

When Maine Was California

Faults, Volcanoes and Hot Springs in the Pine Tree State



Professor Bill Menke, Columbia University
June 23, 2014

Part 1

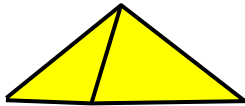
Everything Changes



Very Old



Great Pyramid at Giza
about 4500 years old



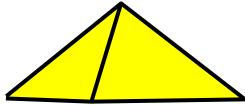
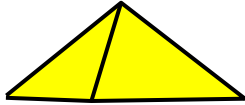
1 pyramid

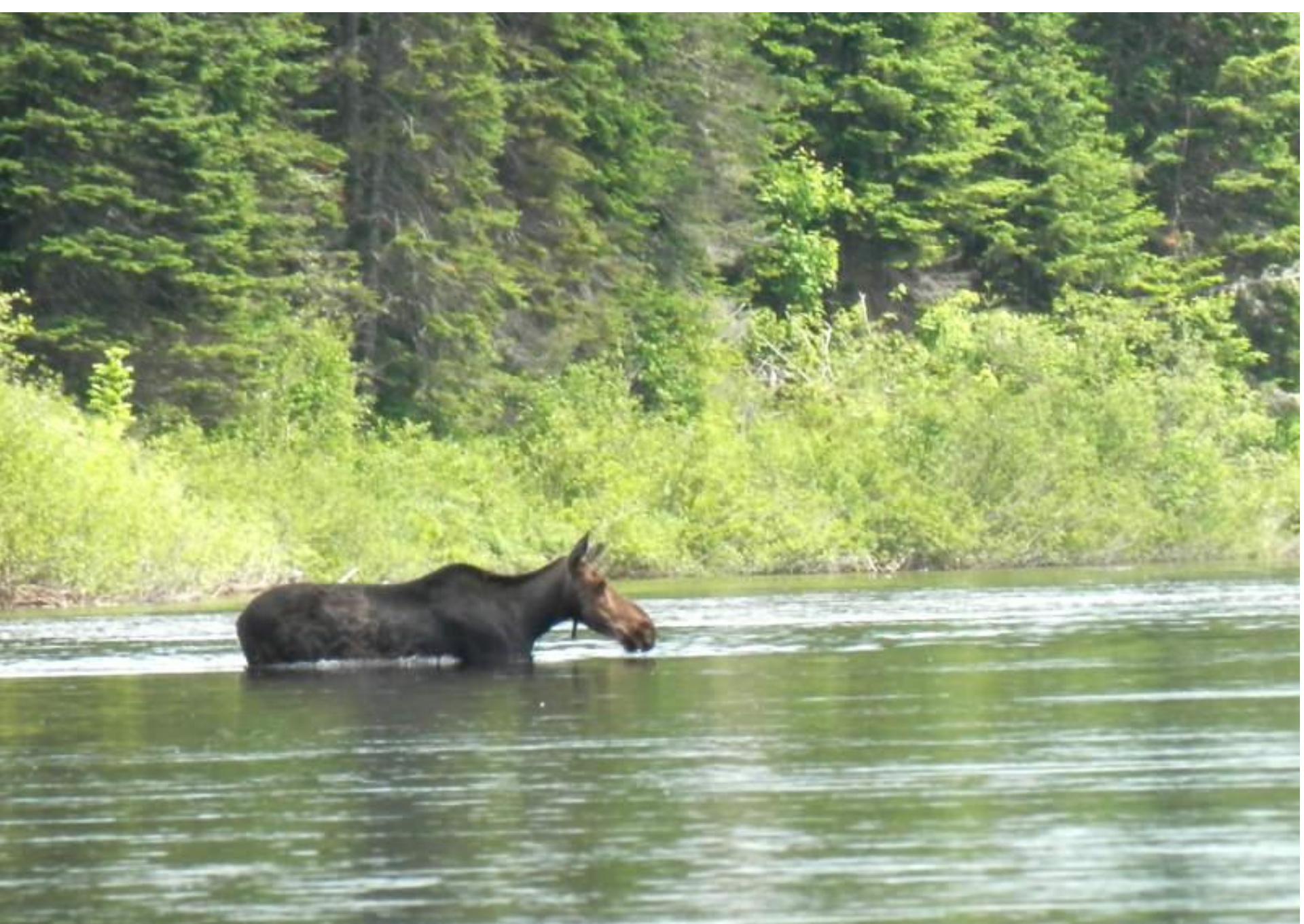
5000 years

Imagine

what Maine was like
4 Pyramids Ago ?

(20,000 years)







