

# Relative Dating

How do we determine a rock's age by the surrounding rocks?

How OLD is THE  
EARTH?

Geologic History



# Relative Dating

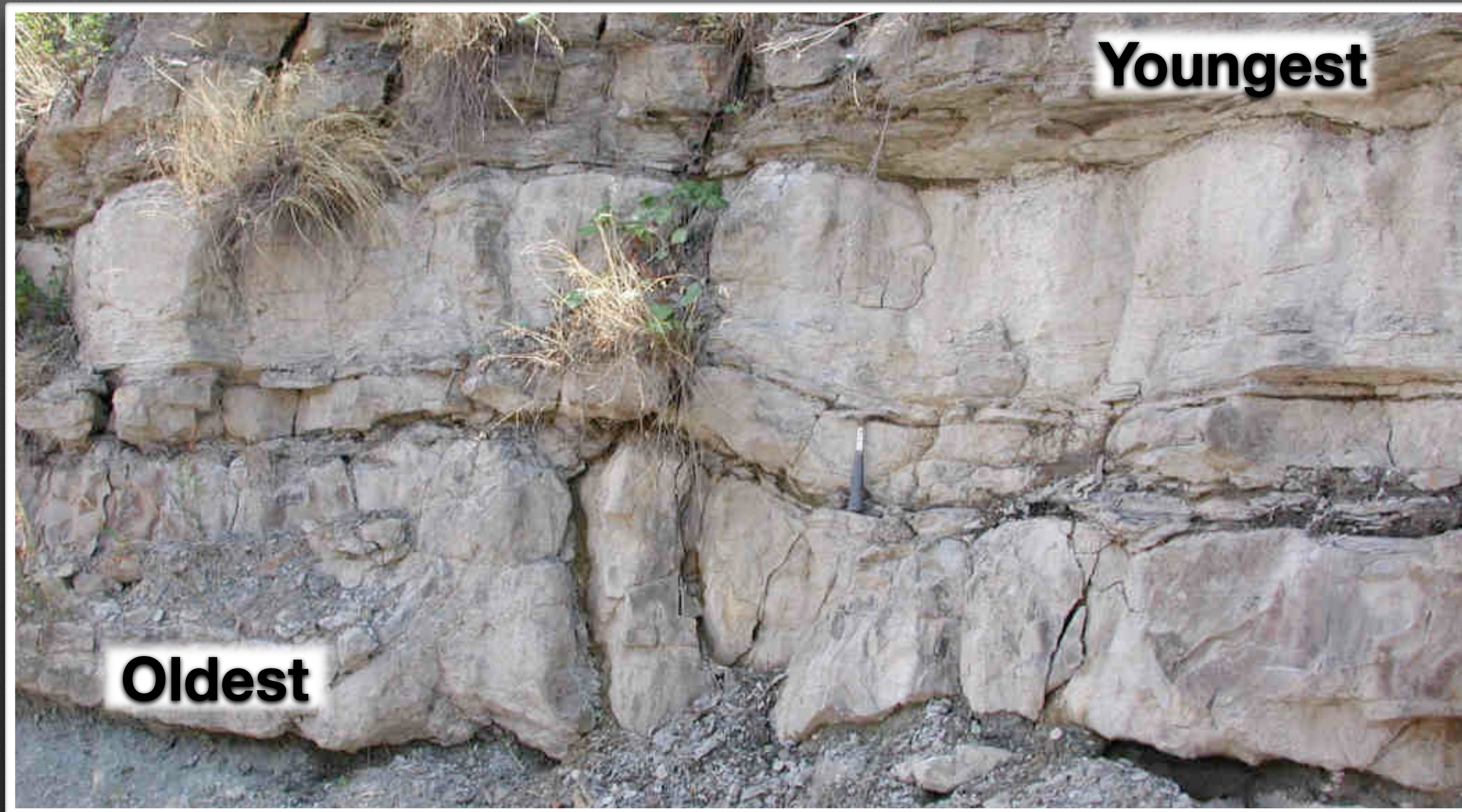
- Uniformitarianism - the idea that forces working on our planet today worked on our planet in the past in the same manner
- “The present is the key to the past”

# Relative Dating

- Relative Dating - determination of the age of a rock or event in relation to other rocks or events

# Relative Dating

- Principle of Superposition - idea that the bottom layer is the oldest and each overlying layer gets progressively younger



Principle of Superposition

# Relative Dating

- Original Horizontality - idea that sedimentary and igneous rocks are deposited in parallel layers to Earth's surface

