## Large-scale erosional landforms



Lecture 3



## striations, grooves, furrows



#### Somewhere in Colorado

l6z/data=!4m6!3m5! 80% ☆

Ou X

🔰 stump 🛛 🗱 San Ju

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## tarn = cirque lake

# cirque lake cirque lake

Terrain View topography and elevation









### Somewhere in Colorado

Bald Mountain

Terrain













striations, grooves, furrows **U-shaped valley** cirque (valley at head of glacier) cirque stairway (nested cirques) cirque lake (tarn) arête (ridge between two cirques) horn (peak between several cirques)



## U-shaped valley







# U-shaped valley



U-shaped valley


















































fjord = flooded U-shaped valley Q

















## Question:

How long do glaciers need to make this topography?





and



## Weathering

breaking down rock

and

Erosion transporting it way



## Glaciation

## mainly mechanical weathering

breaking rock into smaller and smaller pieces (sediments)




How to estimate number of sheep?



## Steps

- 1. randomly select and mark 100 sheep with chalk
- 2. let them mix back into flock
- 3. randomly select a bunch sheep and determine fraction F marked
- 4. total sheep = 100 / F

## If only two sheep are marked then the herd is fifty times bigger than the initial group of 100

<sup>10</sup>Be unstable with half-life of 1.6 ma, produced by cosmic rays hitting atmosphere <sup>9</sup>Be stable, naturally occurs in rock at concentration of about 2.5 ppm

<sup>10</sup>Be unstable with half-life of 1.6 ma, produced by cosmic rays hitting atmosphere marked sheep <sup>9</sup>Be stable, naturally occurs in rock at concentration of about 2.5 ppm unmarked sheep



Really only estimate the flux of <sup>9</sup>Be, so you must know <sup>9</sup>Be concentration in rock to determine the flux of sediments



Check method against sediment flux estimated directly by measuring sediment being transported by the river



1 mm/yr is a large denudation rate for rivers





## glaciated

0.25 mm/yr



2.6 my ago

Average Erosion since start of Ice Age

2,600,000 years

0.25 mm/yr

650,000 mm

650 meters

Average Erosion since start of Ice Age

2,600,000 years

0.25 mm/yr

650,000 mm

650 meters

(but locally may be smaller or larger)