Absolutely Nothing Was
Alive in the Entire State





Elevation 1300 feet

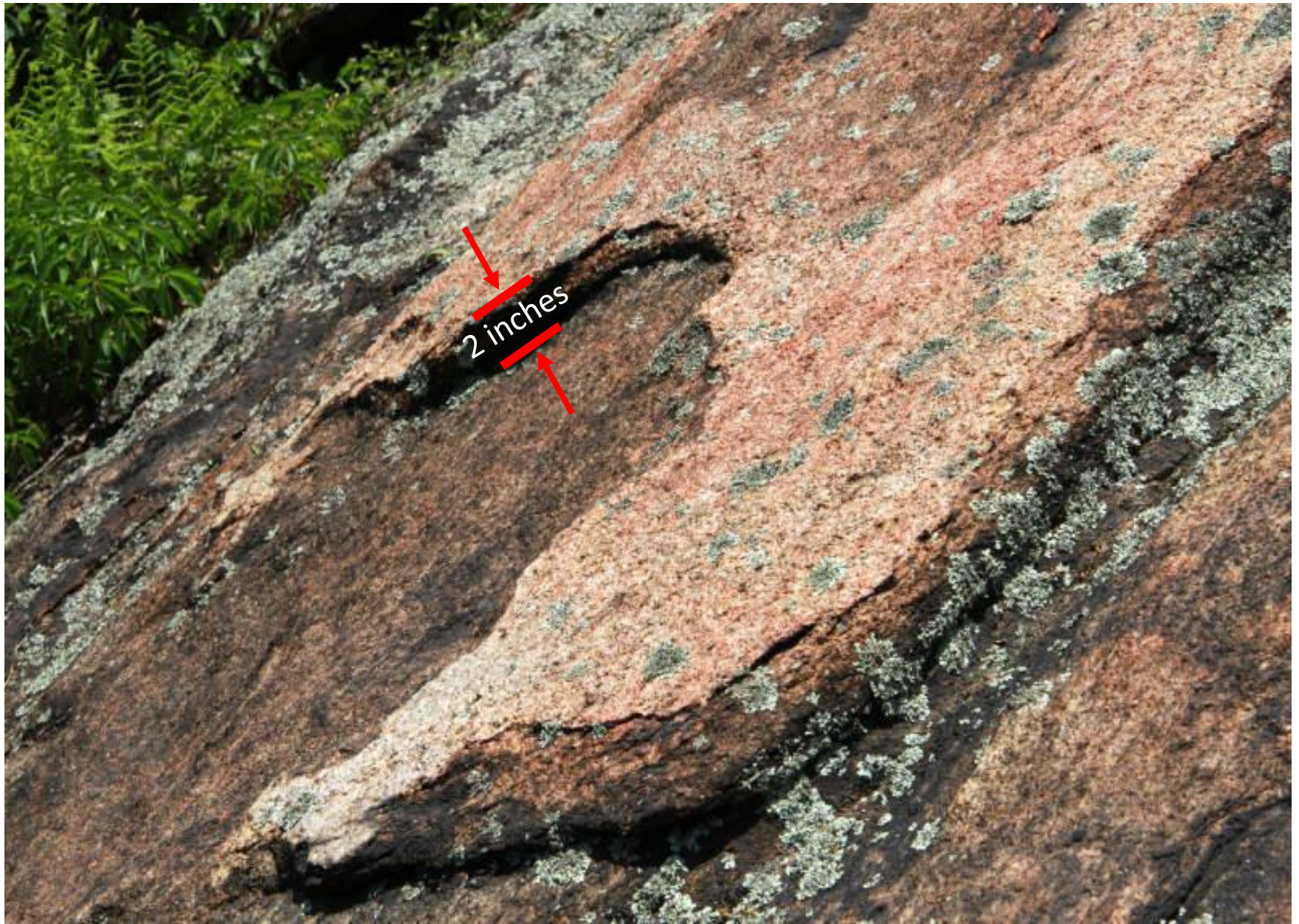






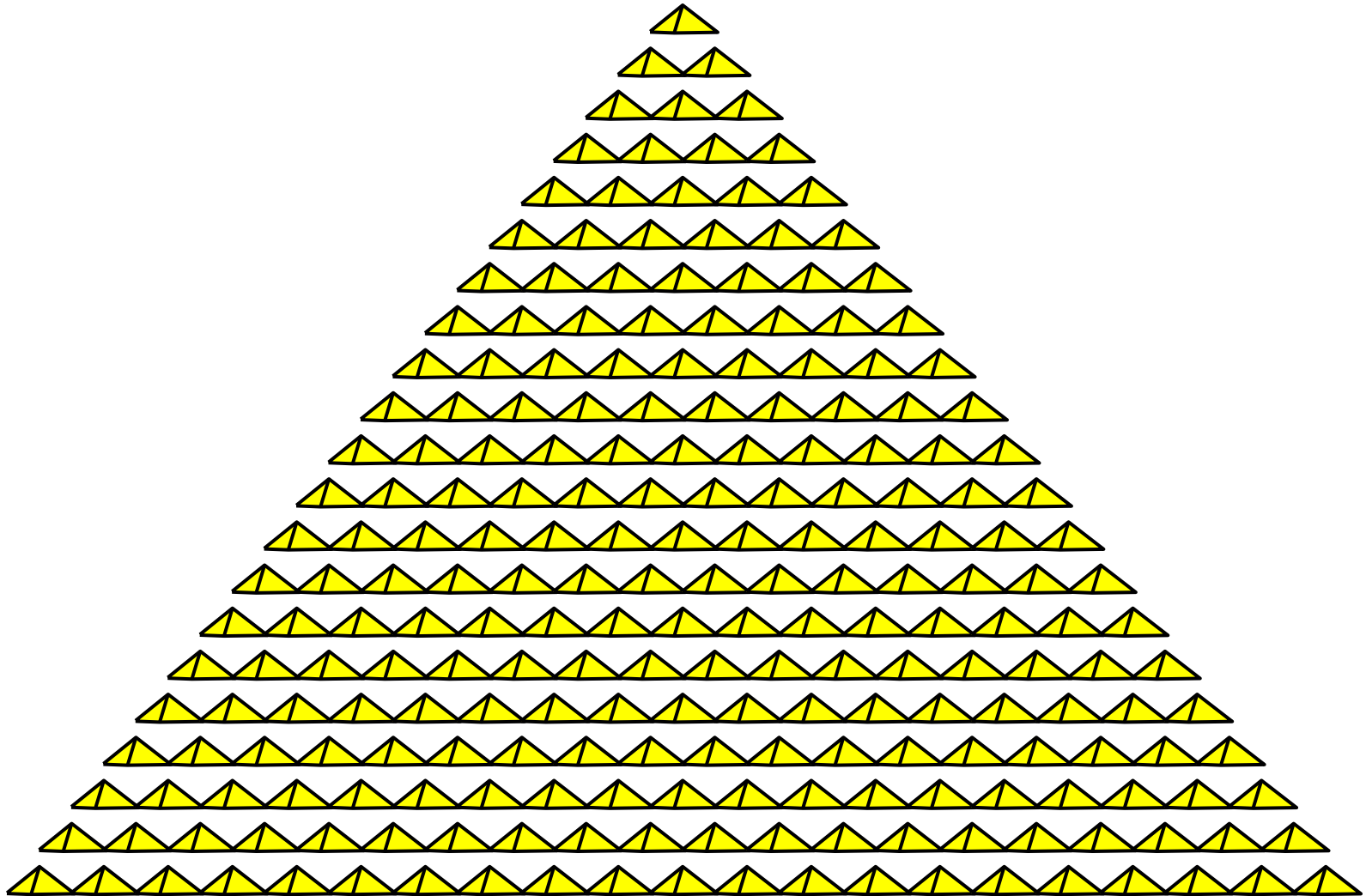


20,000 years
of exposure to the elements



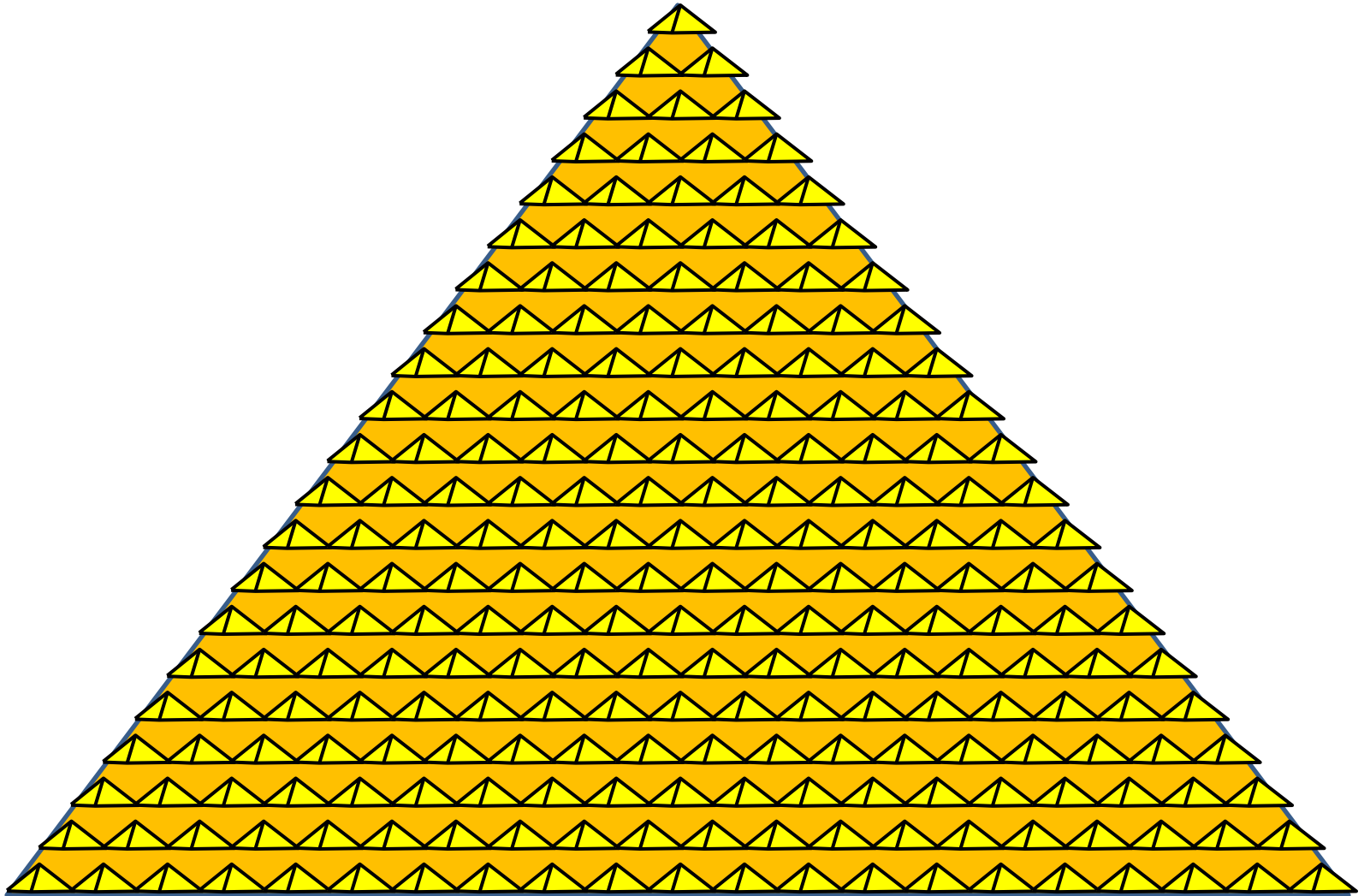
2 inches in 20 thousand years

Pyramid Of 200 Pyramids



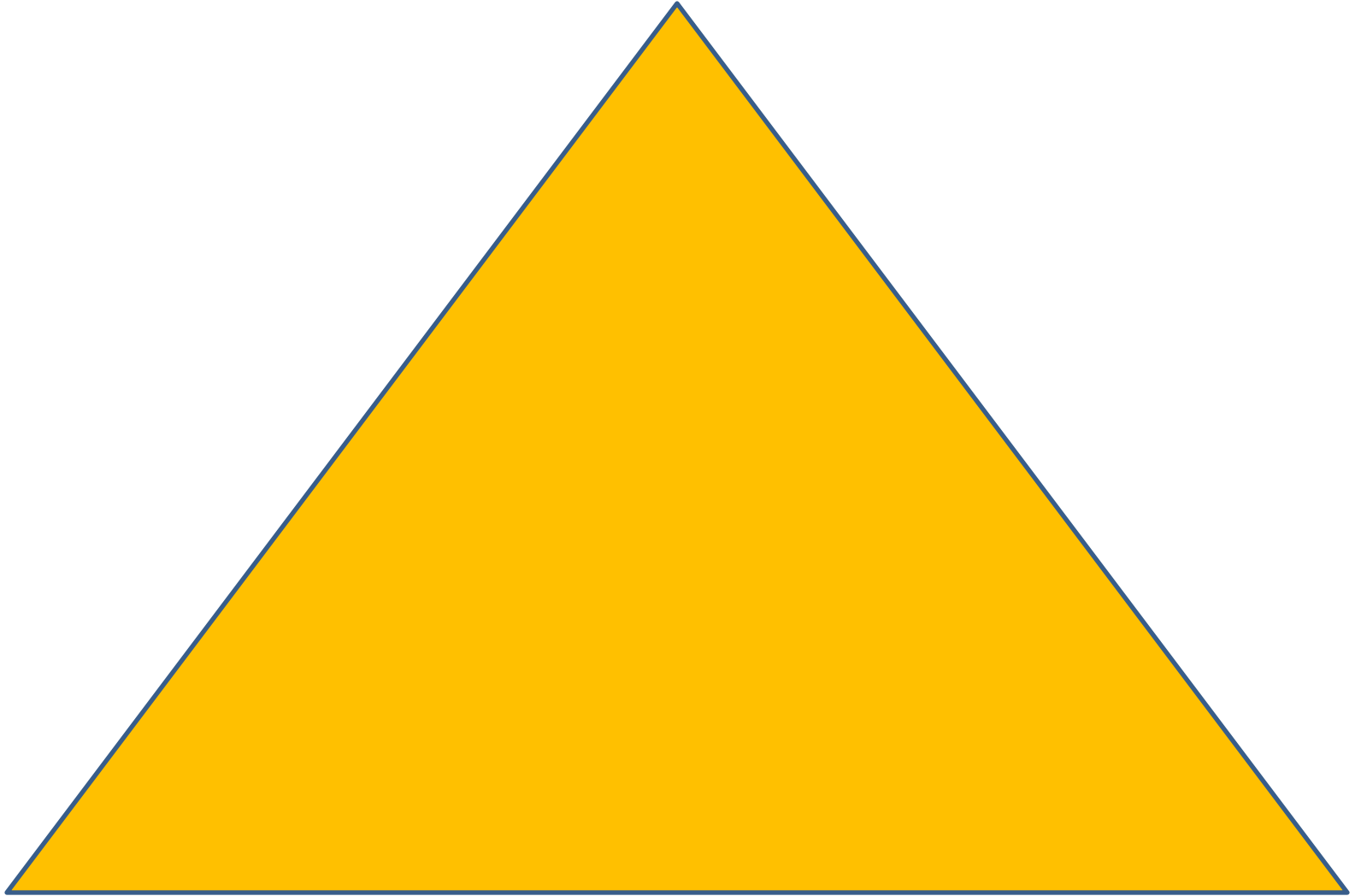
