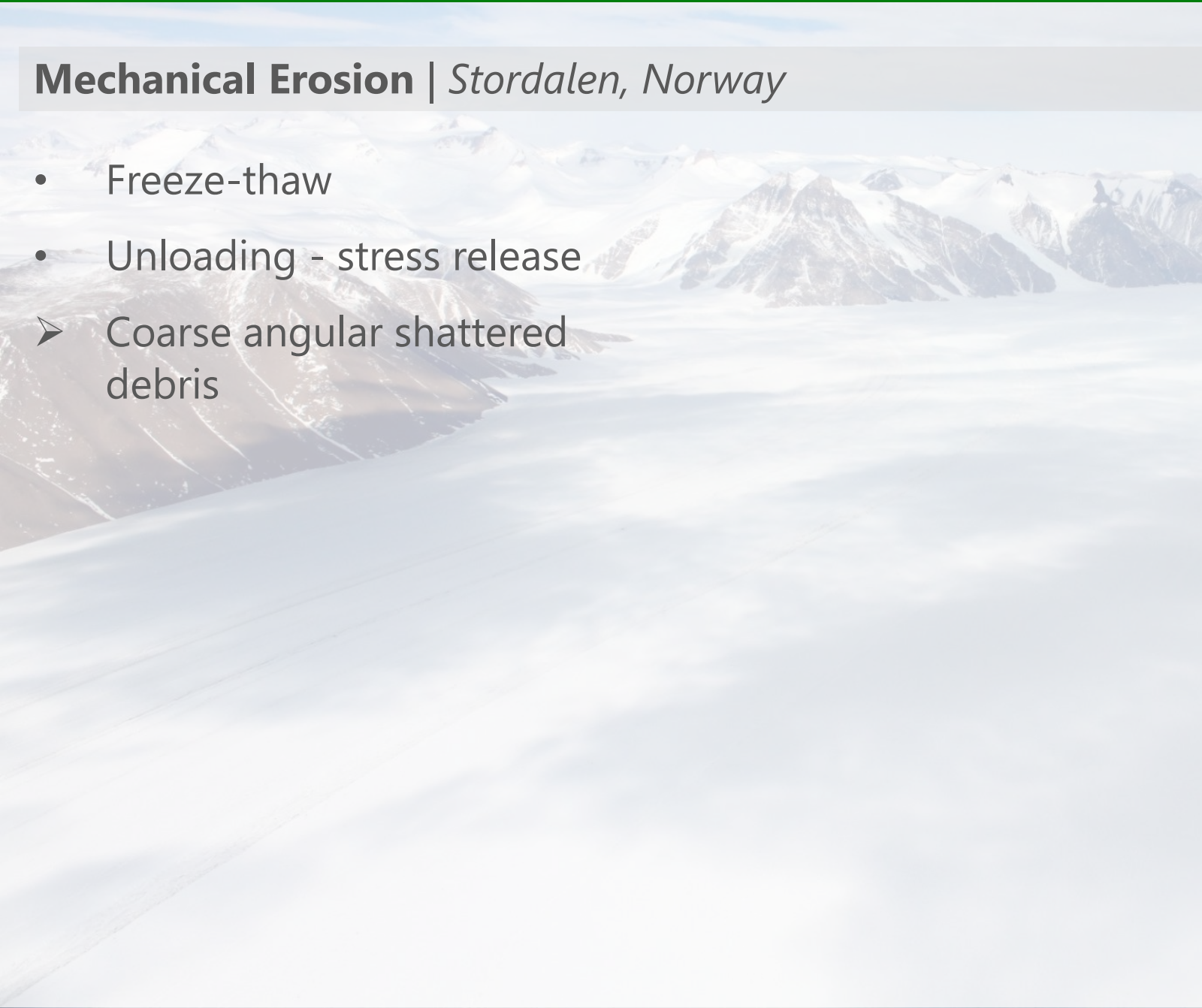
Weathering

- Mechanical weathering
- Chemical weathering
- Biological weathering



Mechanical Erosion | *Stordalen, Norway*

- Freeze-thaw
- Unloading - stress release
- Coarse angular shattered debris



Mechanical Erosion

- Abrasion and gravity
- Coarse angular shattered debris

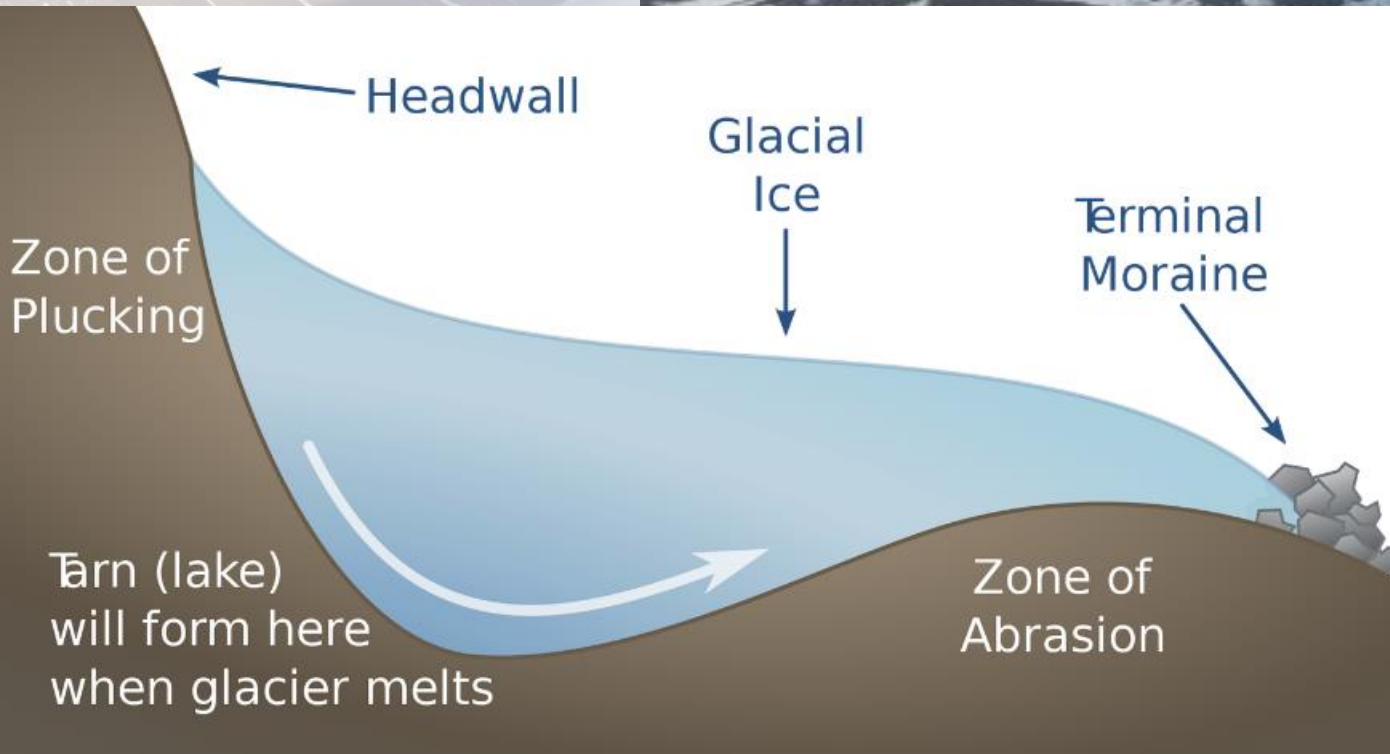
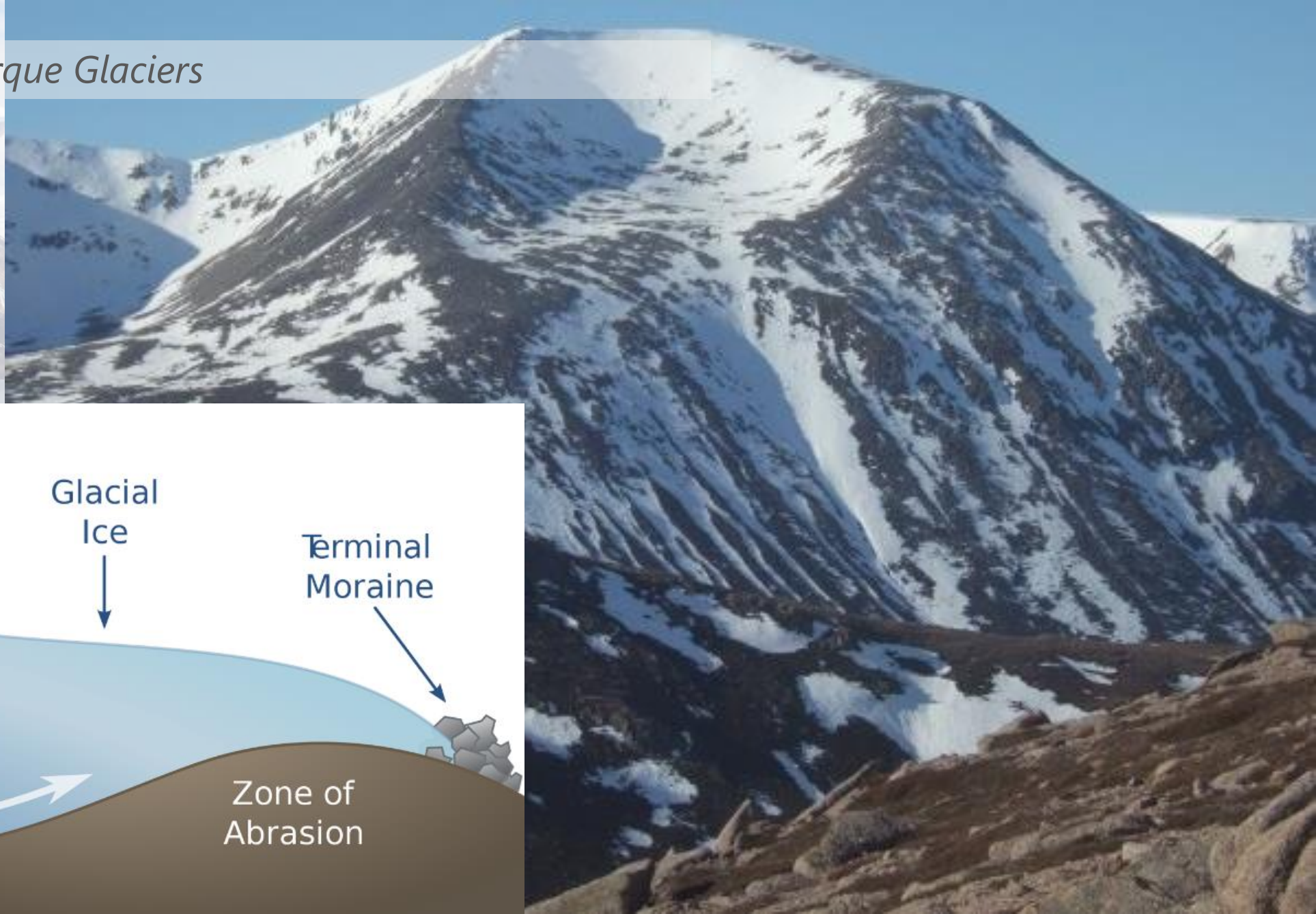