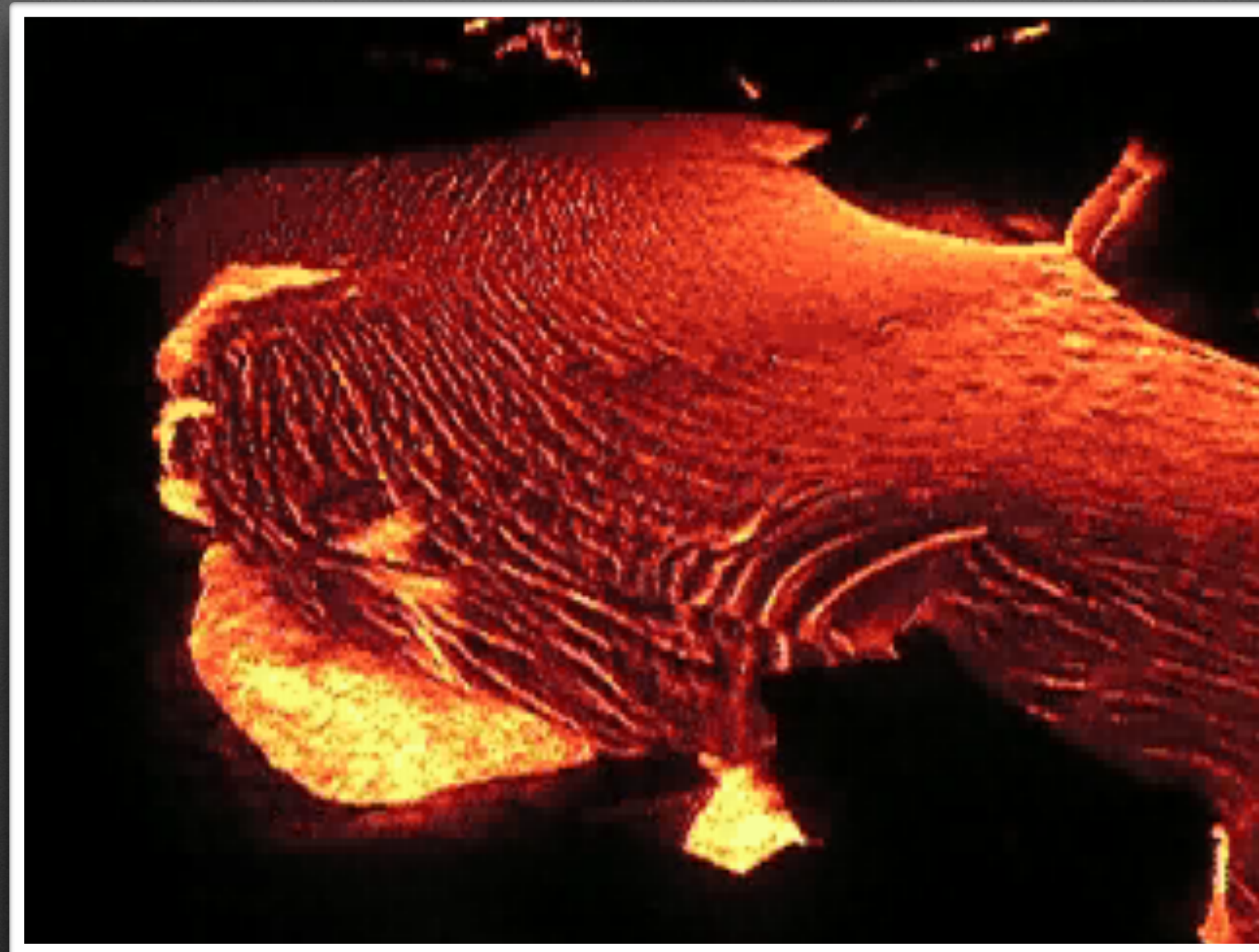


Original Horizontality



# Relative Dating

- Extrusions - molten rock flows onto the surface

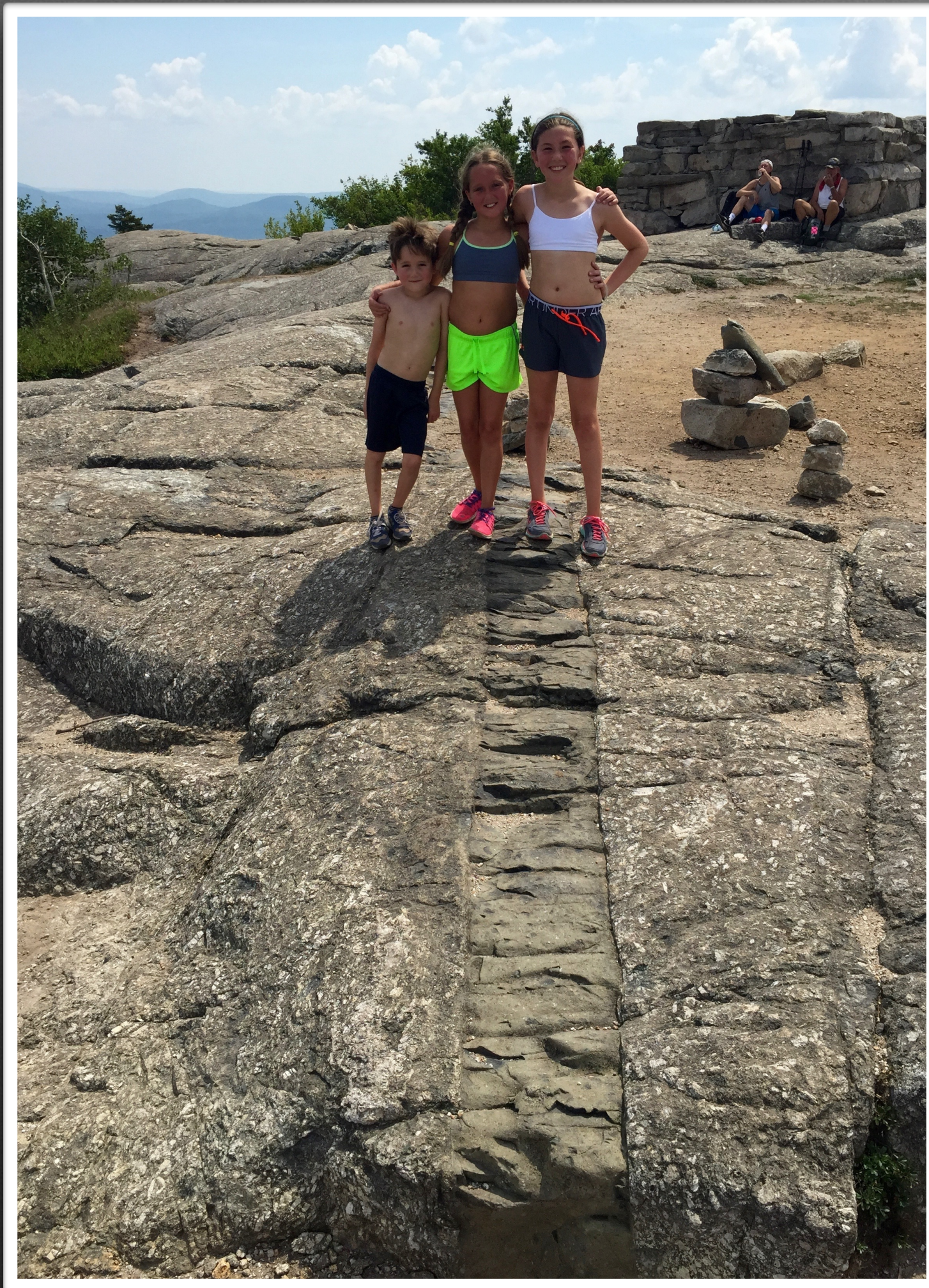


# Relative Dating

- Intrusions - when molten rock squeezes into preexisting rock layers
  - Younger than the rocks that they crosscut
  - Exception to the principle of superposition