One Million Years

Pyramid Of 200 Pyramids



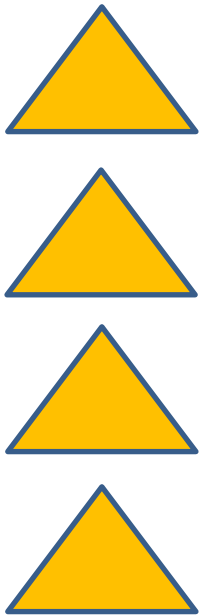
One Million Years

Pyramid Of 200 Pyramids

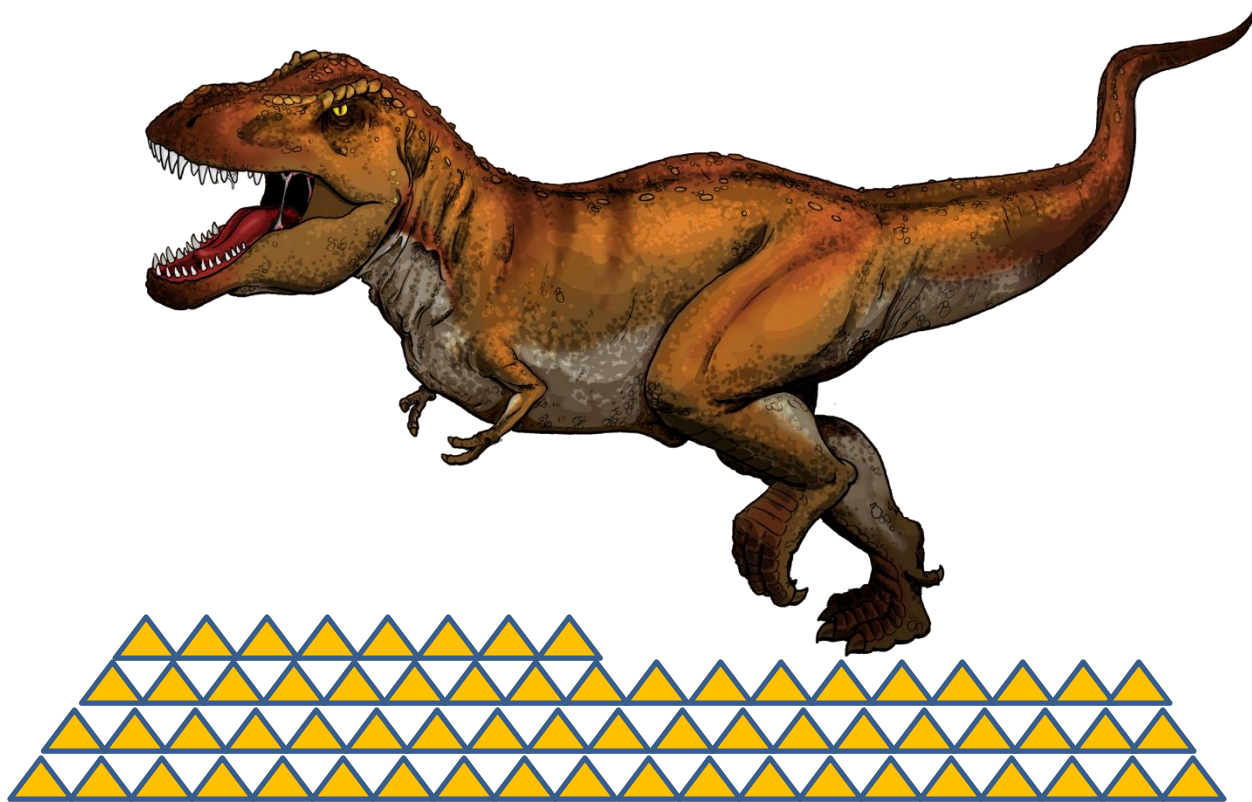


One Million Years

Start of the Ice Age Four Million Years ago

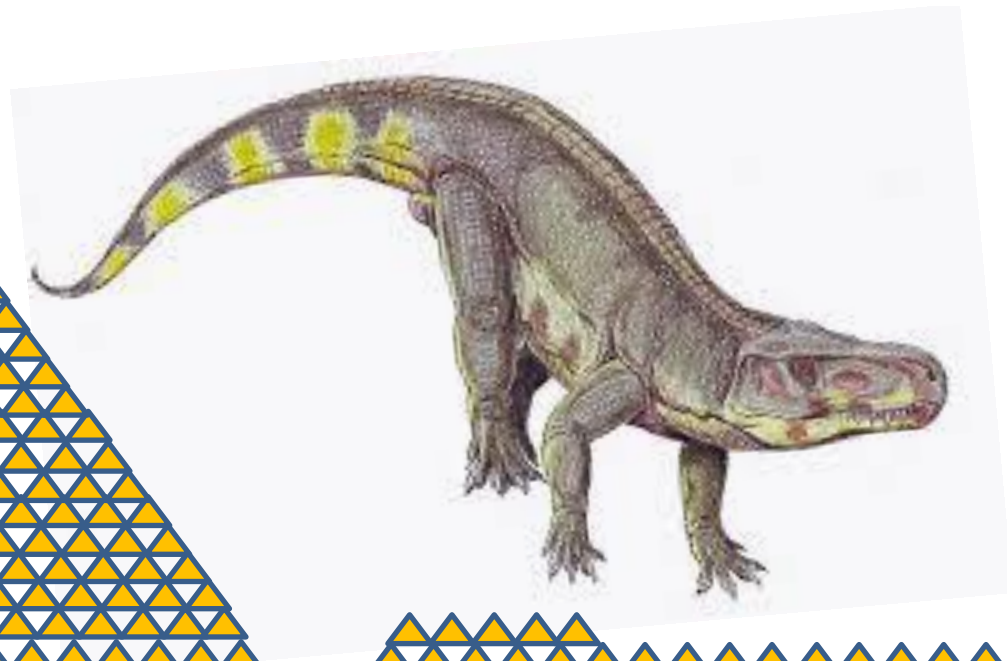
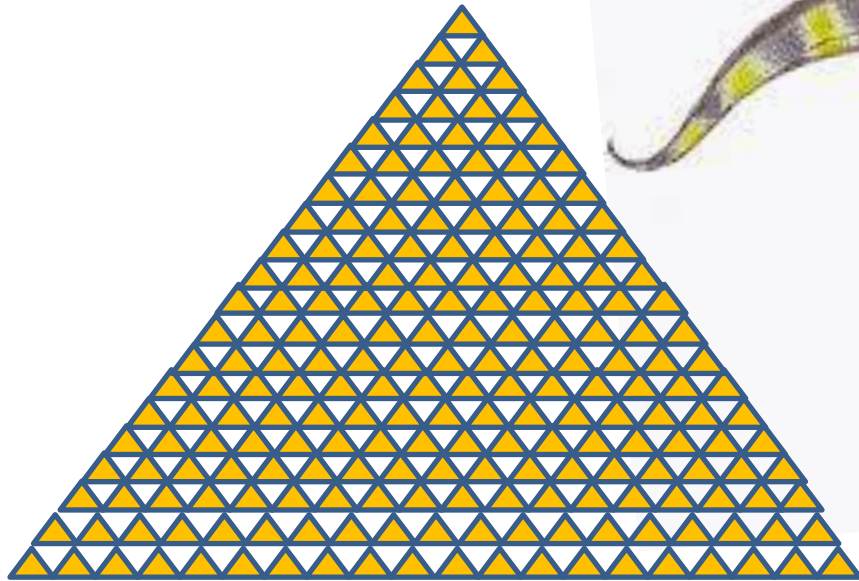