Transport - agents

- Gravity
- Water
- Ice



Snow Compaction | *Cirque Glaciers*



Snow Compaction | *Malbun, Liechtenstein*



Snow Compaction | *Malbun, Liechtenstein*



Snow Compaction | *Malbun, Liechtenstein*



Alpine Glaciers | *Cirque Glaciers*



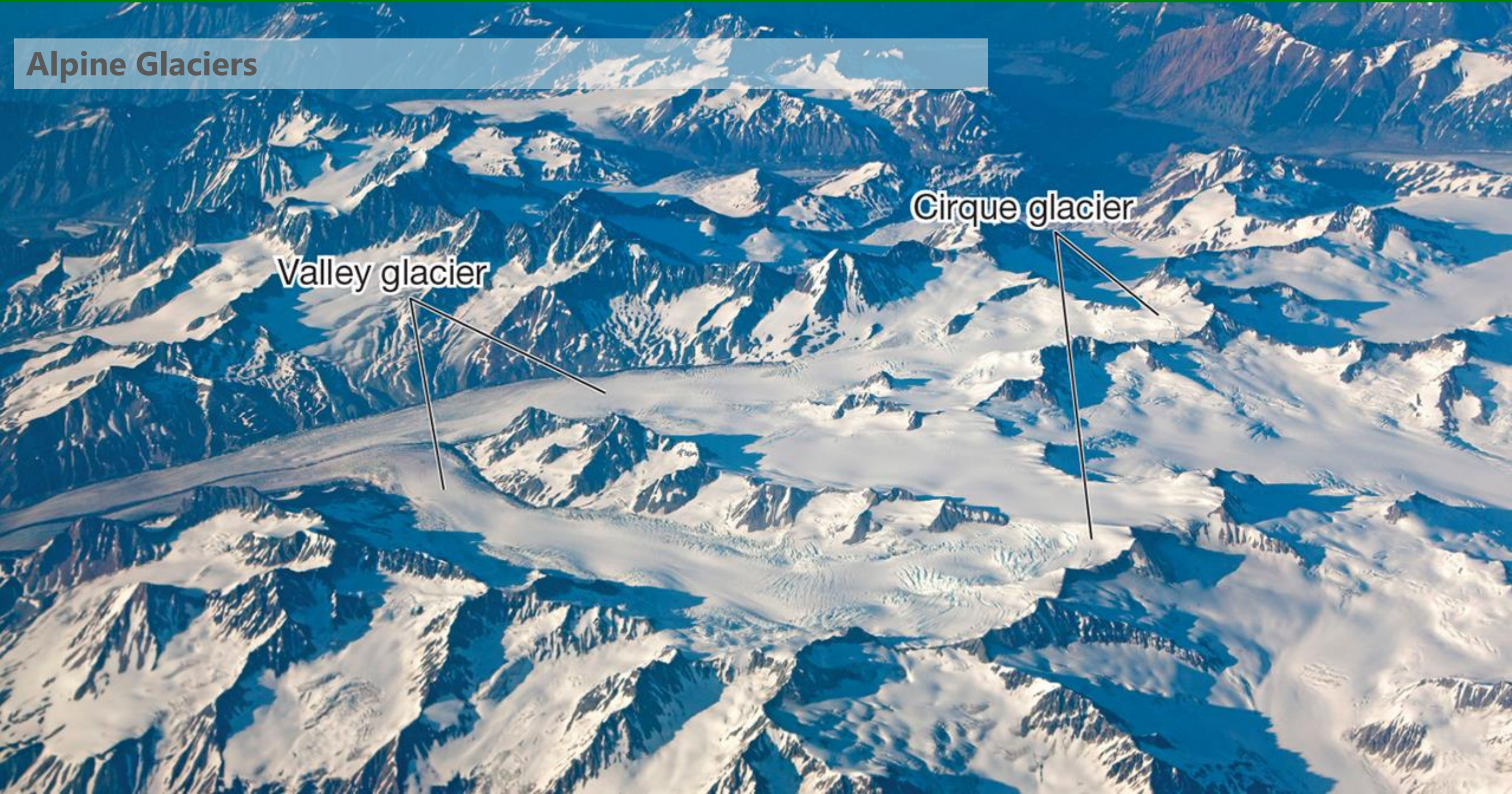
Alpine Glaciers | *Cirque Glaciers*



Alpine Glaciers | *Valley Glaciers*



Alpine Glaciers



Valley glacier

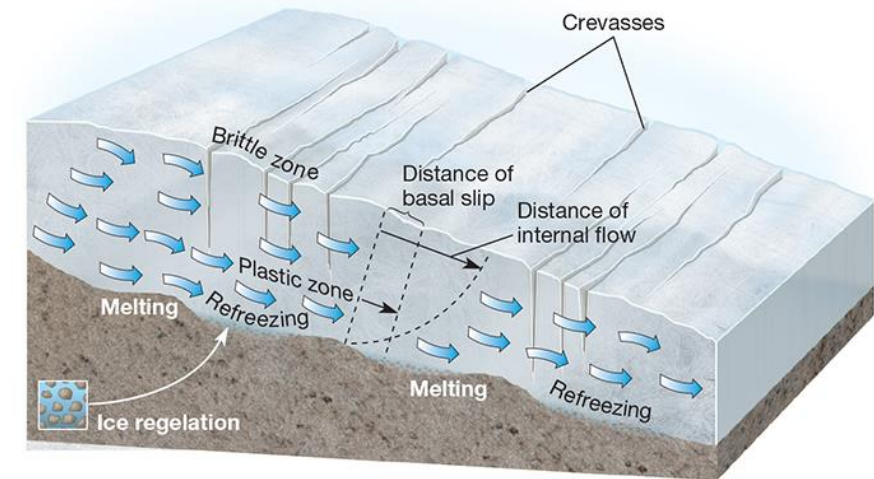
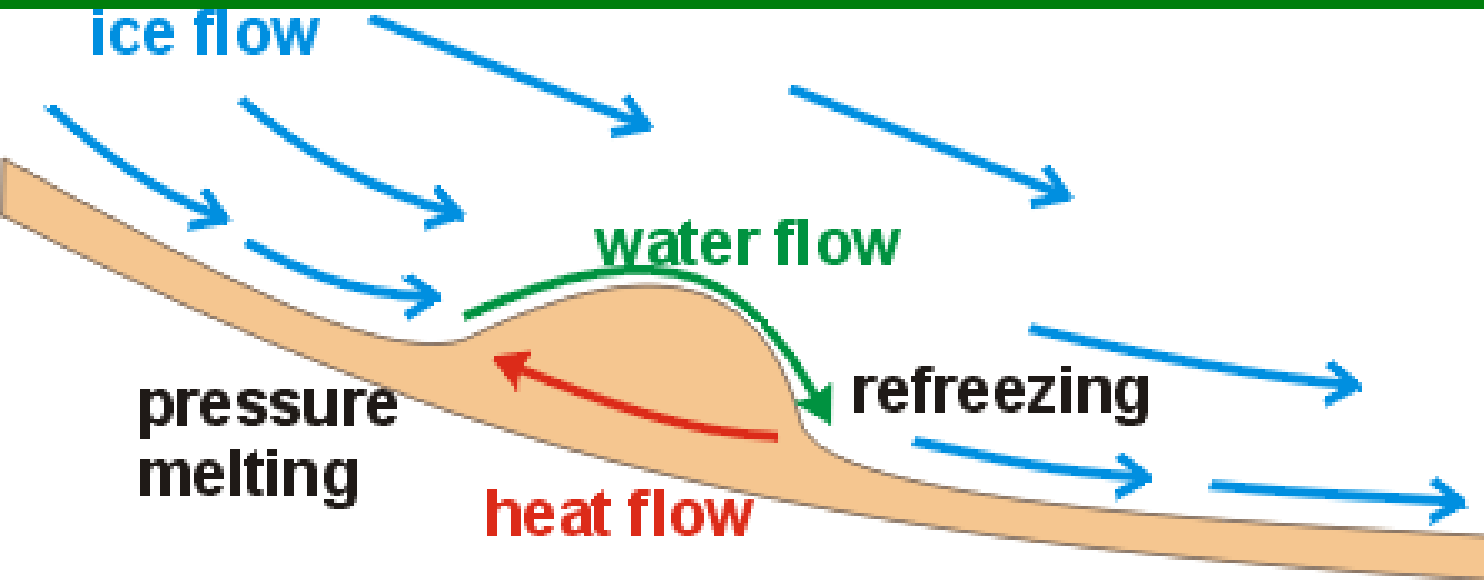
Cirque glacier

Alpine Glaciers | *Piedmont Glaciers*



Alpine Glaciers | *Piedmont Glaciers*





(a) Cross section of a glacier, showing its forward motion, brittle cracking at the surface, and flow along its basal layer.

- Internal plastic flow
 - Deformation of ice crystal structure - creep
- Basal sliding
 - Meltwater at the base of the glacier
- Zone of fracture
 - Upper 50m