Igneous Intrusions



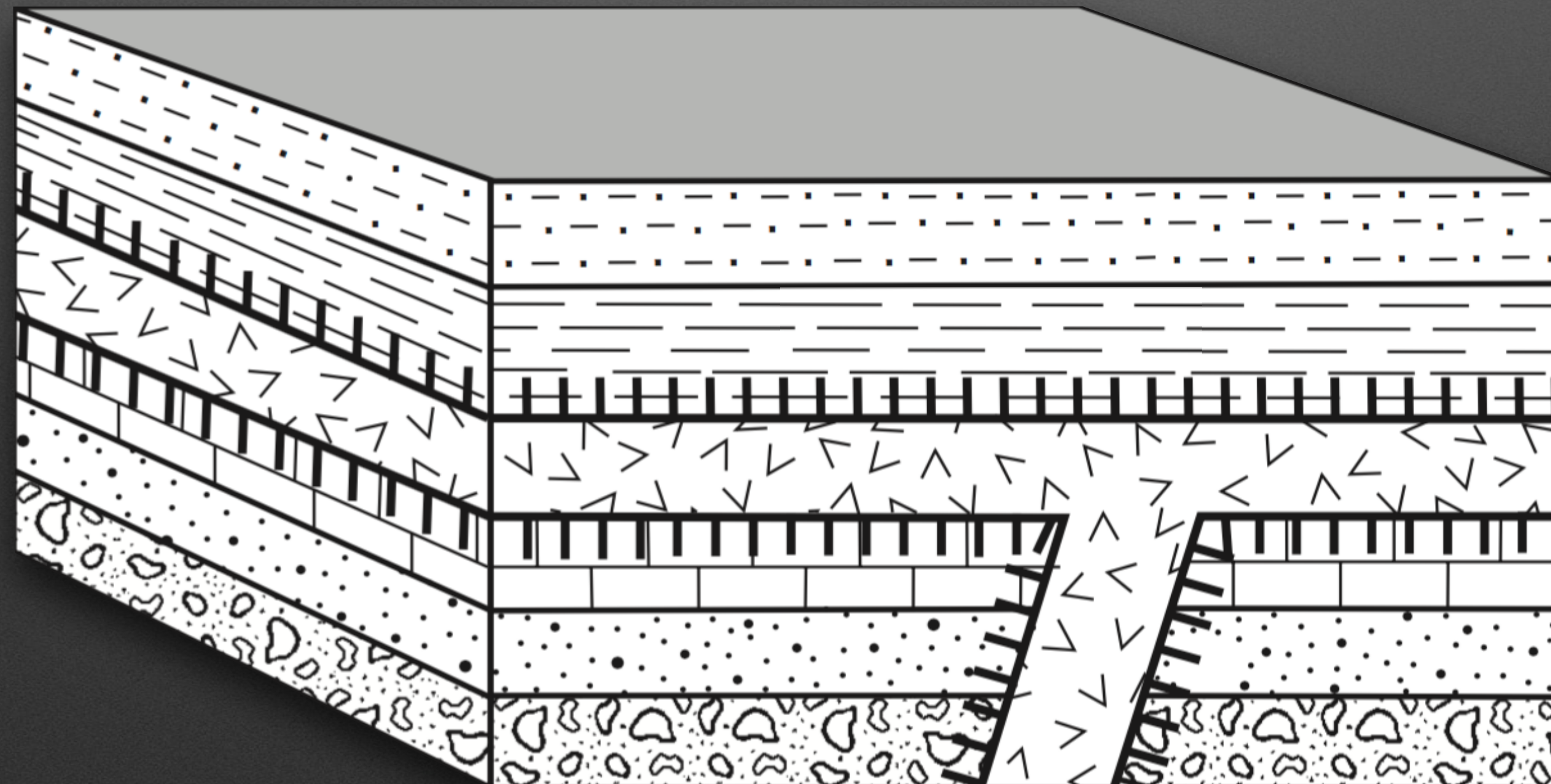
New Hampshire

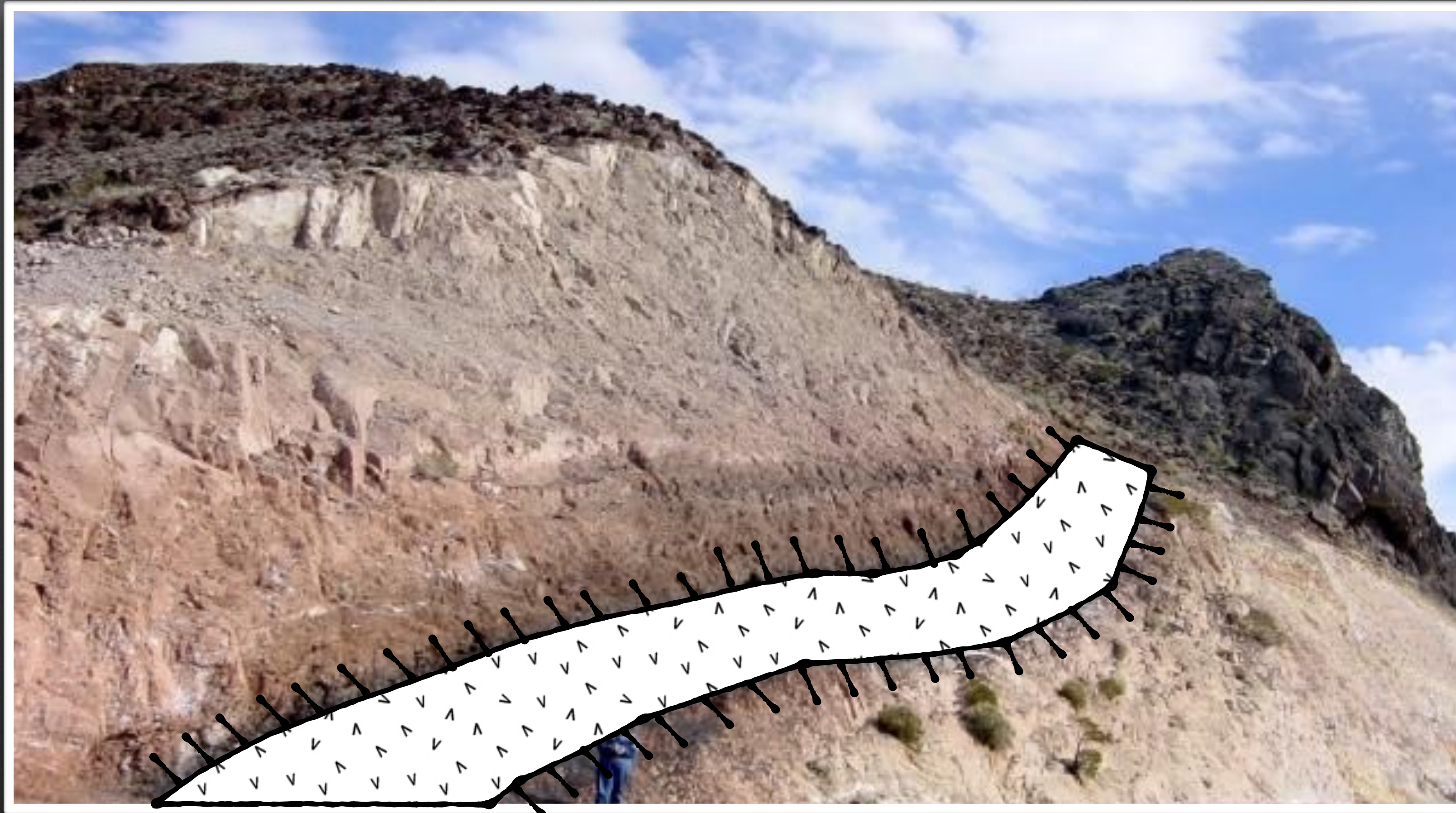


Hawaii

# Relative Dating

- Contact Metamorphism - temperature induces change of preexisting rocks along an intrusion