Death of the Dinosaurs 65 Million Years ago



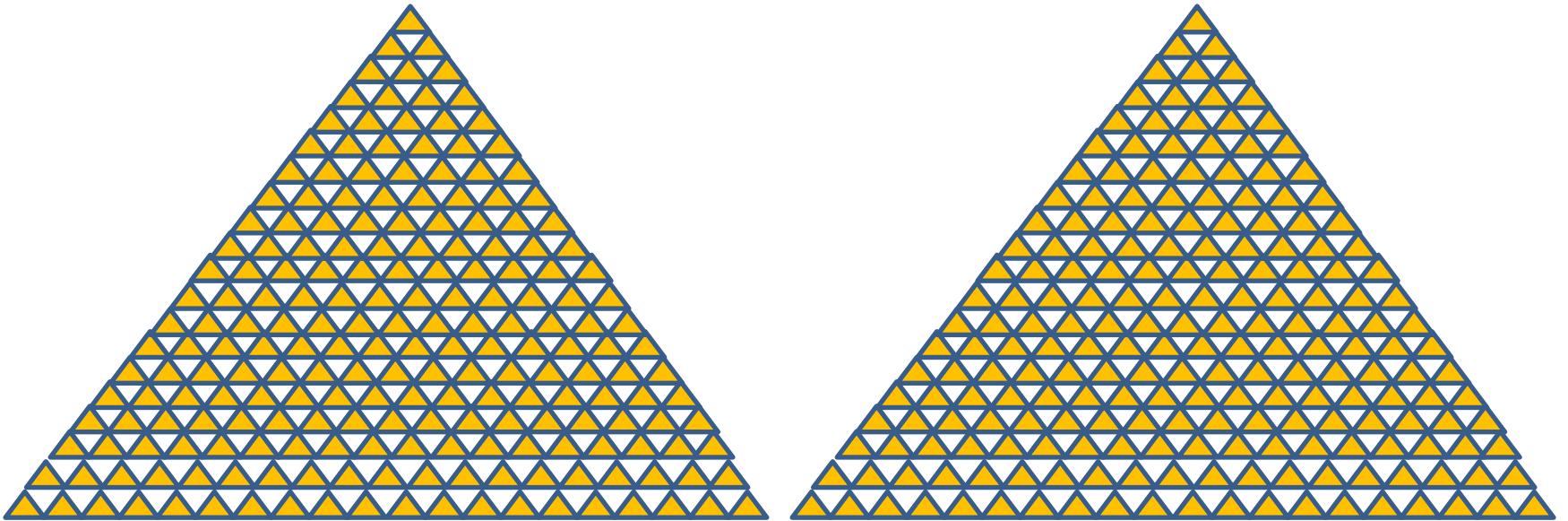
First Dinosaurs

240 Million Years ago

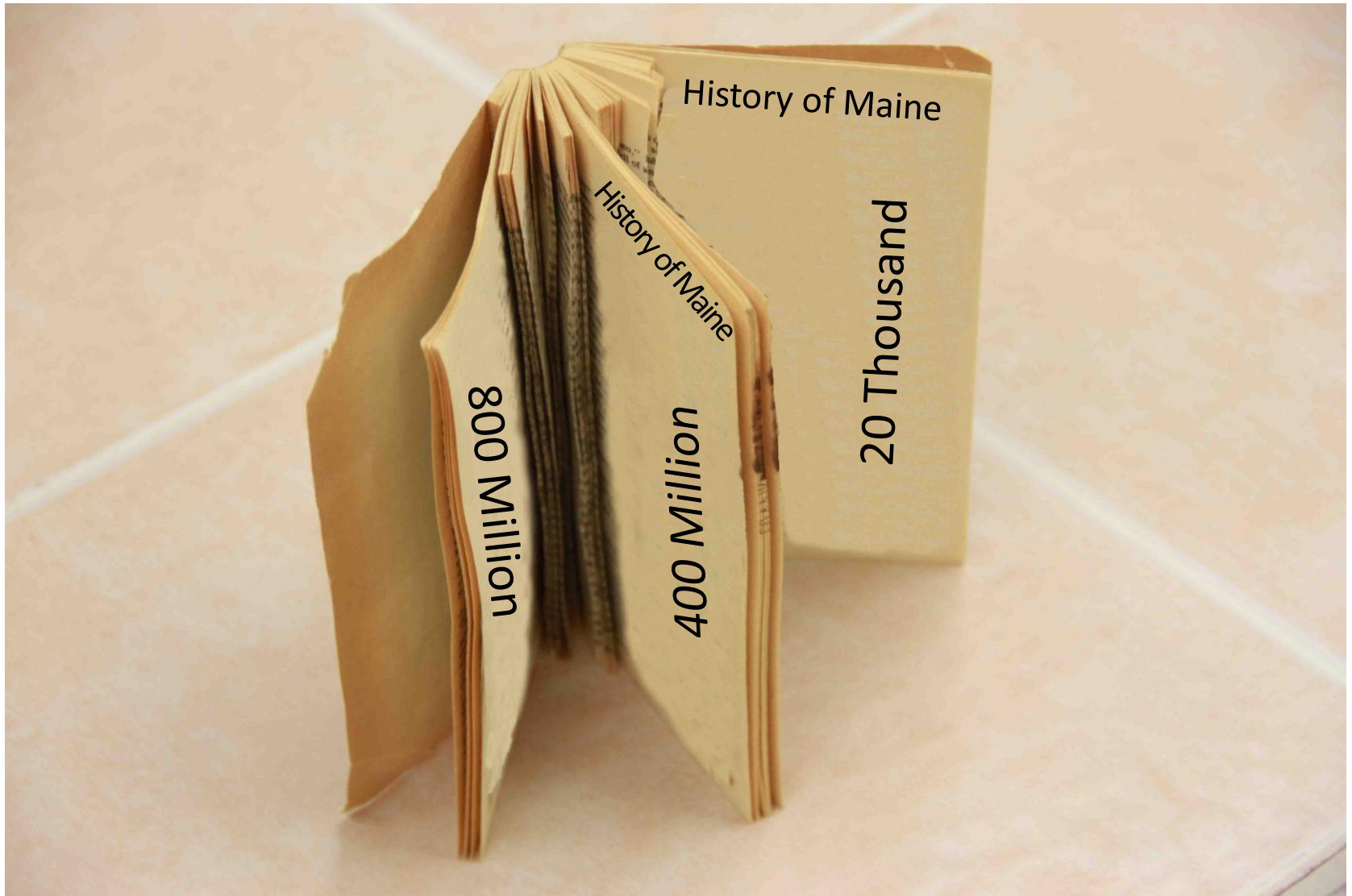


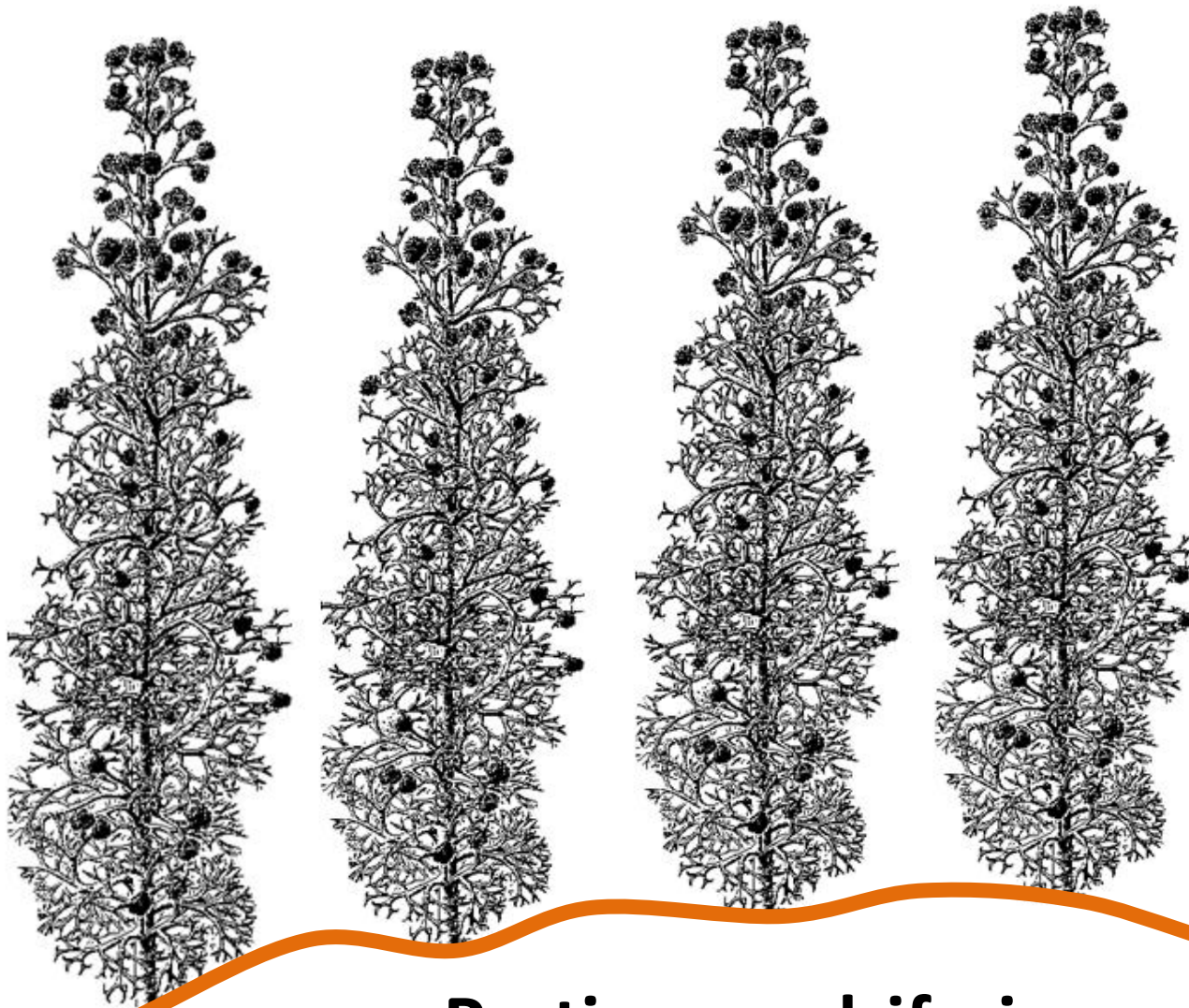
Our Story

400 Million Years Ago



Why then?





Pertica quadrifaria
Maine State Fossil

**Trout
Brook**



**Baxter
State
Park**

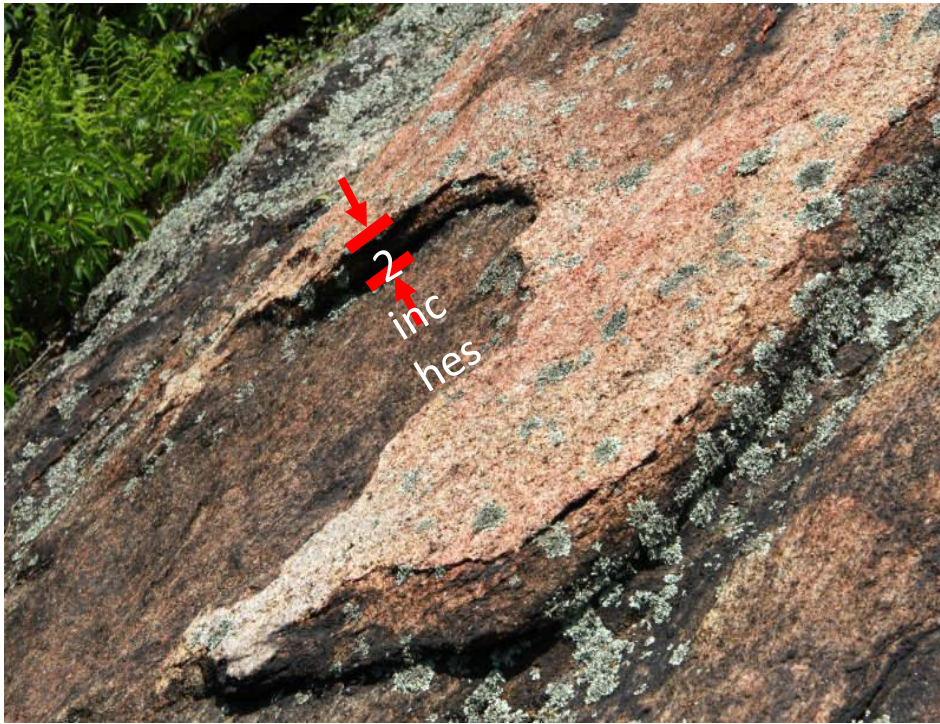
Pertica quadrifaria



Trout Brook Crossing, Baxter State Park

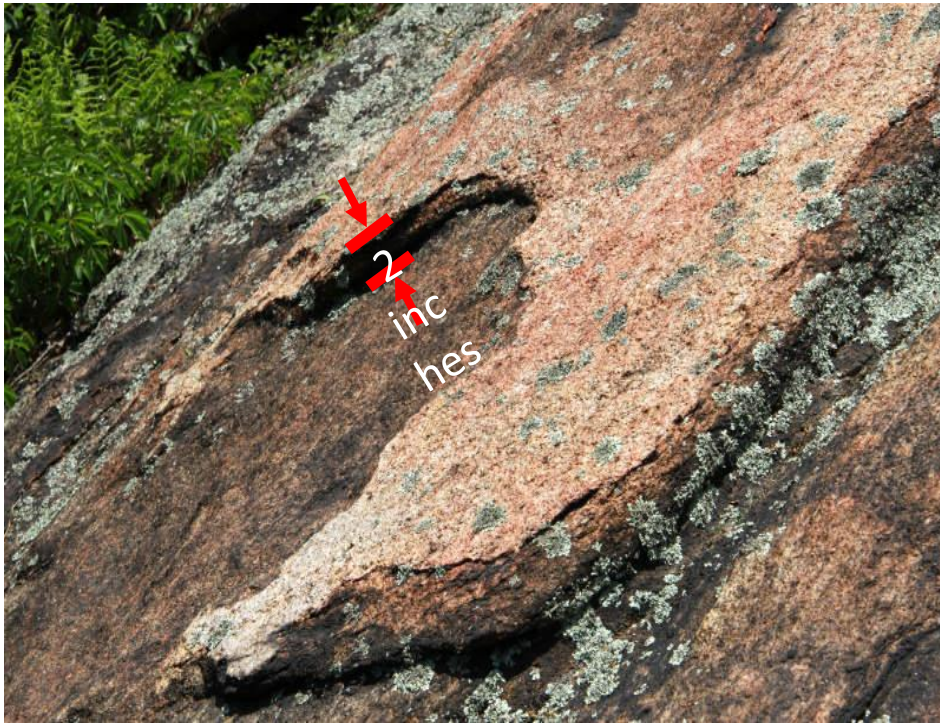


Fly in Amber



2 inches in 20,000 years

40,000 inches in 400 Million Years



2 inches in 20,000 years

40,000 inches in 400 Million Years

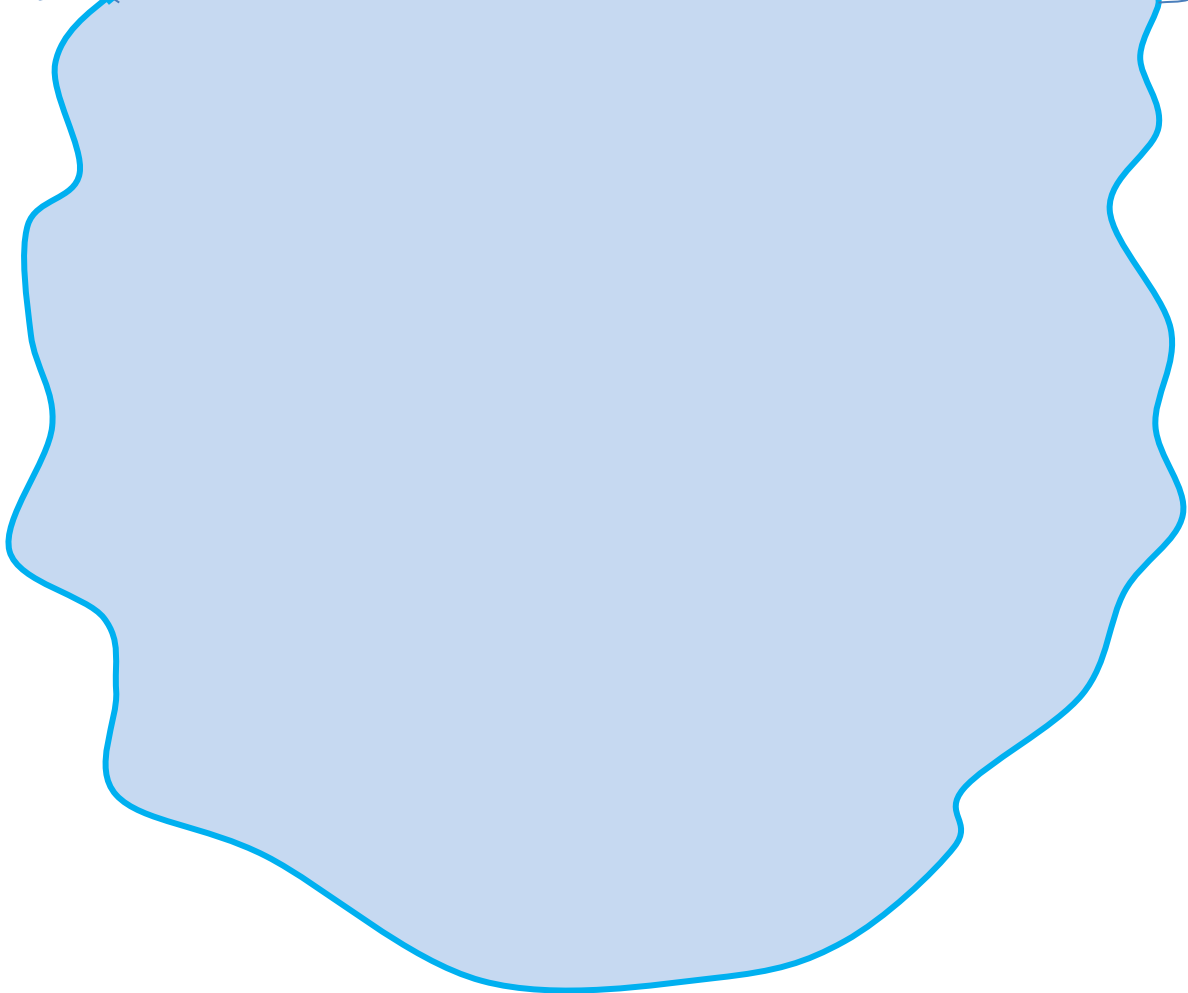
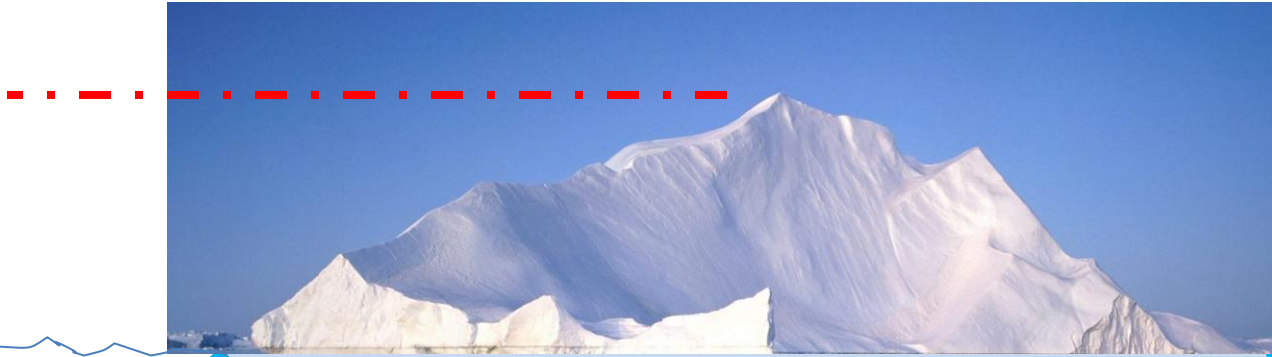
About a half mile !