 - Crevasses



(b) Surface crevasses are evidence of forward movement on the Fox Glacier, South Island, New Zealand.

Corries / Cirques / Cwms | Coumshingaun, Waterford



Corries / Cirques / Cwms | Cwm Idwal, Wales



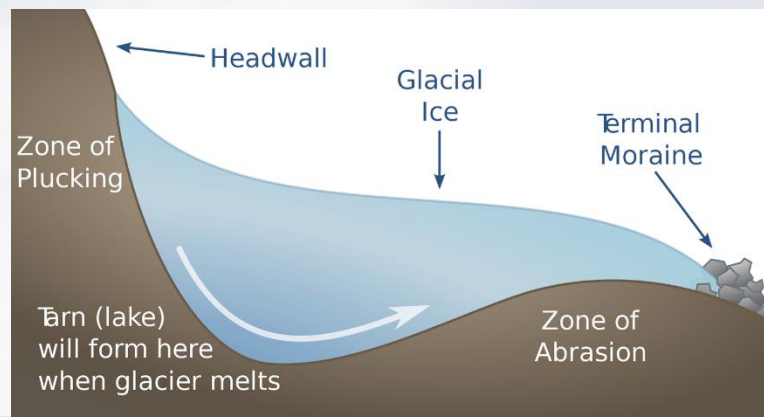
Horn



Photo: Mike Wallin

Source: <http://www.ivo.se/mike/matter.html>

Horn – 3 or more cirque headwalls leaves a sharp spire-shaped peak e.g. Matterhorn, Switzerland.



Arête



Source: <http://www.zephyrus.demon.co.uk/geography/resources/glaciers/arete.html>

Arête – divide between 2 cirque headwalls e.g. Striding Edge, UK

Arête | *Malbun, Liechtenstein*



U-shaped valleys and misfit rivers



U-shaped valleys and misfit rivers | *Nant Ffrancon, Wales*



U-shaped valleys and misfit rivers | *Glenariff, Antrim*



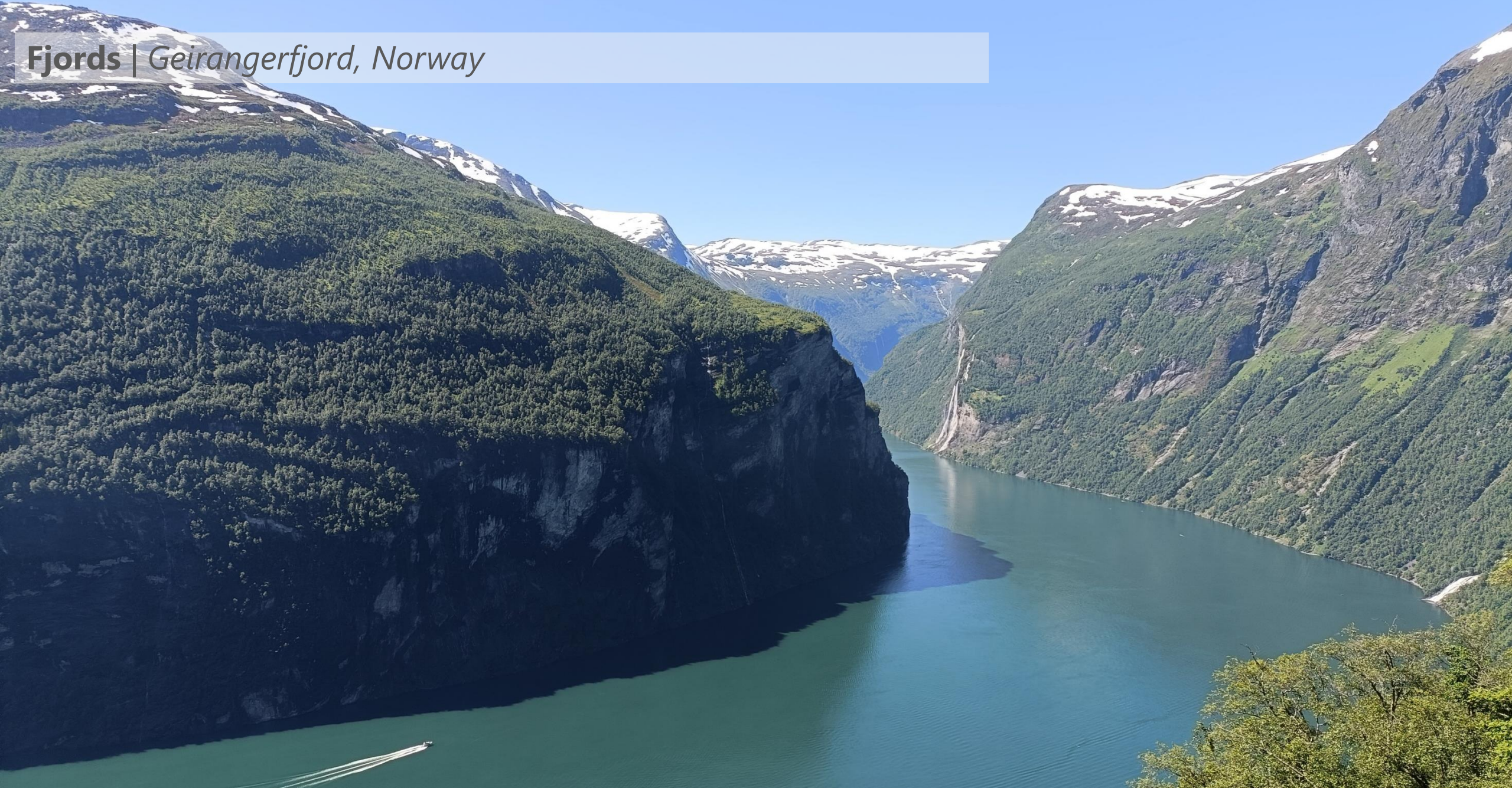
U-shaped valleys and misfit rivers | *Sylte, Norway*