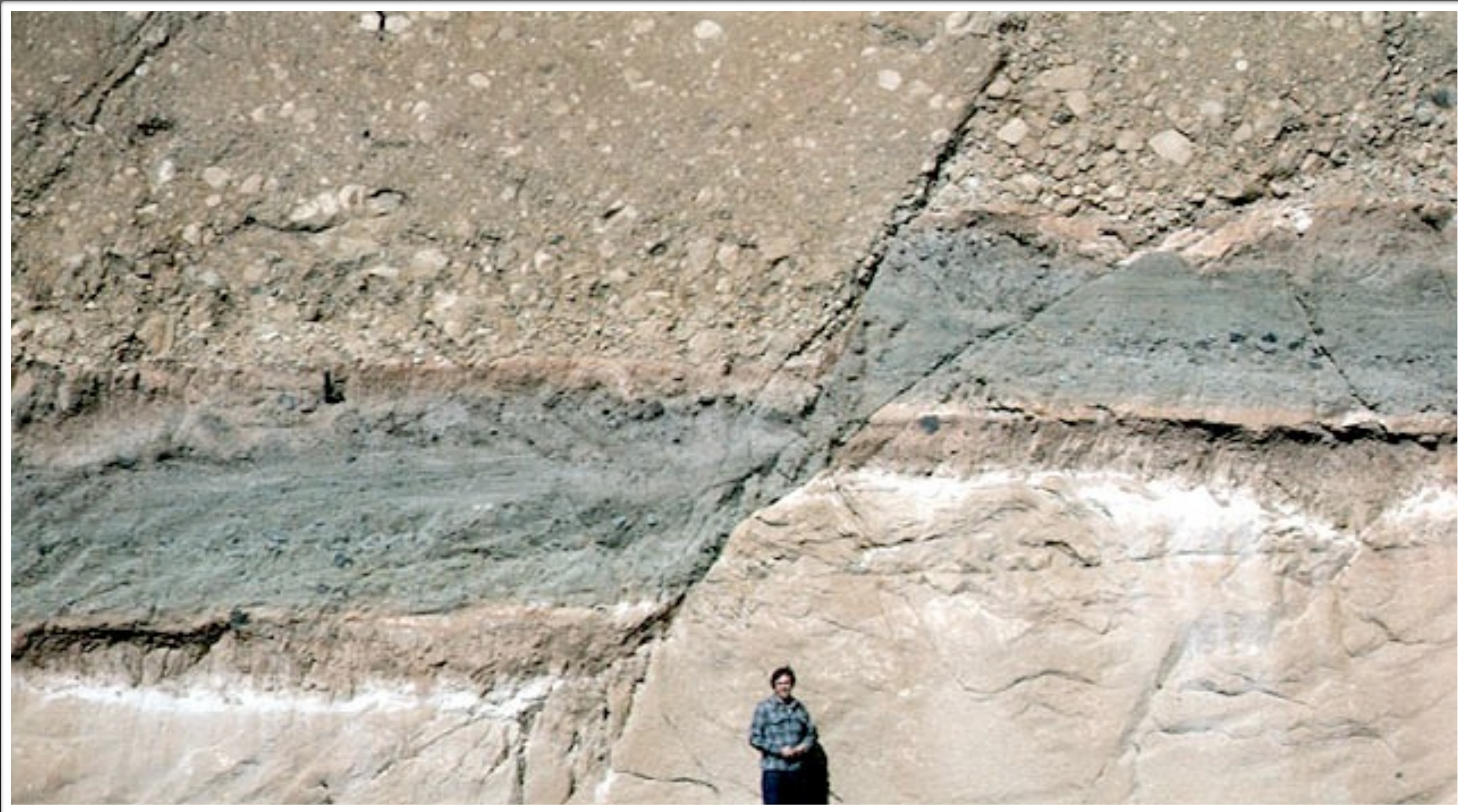




Contact Metamorphism

# Relative Dating

- Faults - a crack in the bedrock where movement has occurred
  - Younger than the rocks that they crosscut