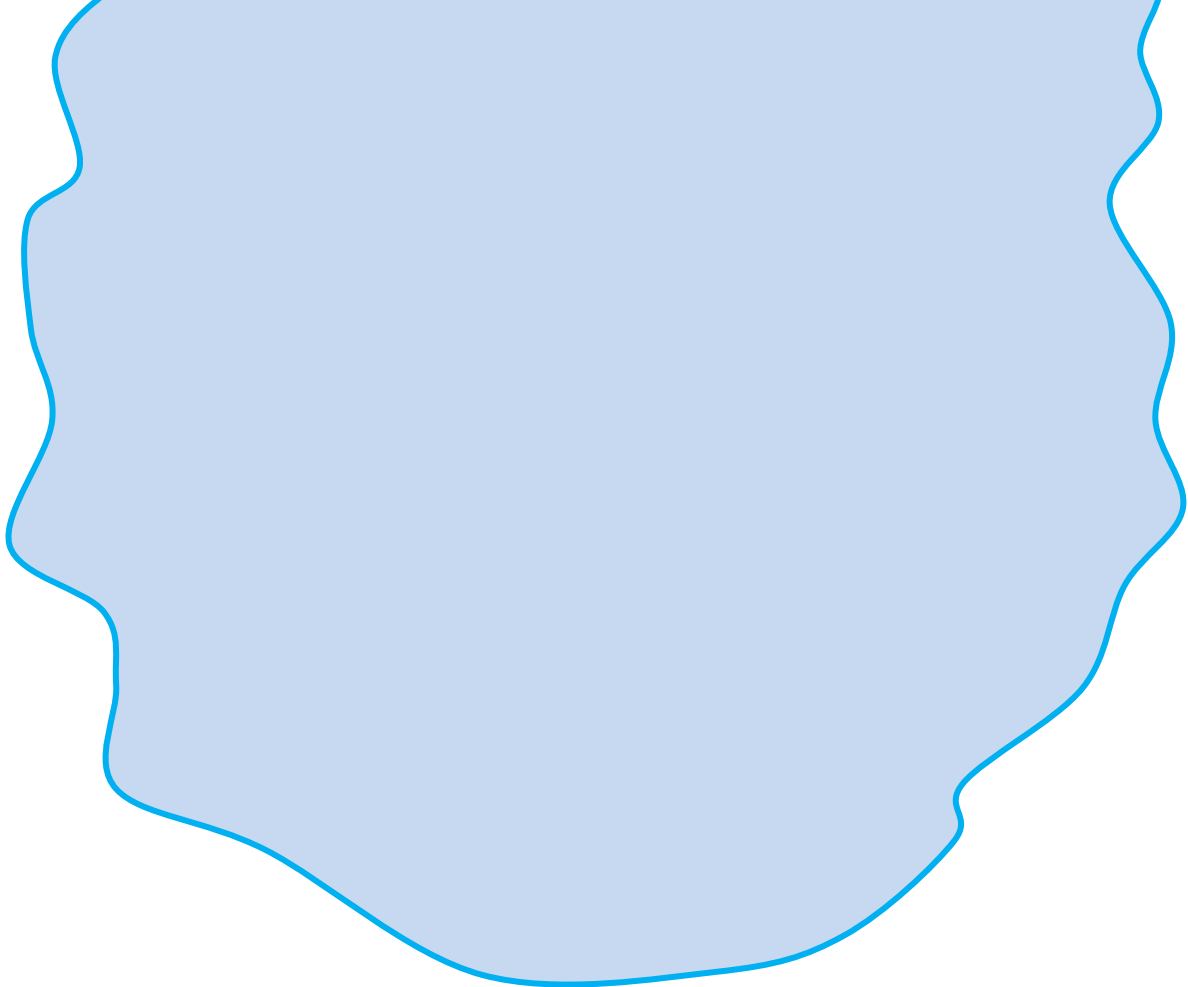


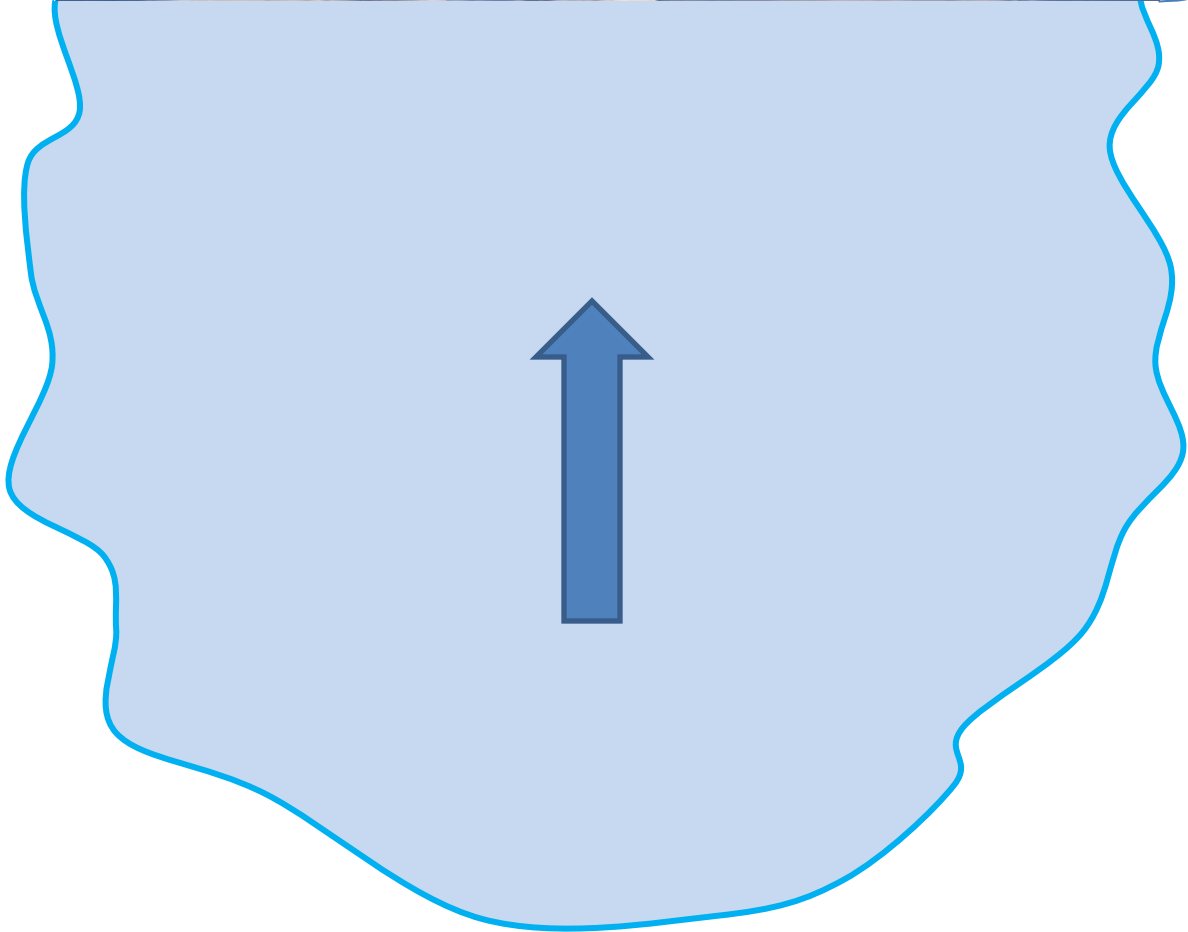
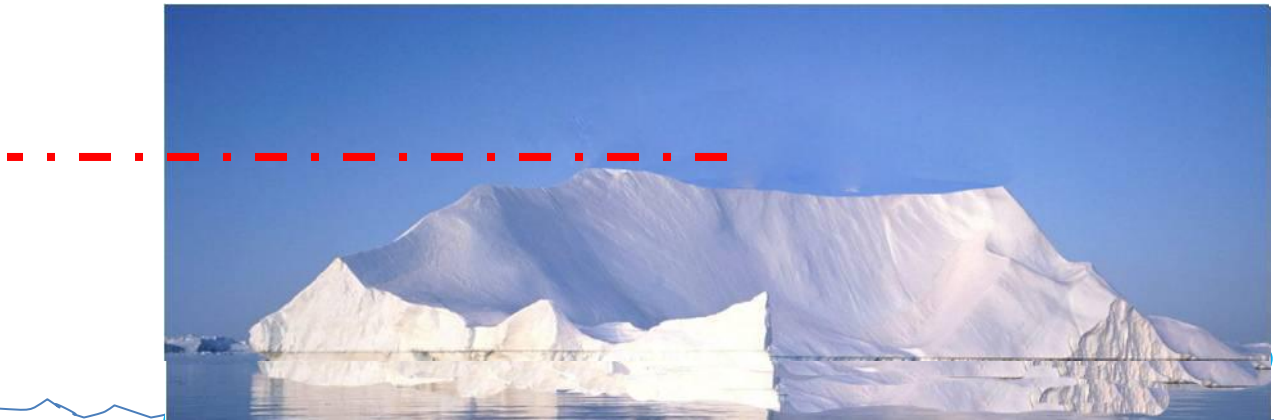
How can you erode a half mile off the land without it being underwater?