U-shaped valleys and misfit rivers | *Trollstigen, Norway*



Fjords | *Geirangerfjord, Norway*



Fjords | *Killary Harbour, Galway*



Fjords | *Killary Harbour, Galway*



Fjords | *Killary Harbour, Galway*



Glacial Erosion | *Pavements and Striations*



Glacial pavements

- Surfaces smoothed by glacial erosion

Striations

- Linear grooves cut by glacial erosion



Pavements and Striations | *Killary Harbour*



Pavements and Striations | *Killary Harbour*



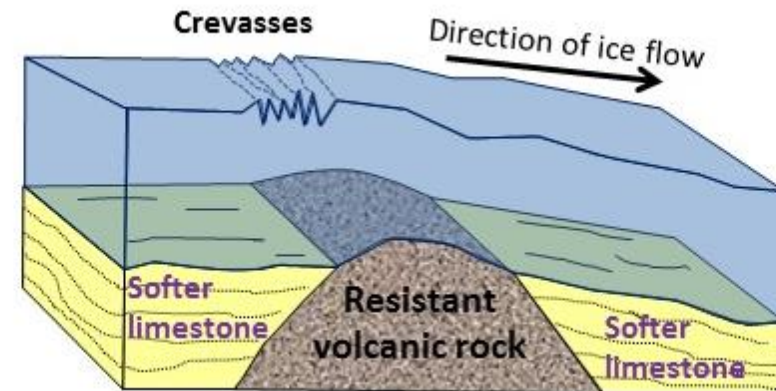
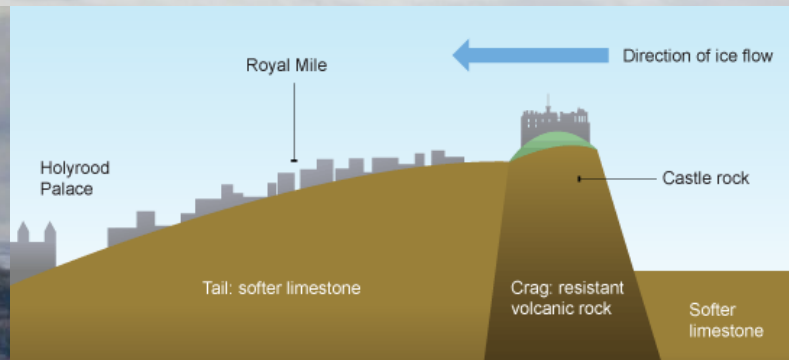
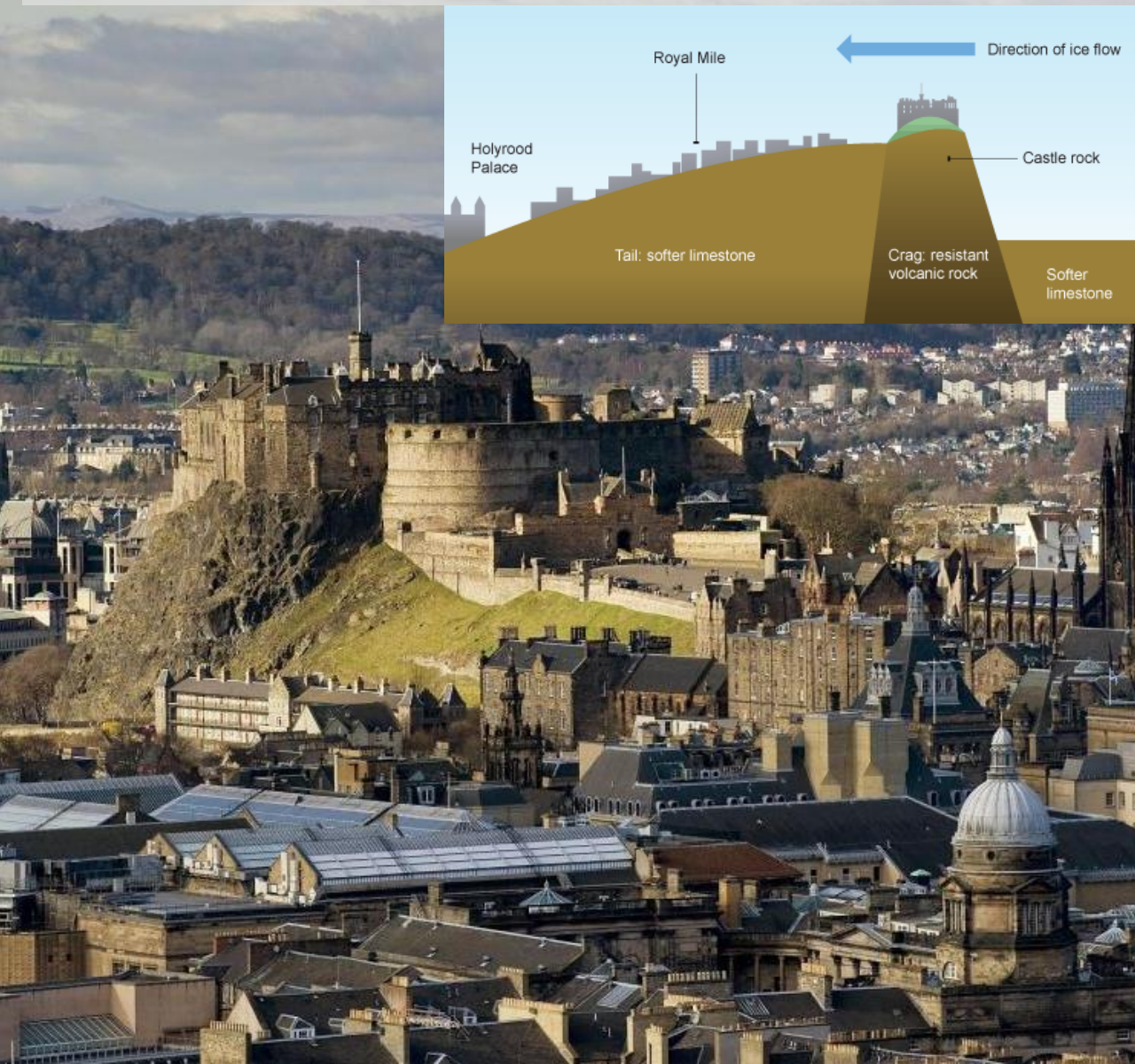
Pavements and Striations | *Killary Harbour*



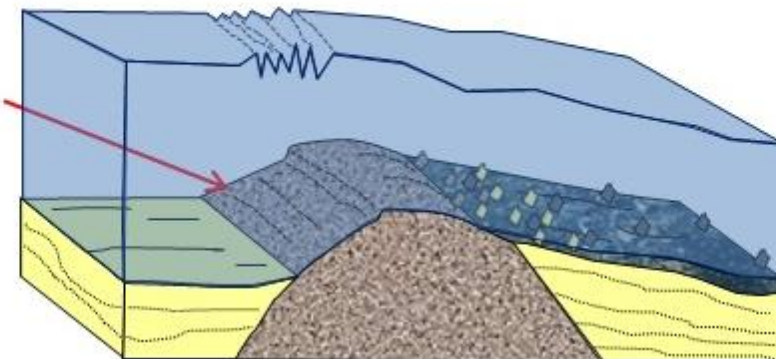
Pavements and Striations | *Killary Harbour*