Faults





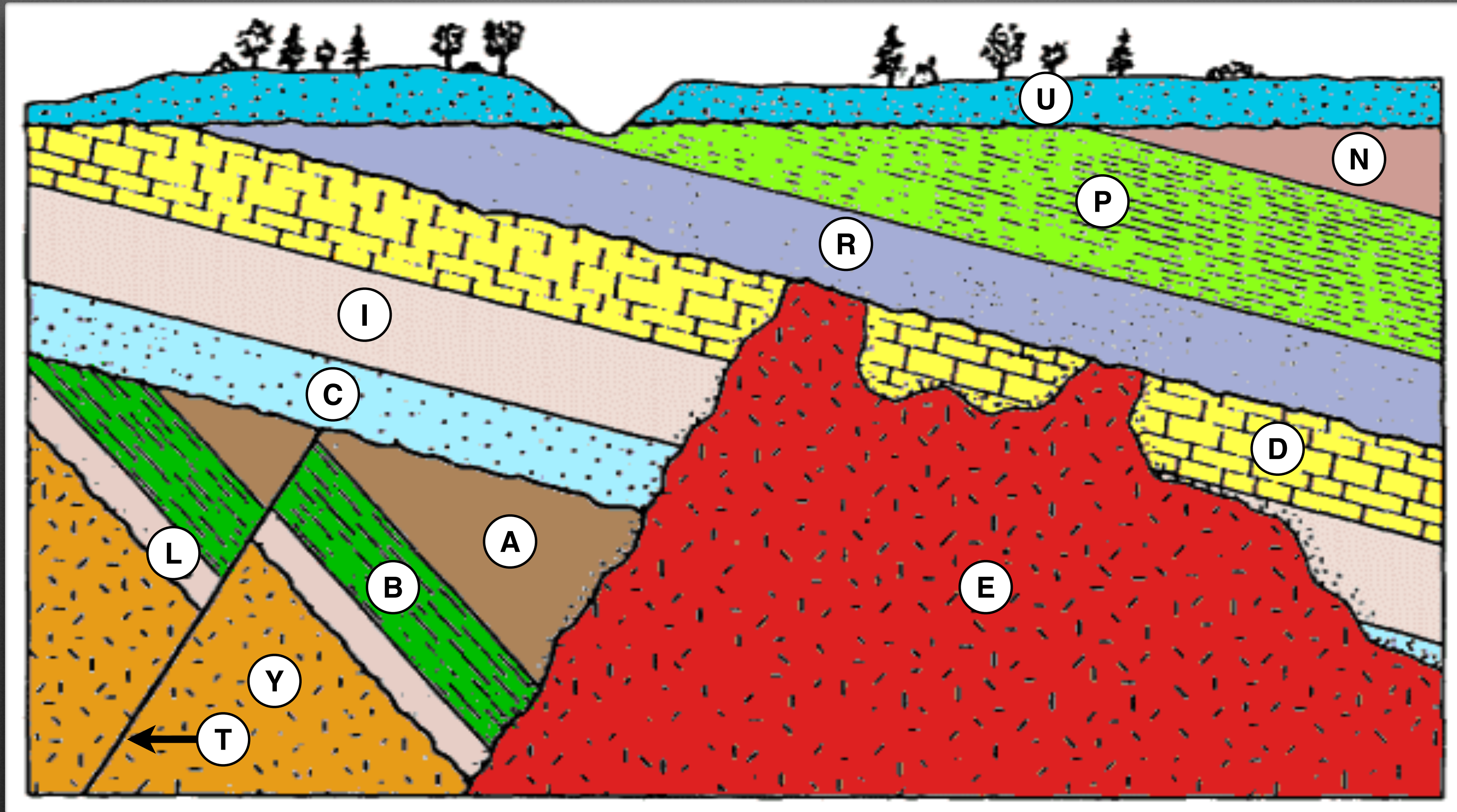
Faults

# Relative Dating

- Folds - when thrusting rock layers cause preexisting rock layers to overturn
  - Exception to the principle of superposition