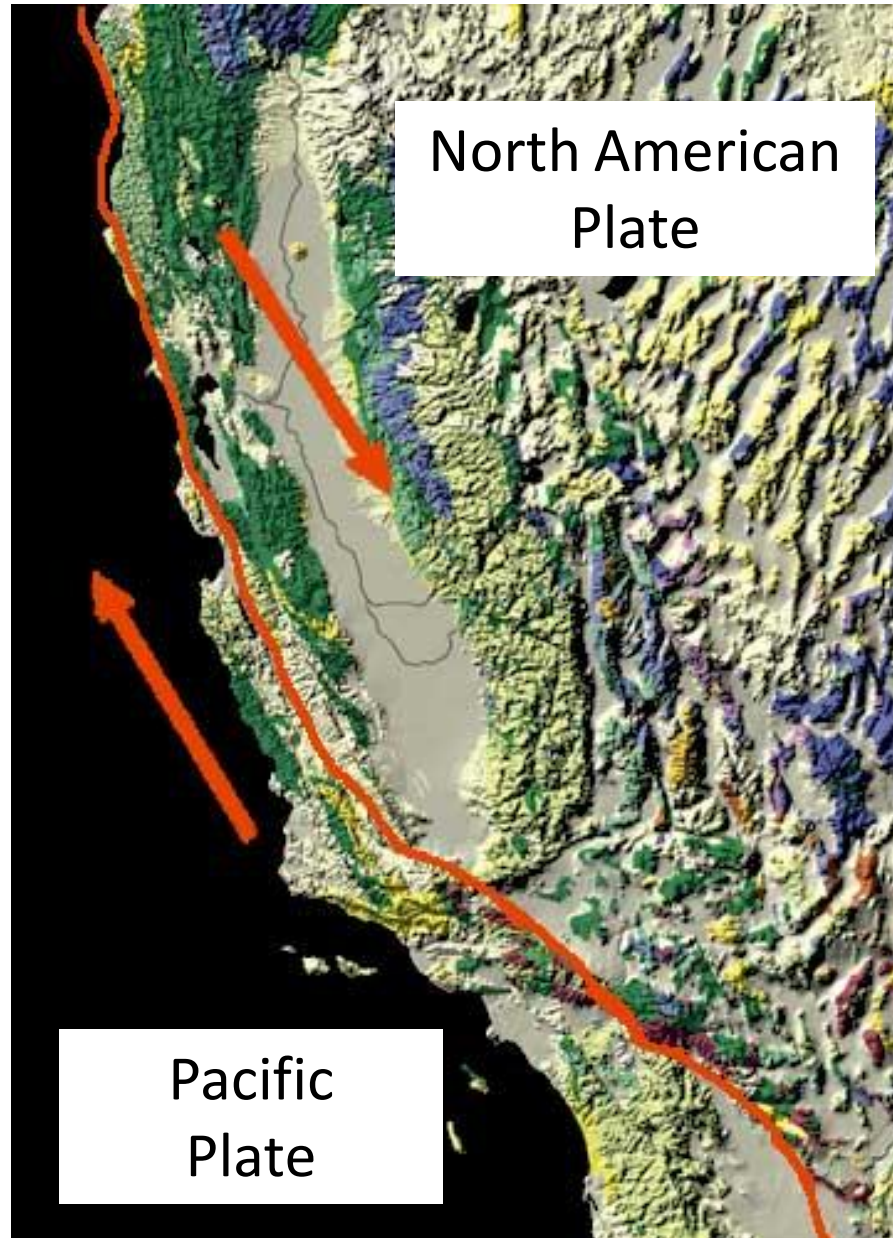


Part 2

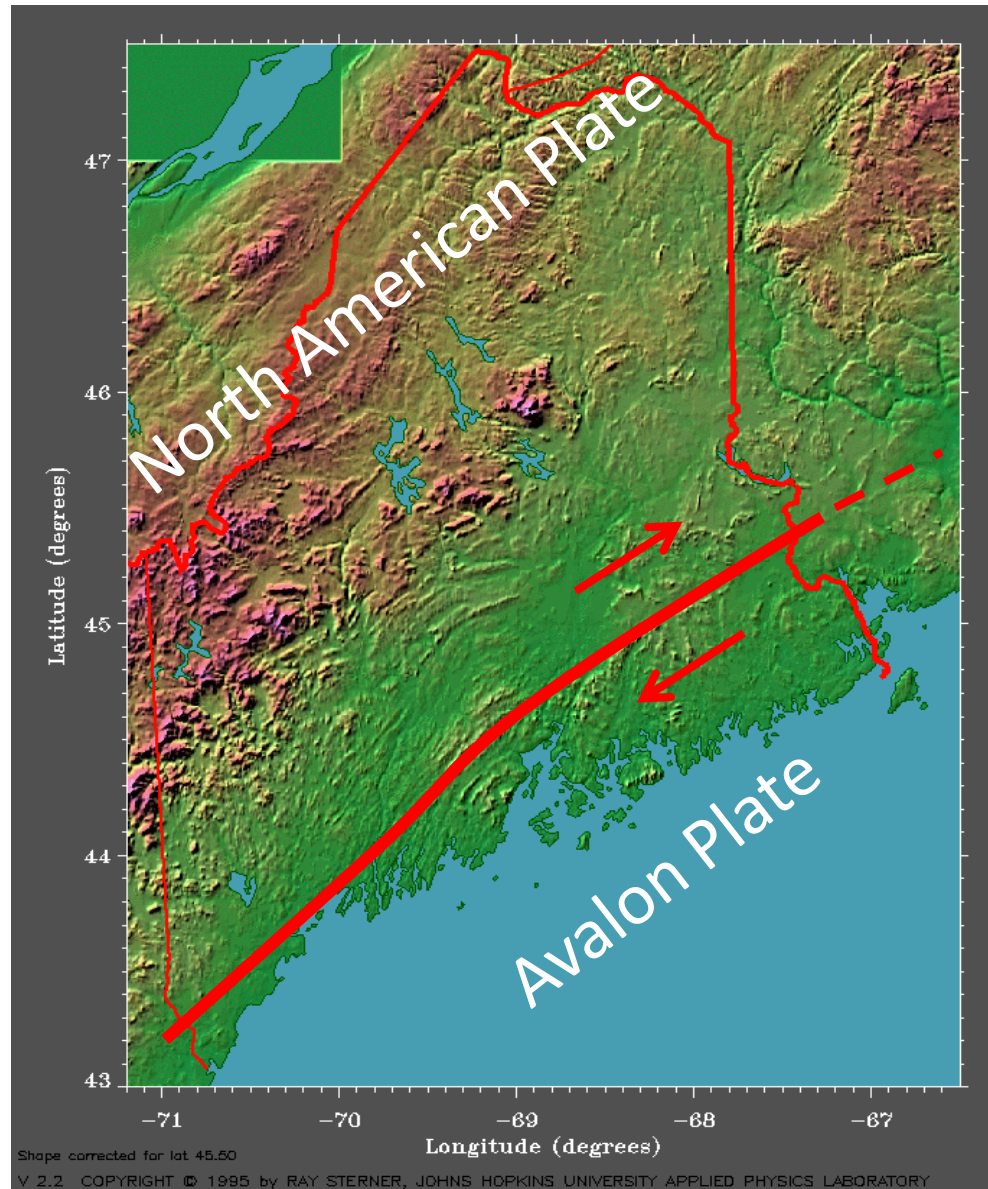
Maine's "San Andreas" Fault

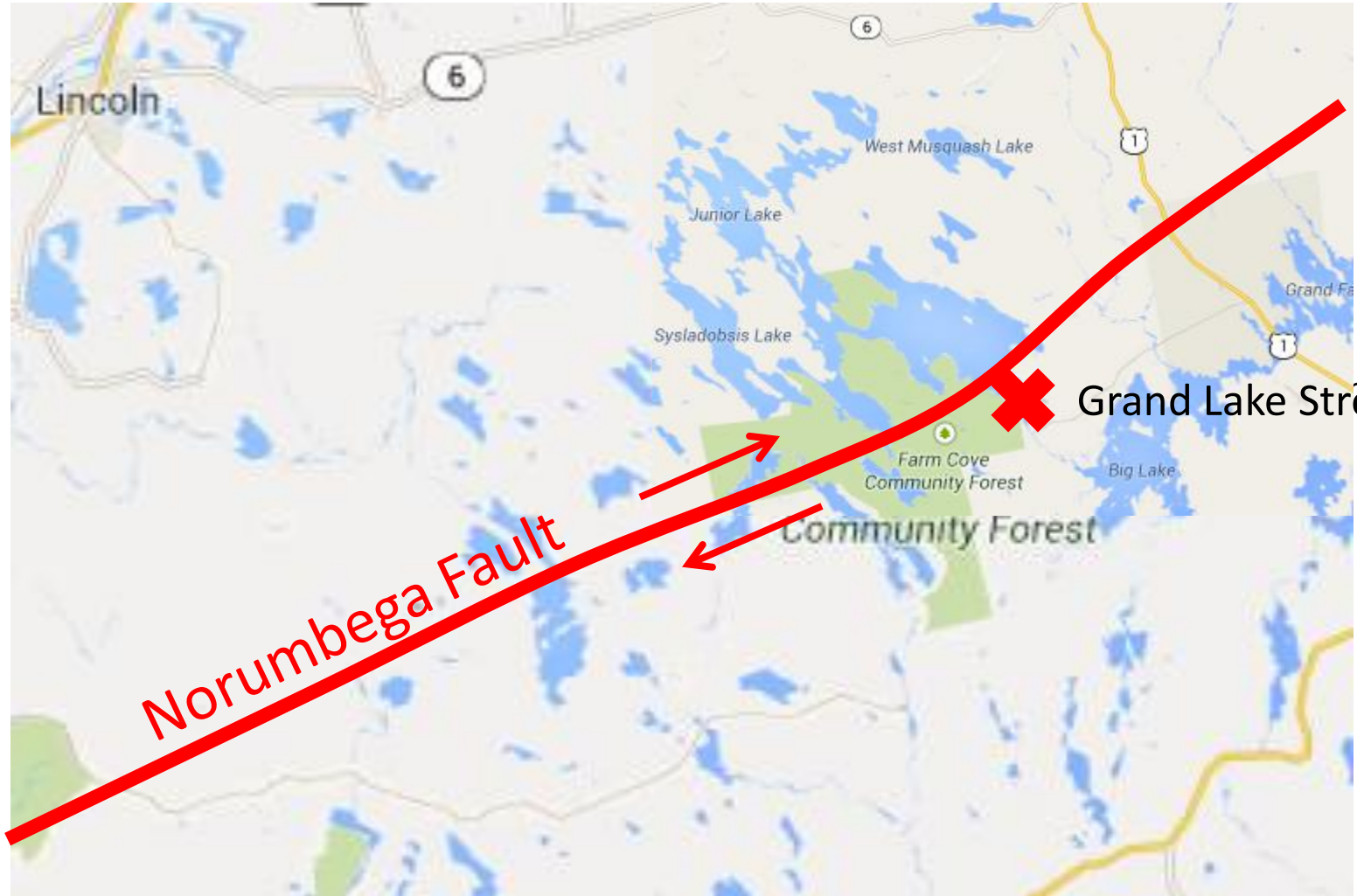
brought coastal Maine to us

San Andreas Fault



Norumbega Fault