Crag & tail | *Edinburgh Castle & Royal Mile*



Plucking and abrasion erode the stoss side of the feature



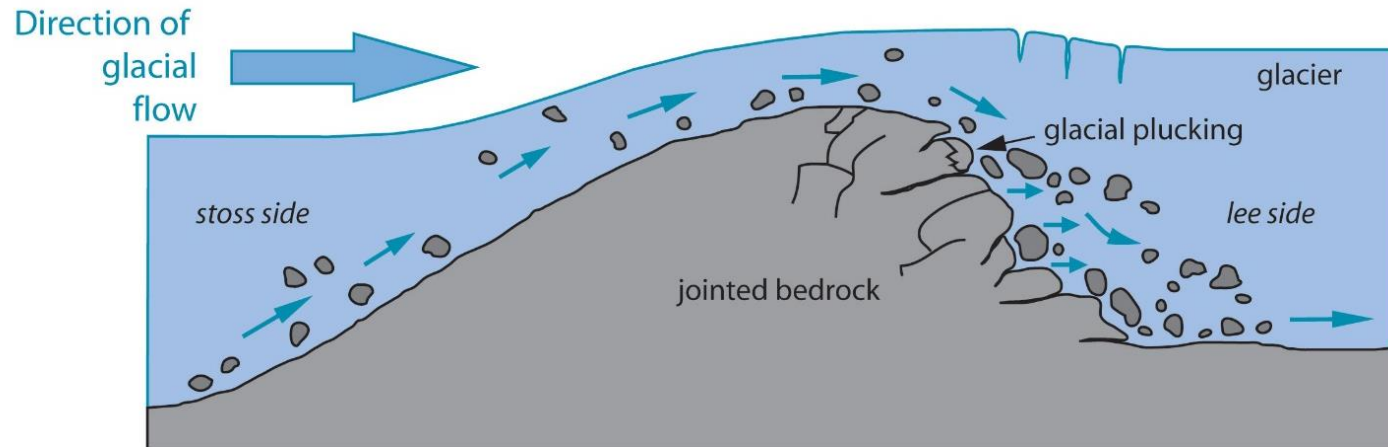
Moraines are often deposited on the top of the tail

Crag is steep sided and has cracks in it from plucking



Less resistant rock gives the tail, which has a gentler gradient

Glacial Erosion | *Roches moutonnées*



Glacier erosion by plucking on the lee side of a protruding rock outcrop



Glacial Deposition | *Erratics*

Clasts carried by glaciers a long distance from their provenance

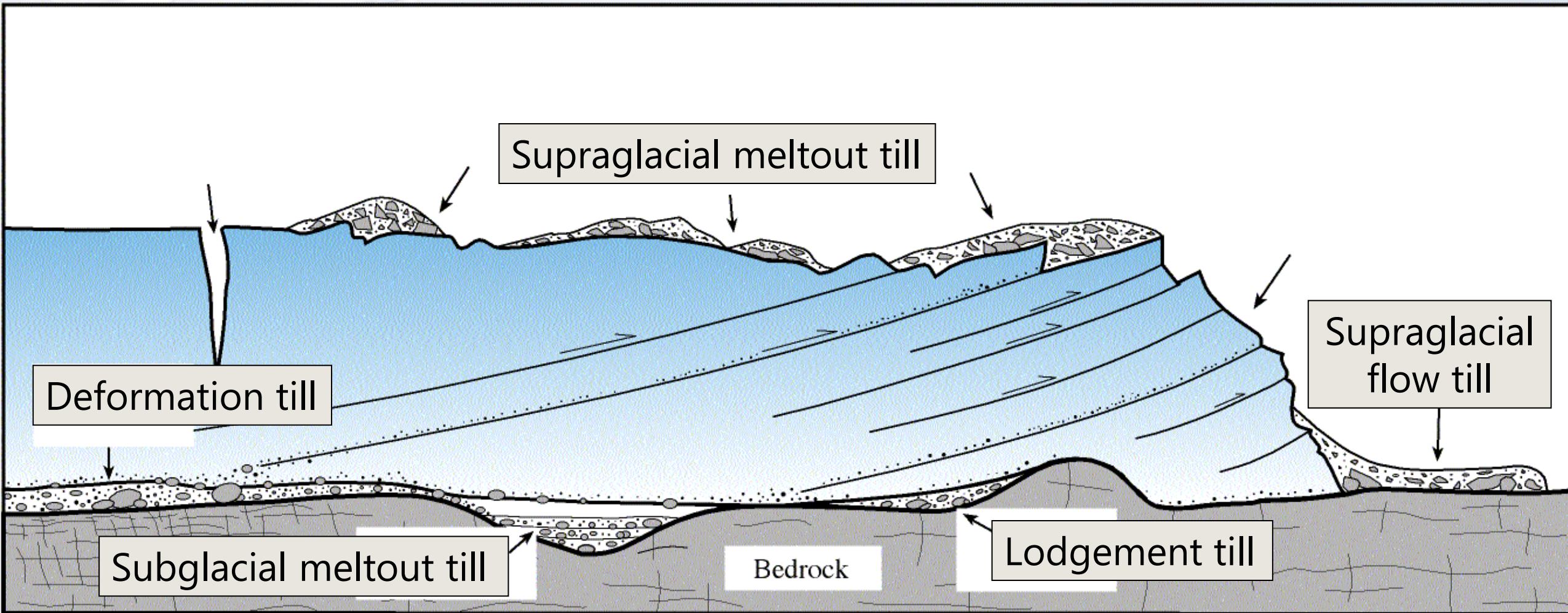
Usually noted as large boulders, but also applies to small extrabasinal clasts