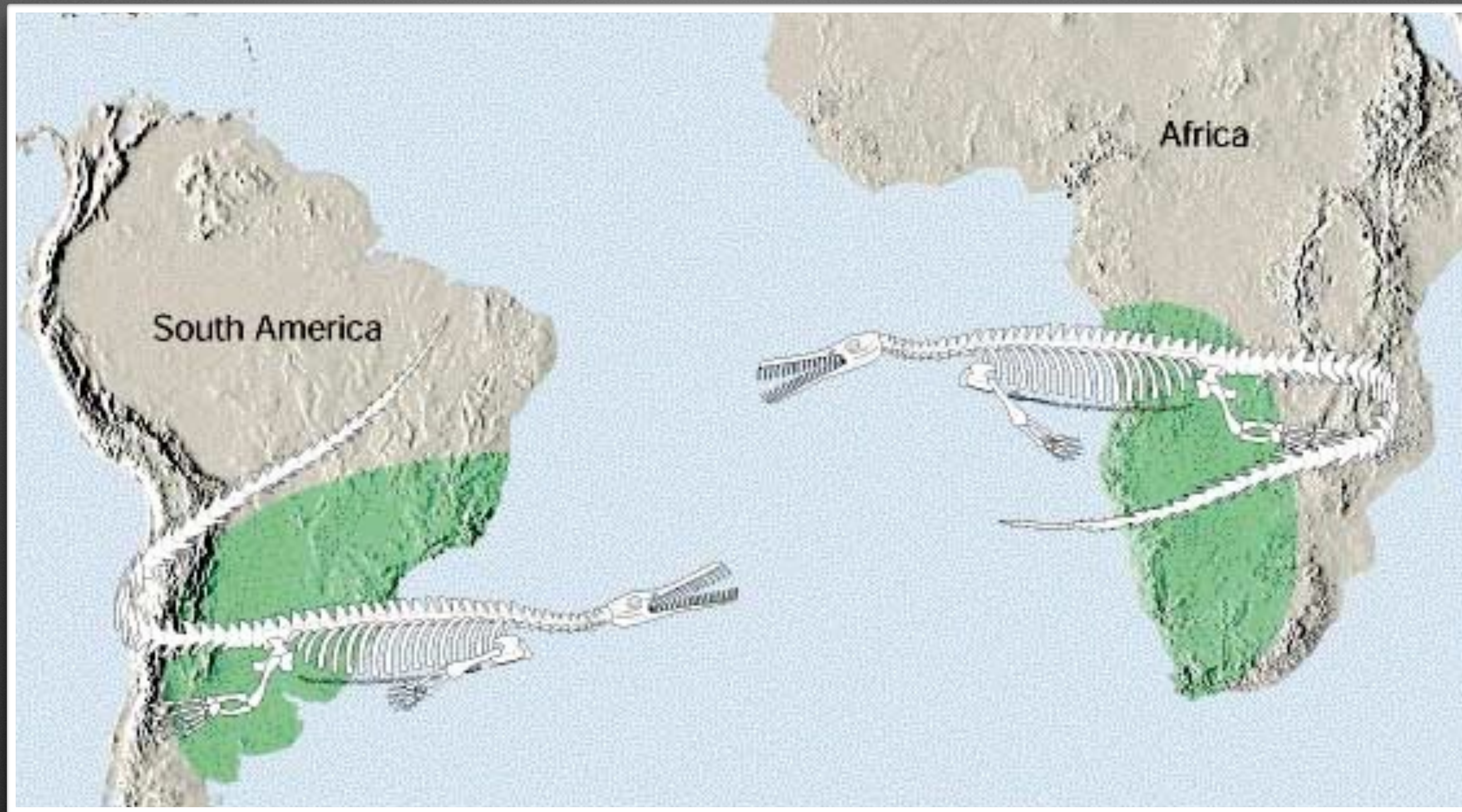
Folds



Relative Dating

# Relative Dating

- Correlation - the process of showing that rocks or geologic events from different places are the same or similar age
  - Correlation is the most effective method when using relative dating



Correlation

# Relative Dating

- What to look for when correlating rocks:
  - Similarities in Rocks
  - Rock Sequence
  - Mineral Composition
  - Color
  - Fossils

# Relative Dating

- Fossils - remains or evidence of former living things
  - Examples: bones, shells, footprints, and organic compounds (DNA)





# Relative Dating

- Index Fossil - fossil used to define and identify geologic periods
  - Best method for correlating rocks