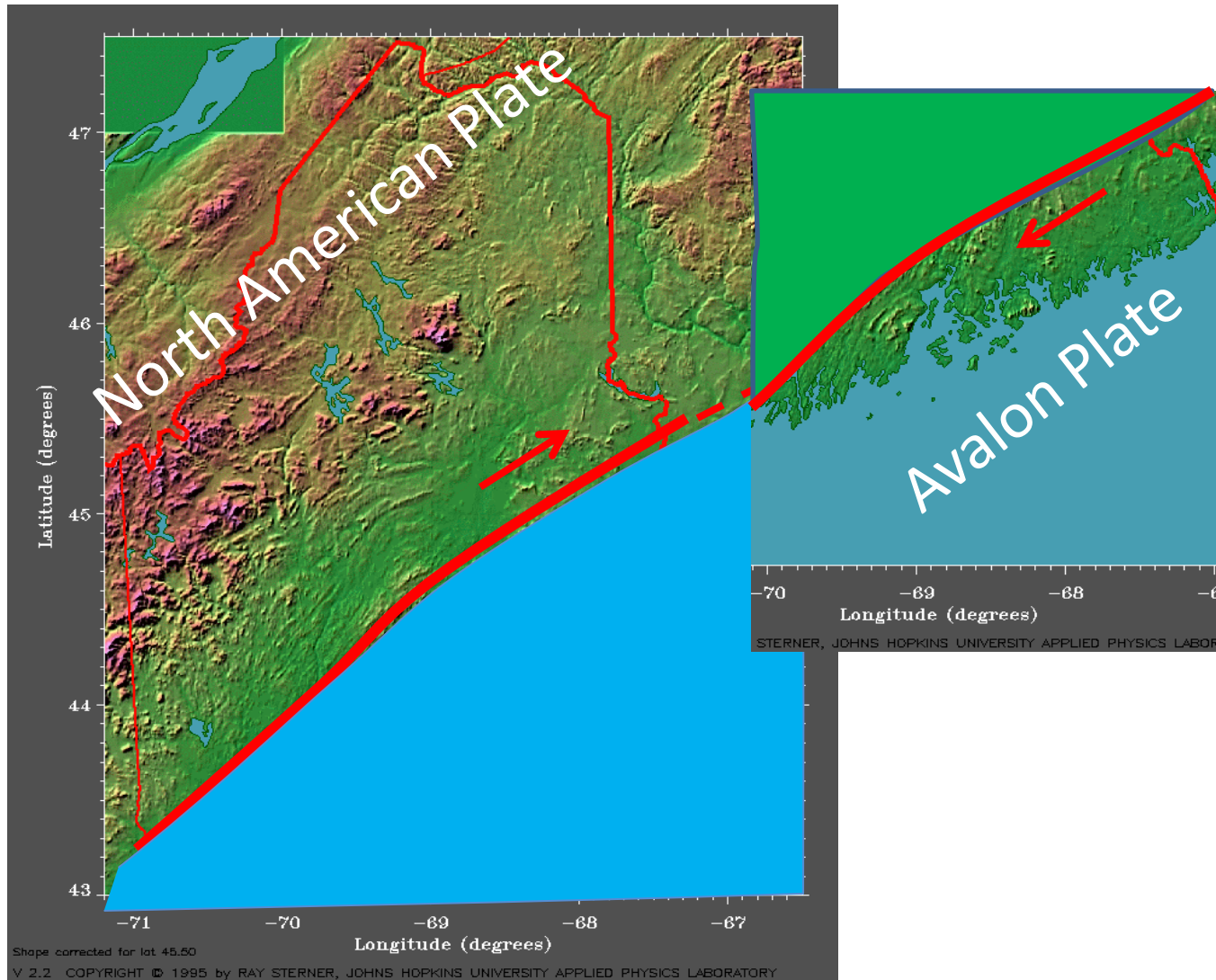


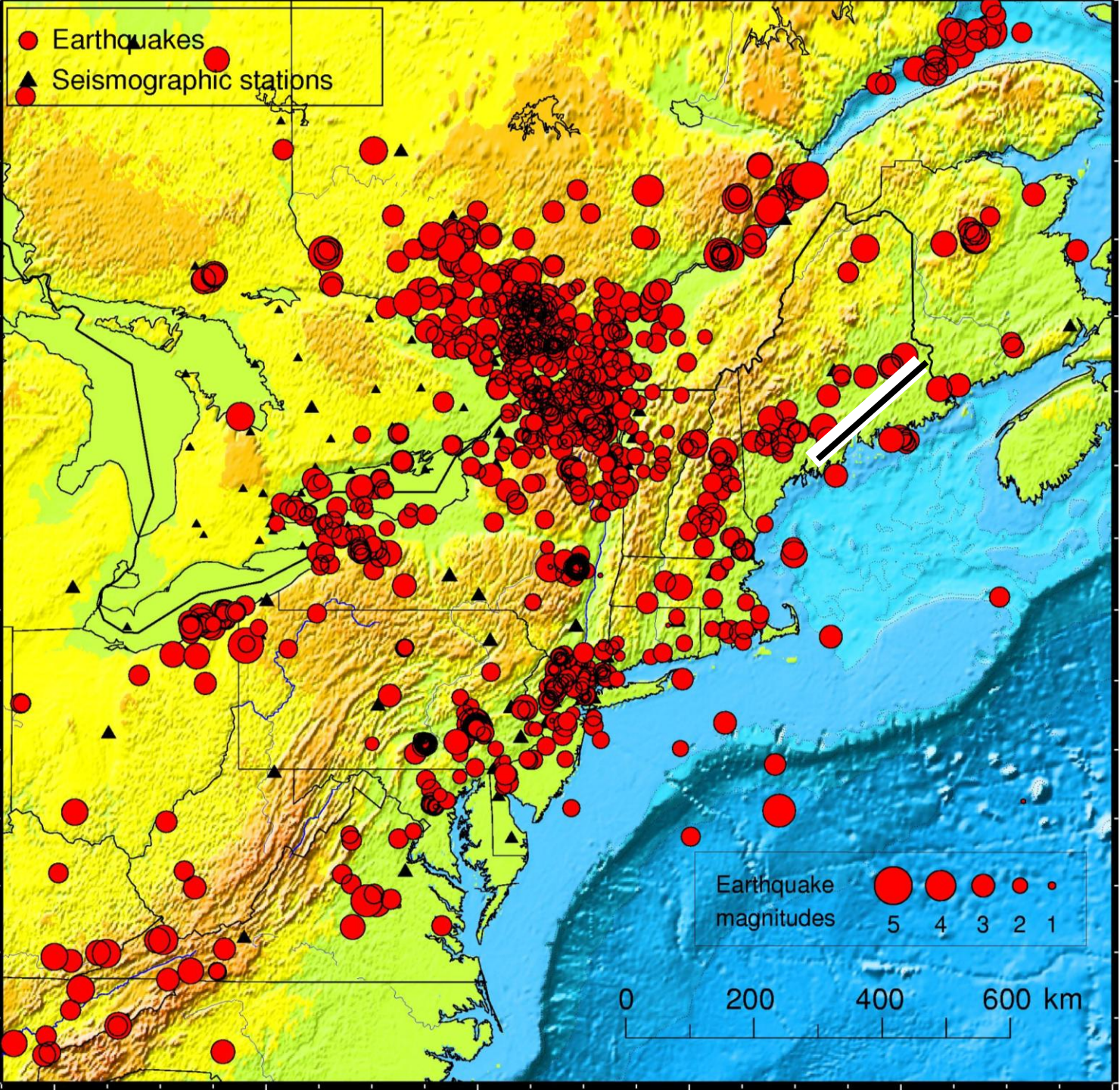


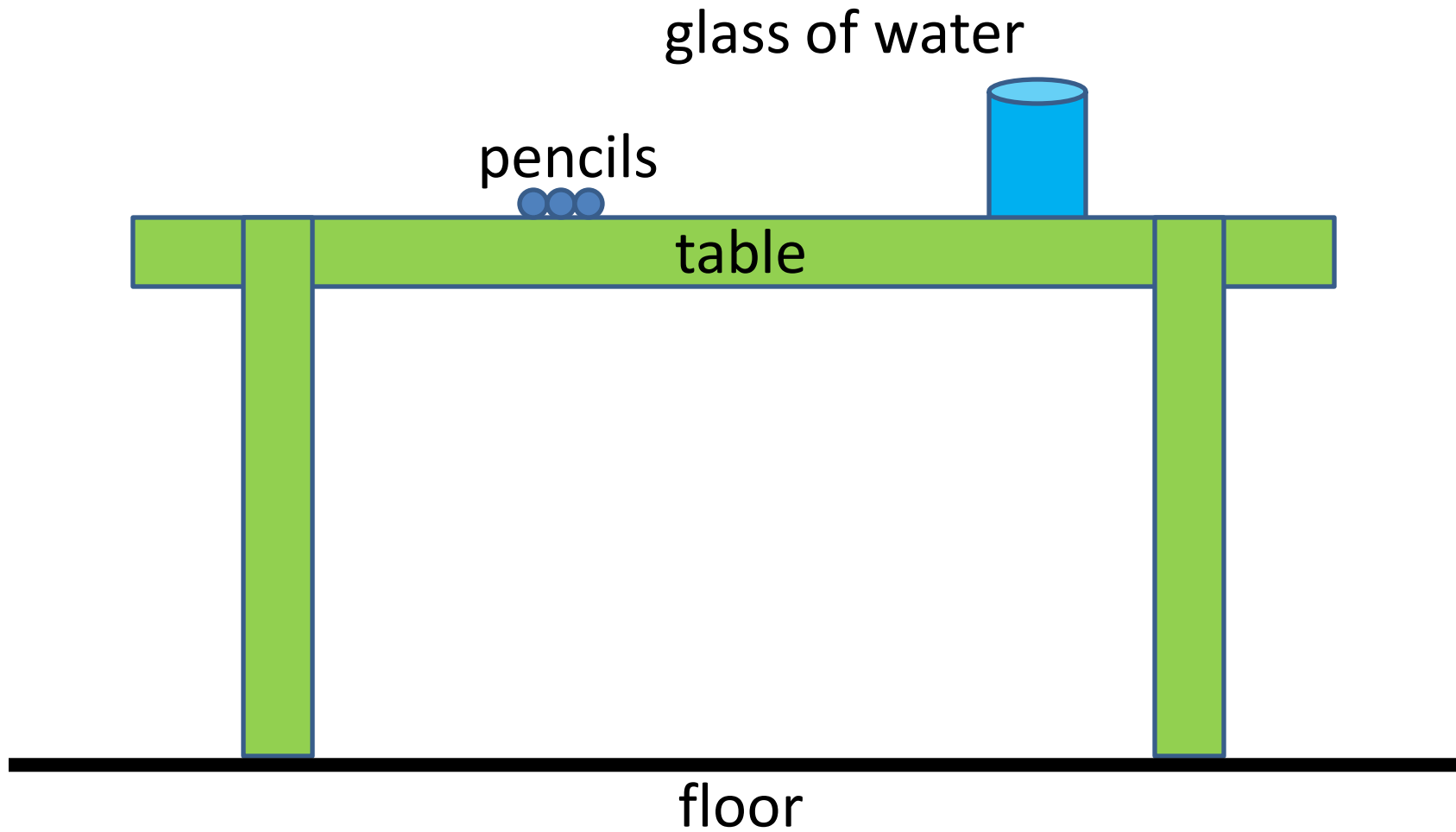
Norumbega Fault

Grand Lake Stream

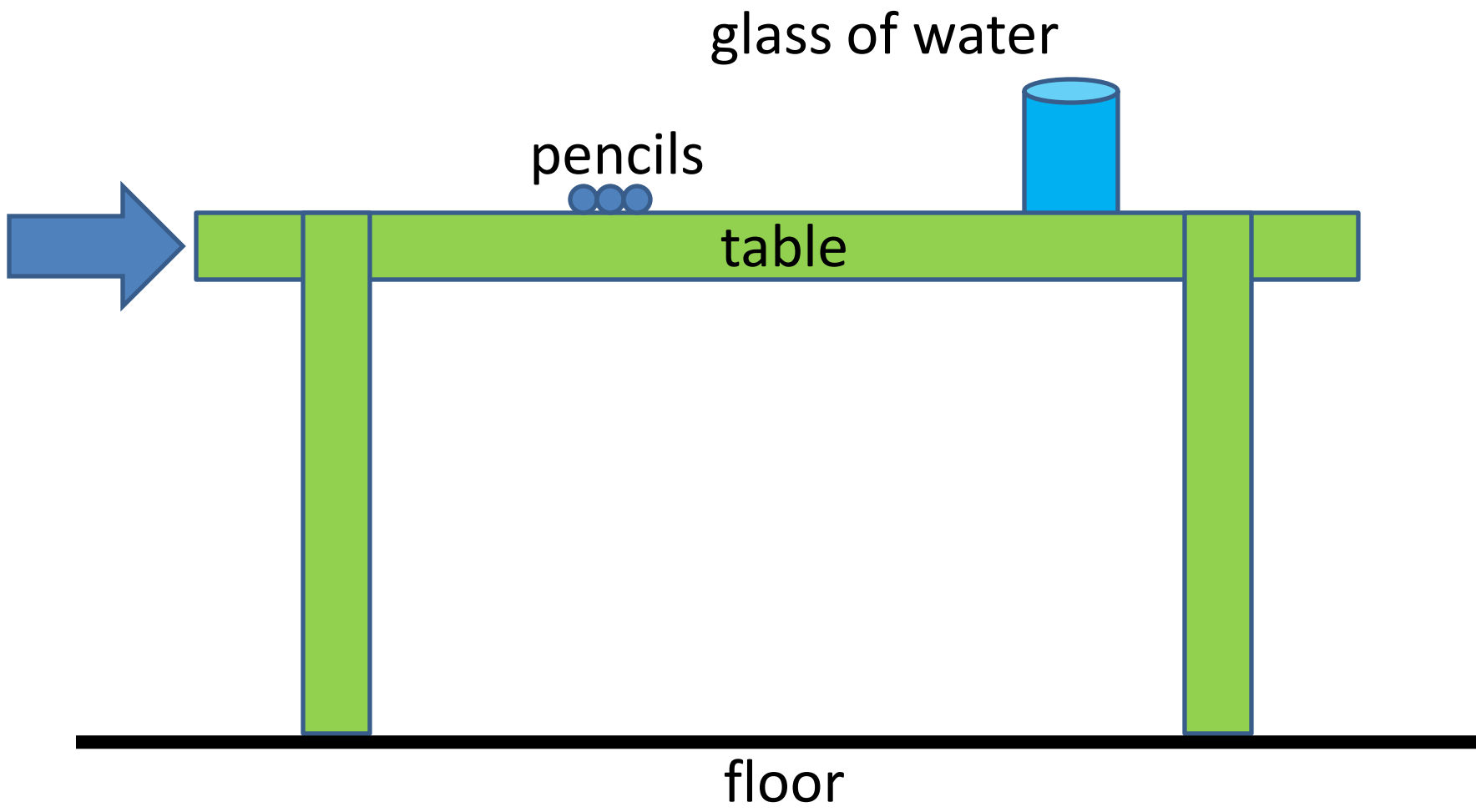
Maine Had the Fault Stopped Moving Early