Erratics | *Lumsdin's Bay, Wexford*



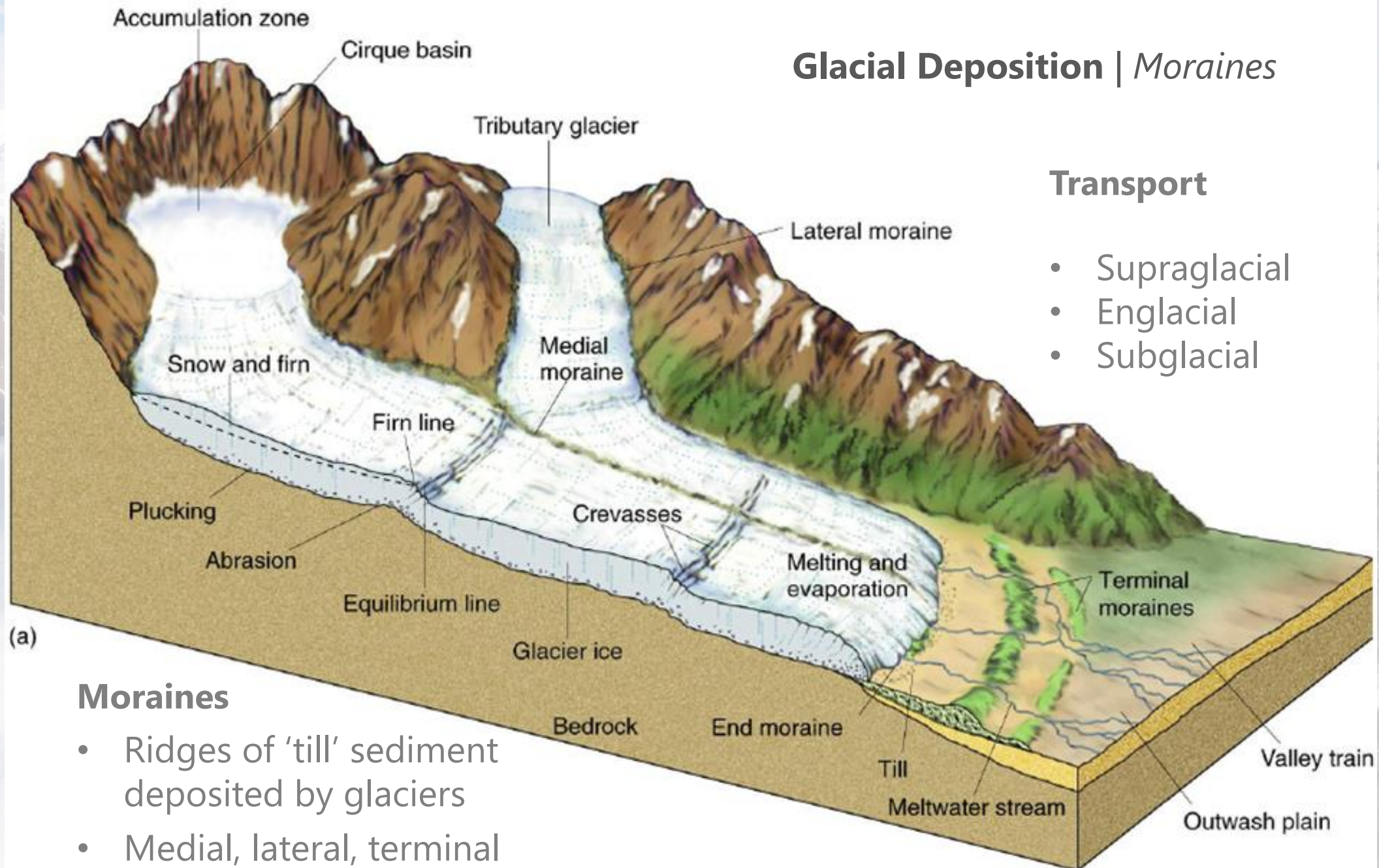
Glacial Deposition | *Till*



Glacial Deposition | *Moraines*

Transport

- Supraglacial
- Englacial
- Subglacial



Moraines

- Ridges of 'till' sediment deposited by glaciers
- Medial, lateral, terminal

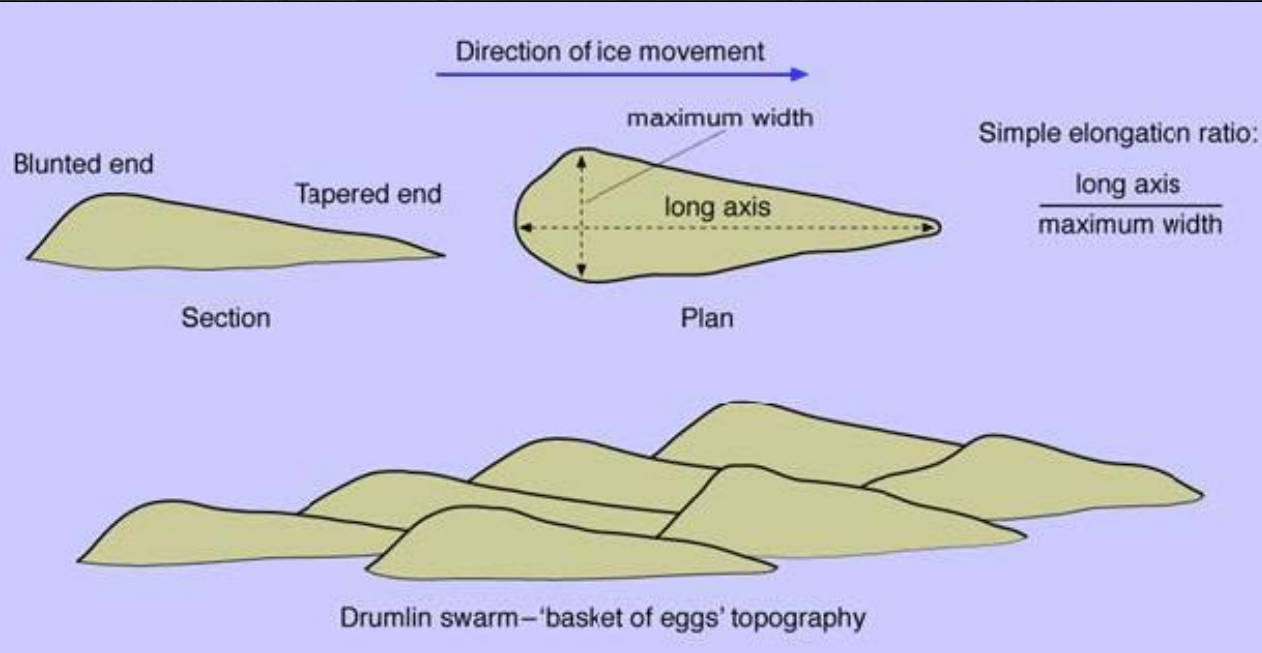
Glacial Deposition | *Moiraine*



Glacial Deposition | *Moraines*



Glacial Deposition | *Drumlins*