# Relative Dating



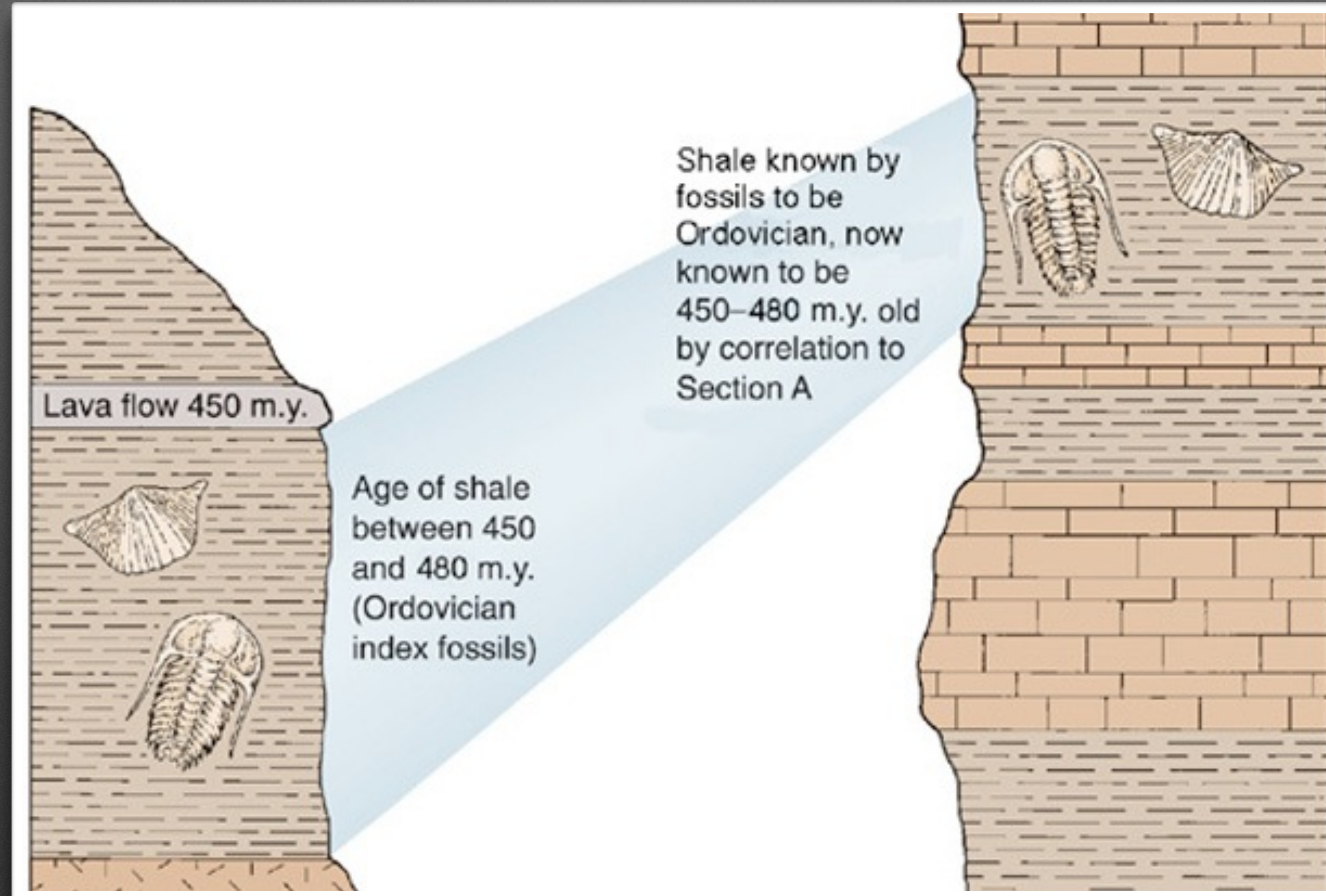
Dinosaur Fossils  
251 - 65 mya



Trilobite Fossils  
544 - 251 mya



Charlie with some Trilobites



Correlation

# Relative Dating

- To be considered a good index fossil it needs to meet two criteria:
  1. The organism existed over a large geographic area
  2. The organism existed over a short time

# Relative Dating

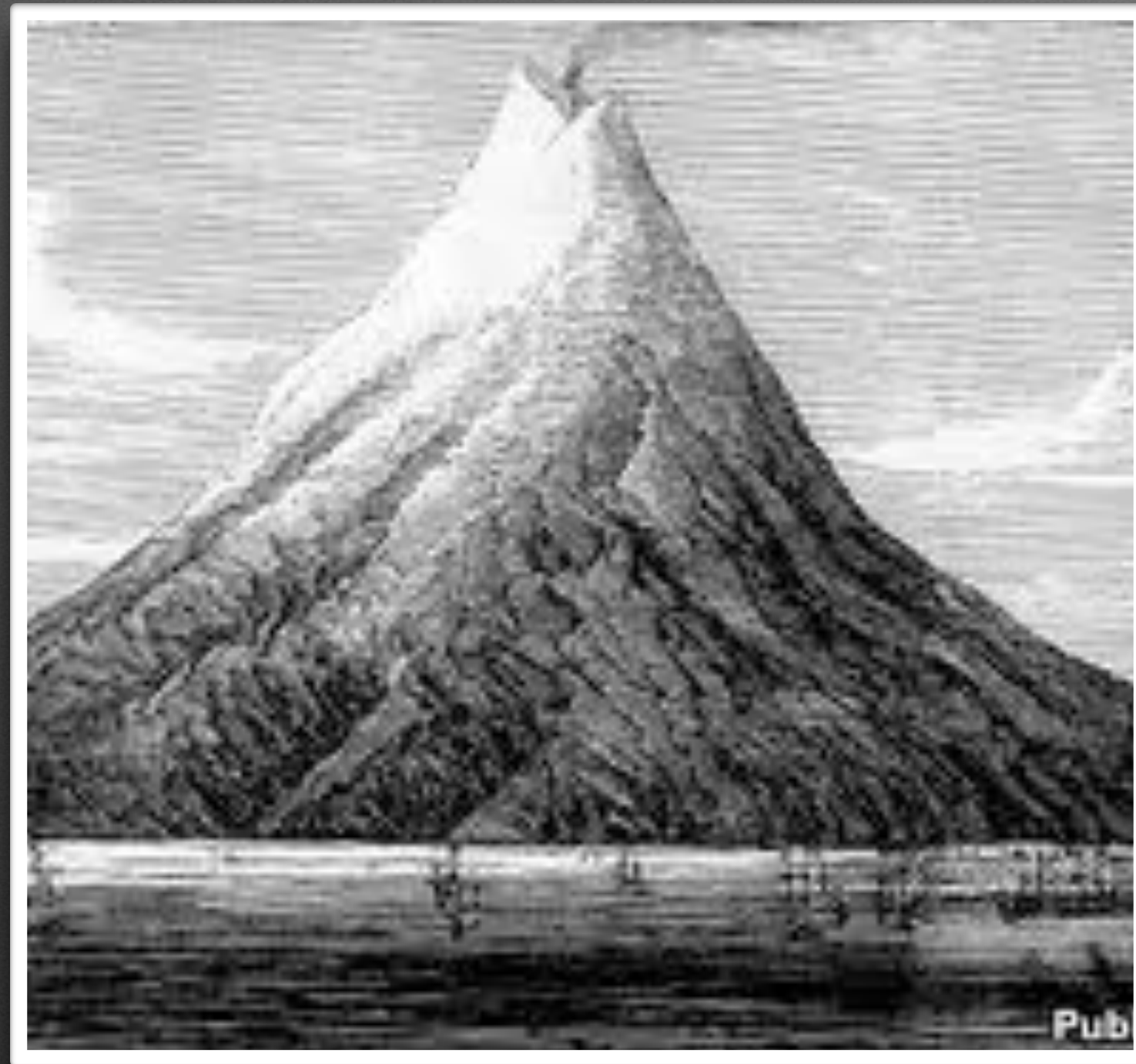
- Geologic Time Markers - deposits spread over large areas that represent a specific date
  - Examples: volcanic ash deposits and meteorite impacts

# Relative Dating



KT Asteroid - 65 mya  
Meteorite Impact

# Relative Dating



Krakatau - 1883  
Volcanic Ash Deposit





KT Boundary



[earthtoleigh.com](http://earthtoleigh.com)