'Egg-shaped' hills of 'till' sediment shaped by movement of glaciers

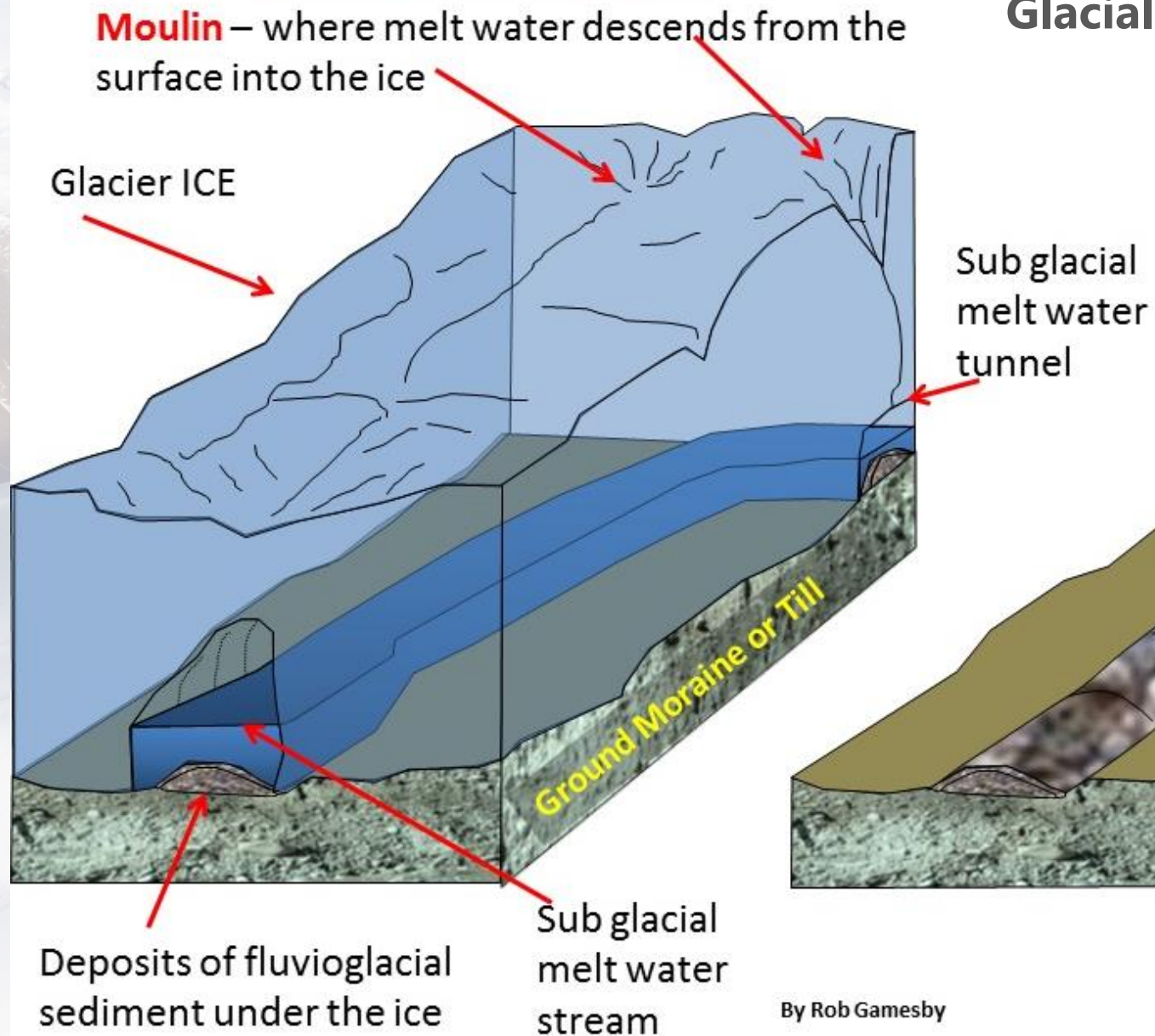
Glacial Deposition | *Drumlins*



Drumlins | *Connemara*



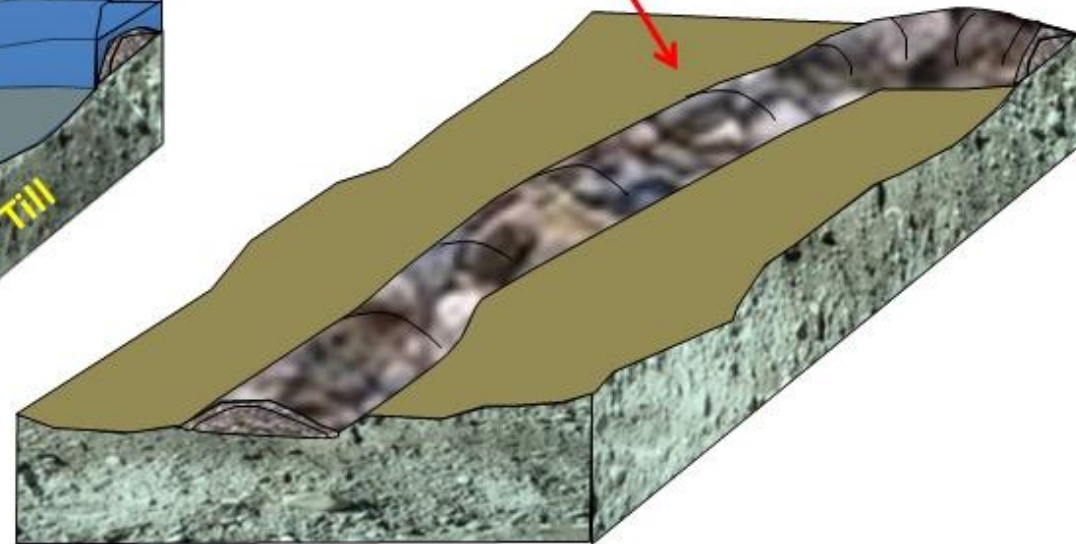
DURING GLACIAL PERIODS



Glacial Deposition | *Eskers*

POST GLACIATION

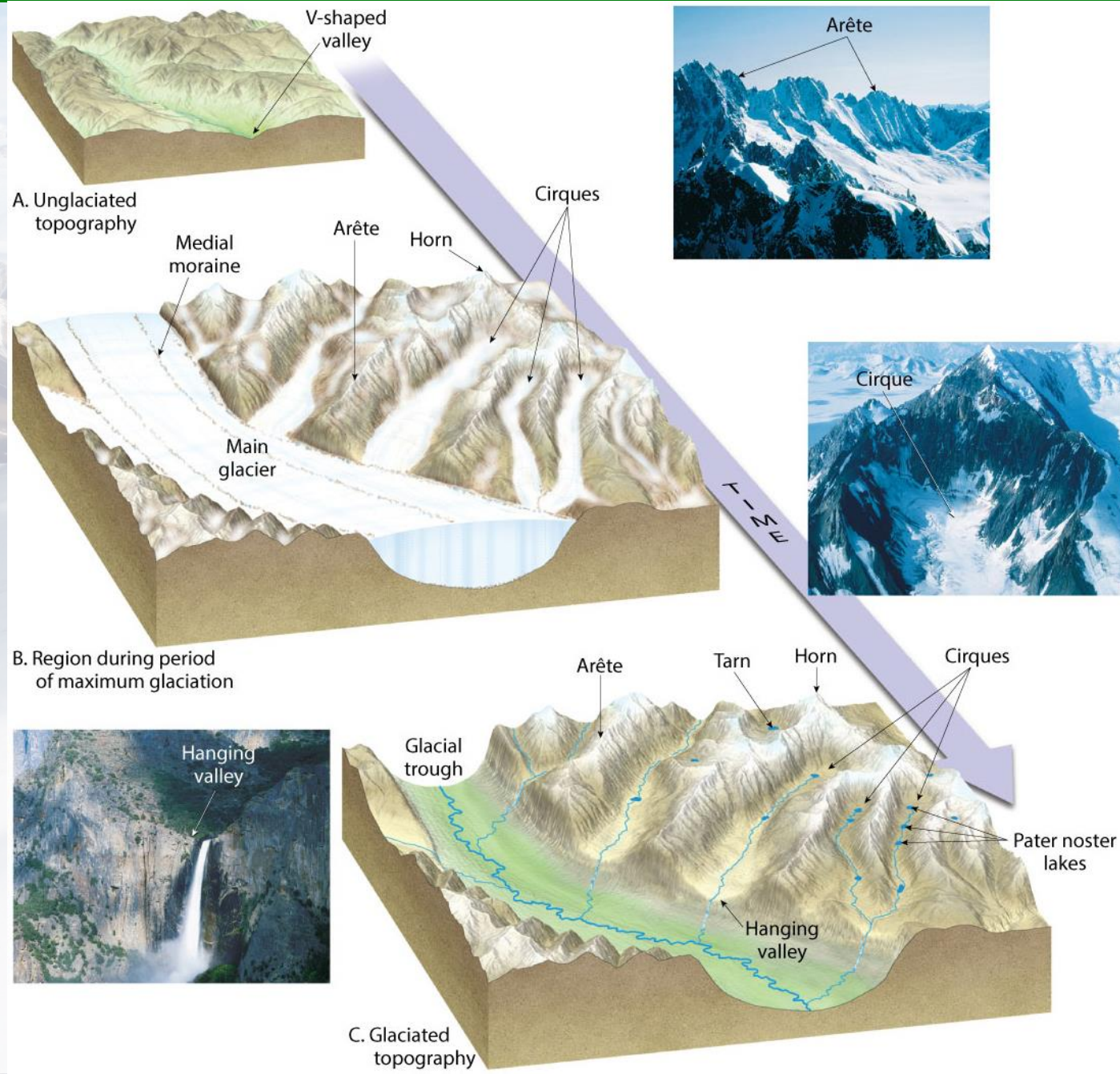
Esker left behind
POST GLACIATION

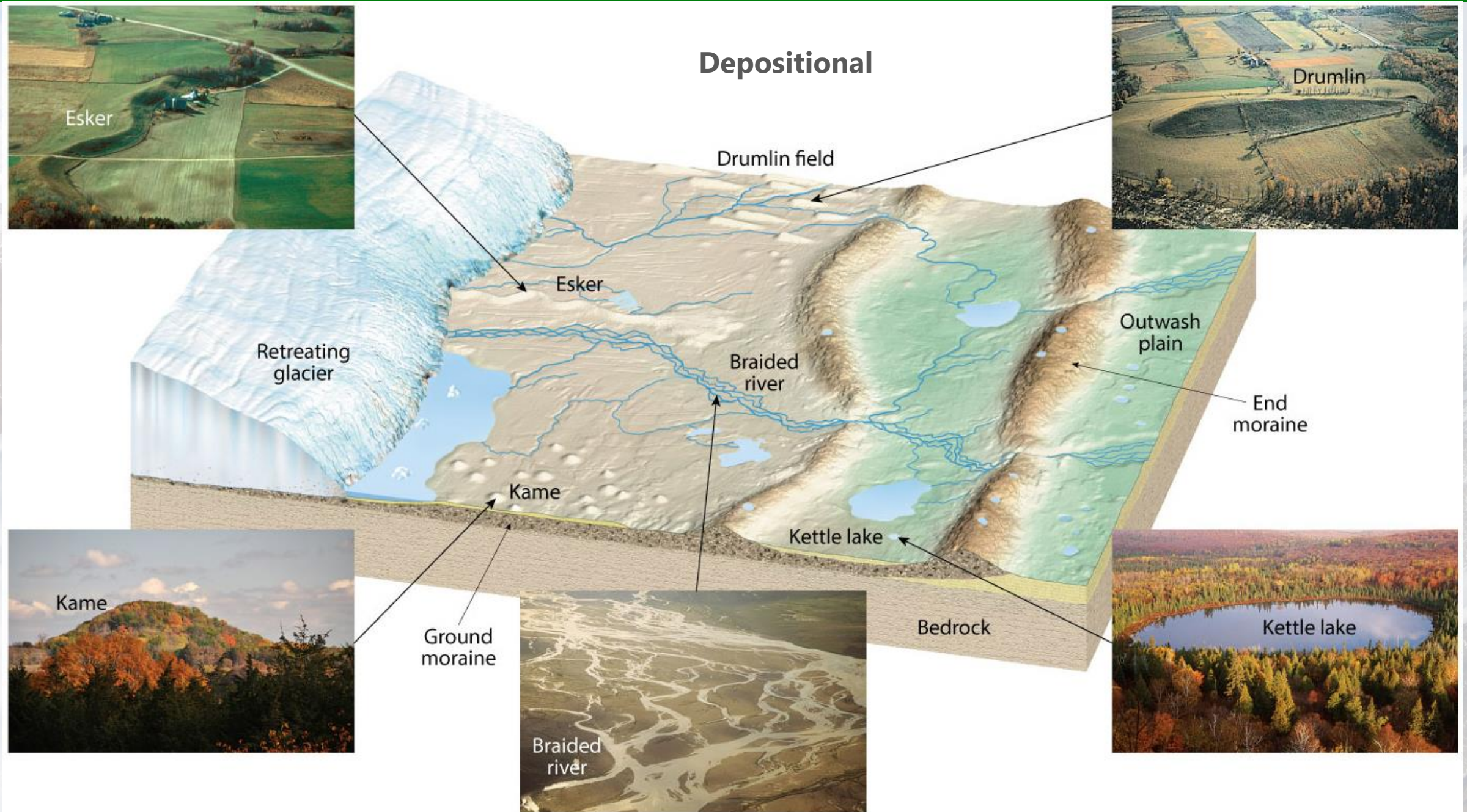


Glacial Deposition | *Eskers*



Erosional

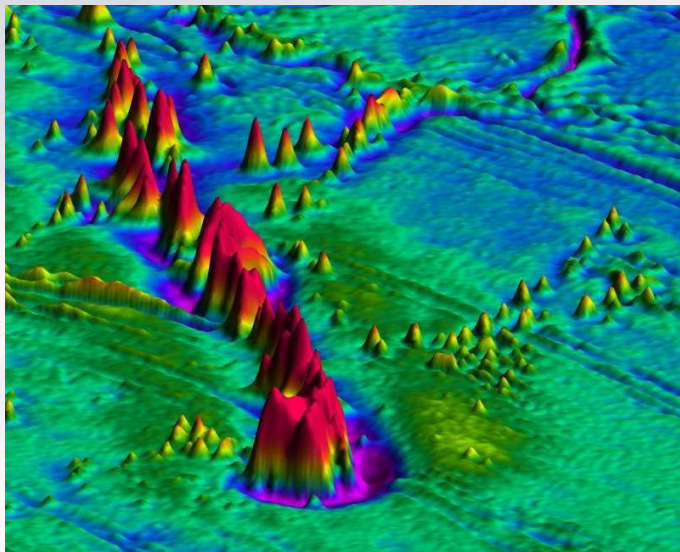
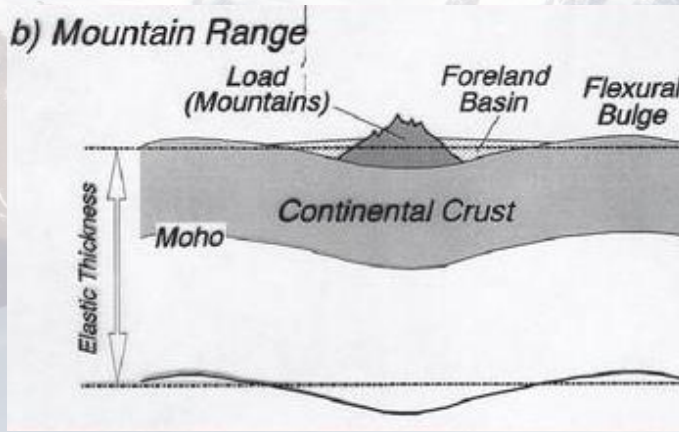
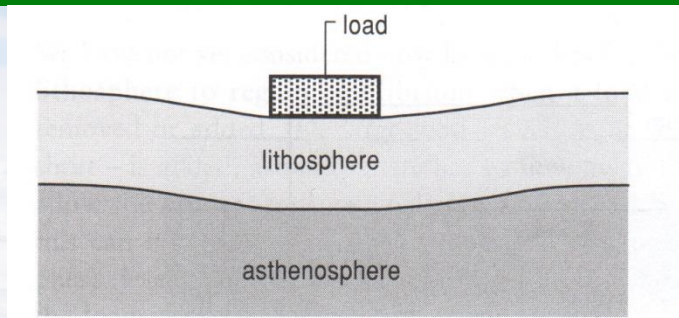




Raised Beaches



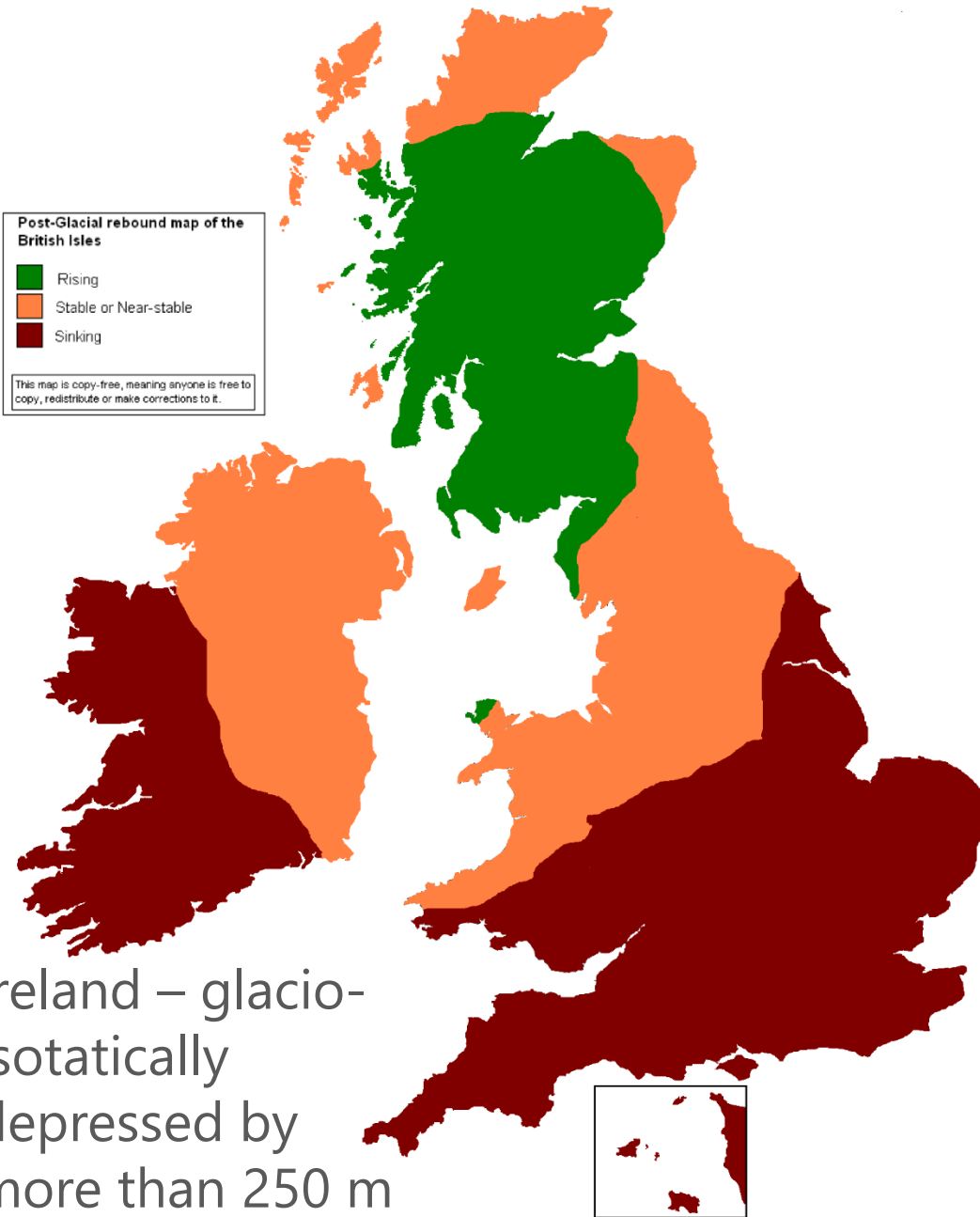
Wait – why raised?
Shouldn't glaciation mean
lower sea level?



Post-Glacial rebound map of the British Isles

- Rising
- Stable or Near-stable
- Sinking

This map is copy-free, meaning anyone is free to copy, redistribute or make corrections to it.



Raised Coastlines