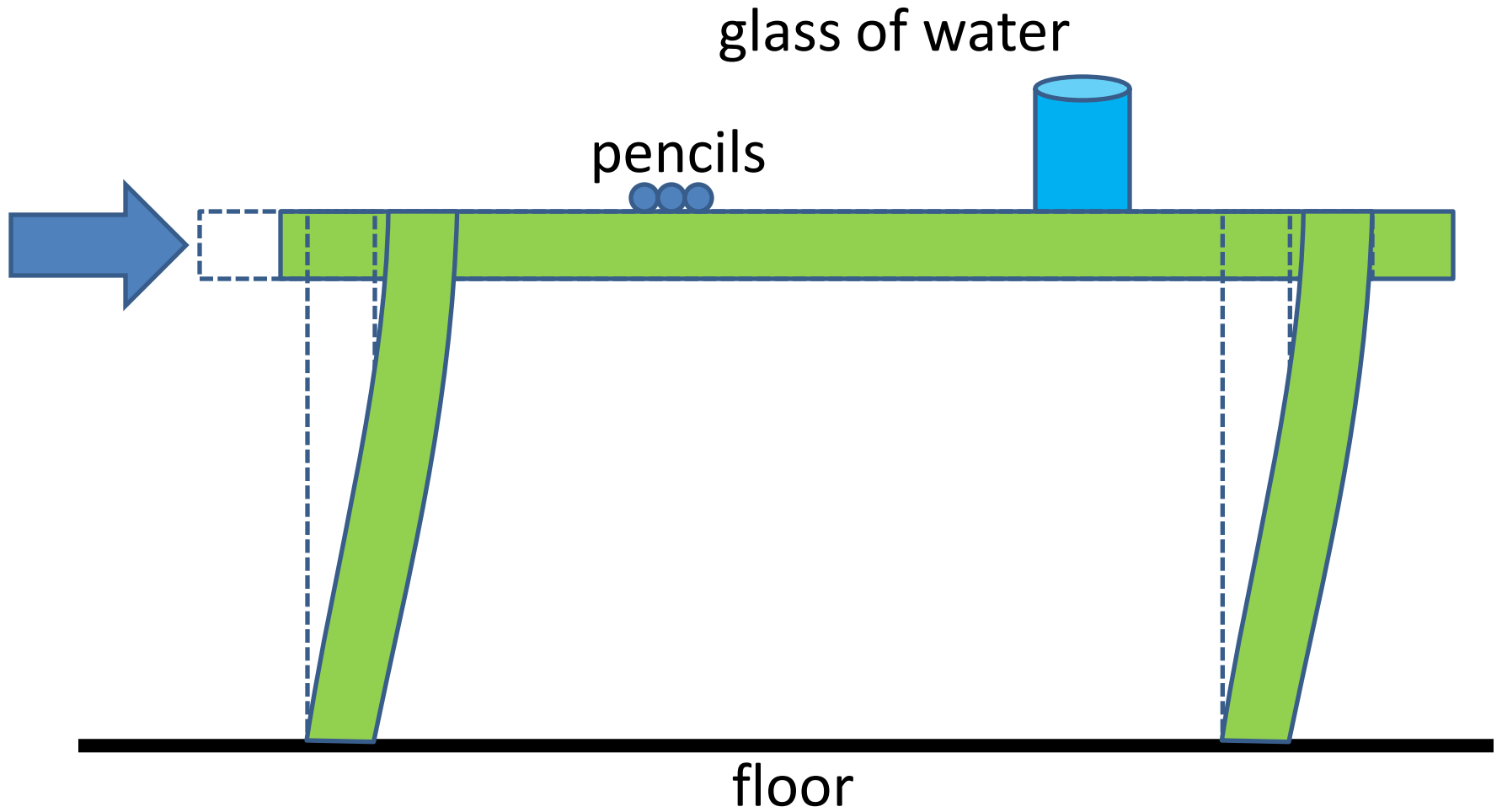




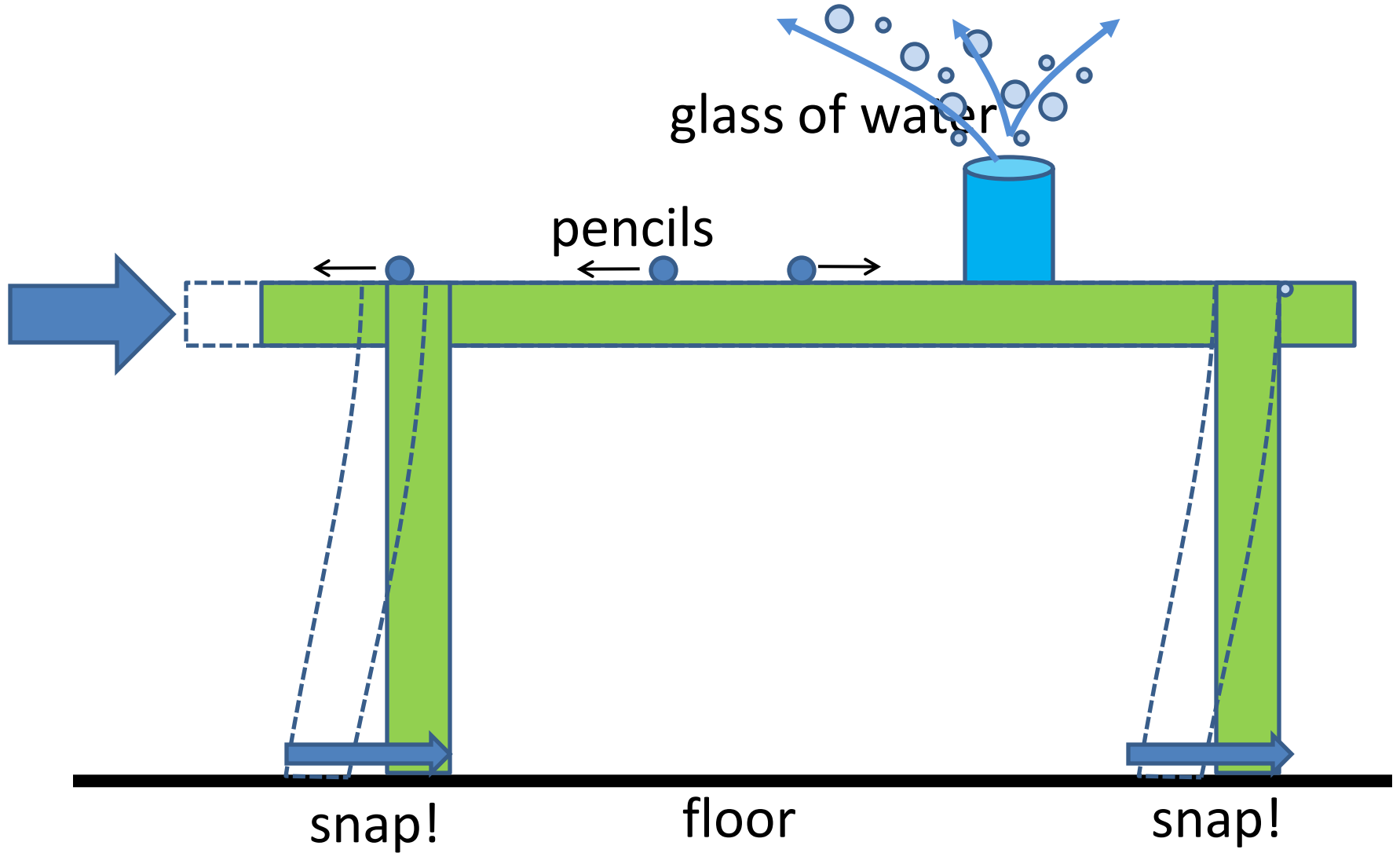
push the table

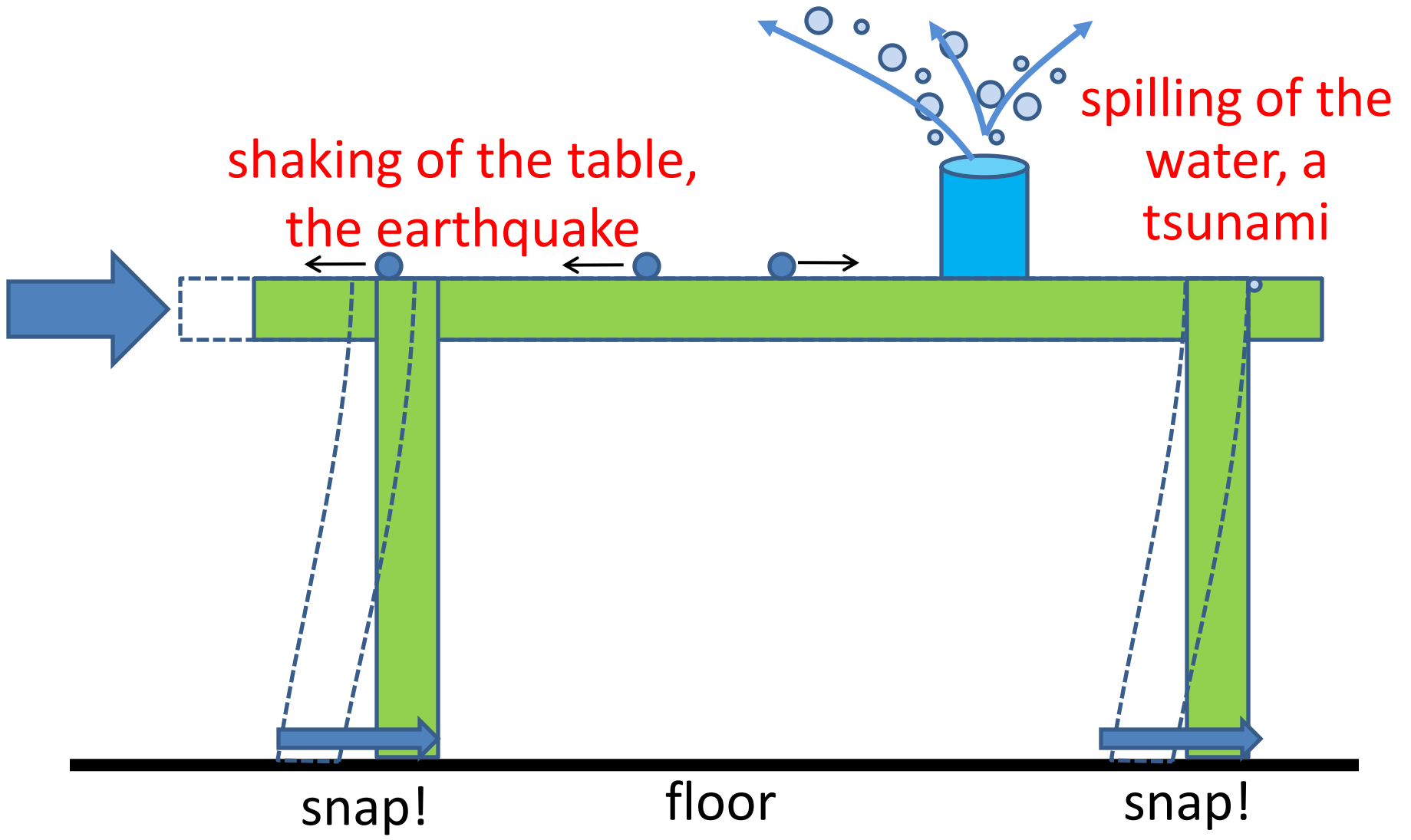


the legs slowly bend



the legs snap back straight





shaking of the table,
the earthquake

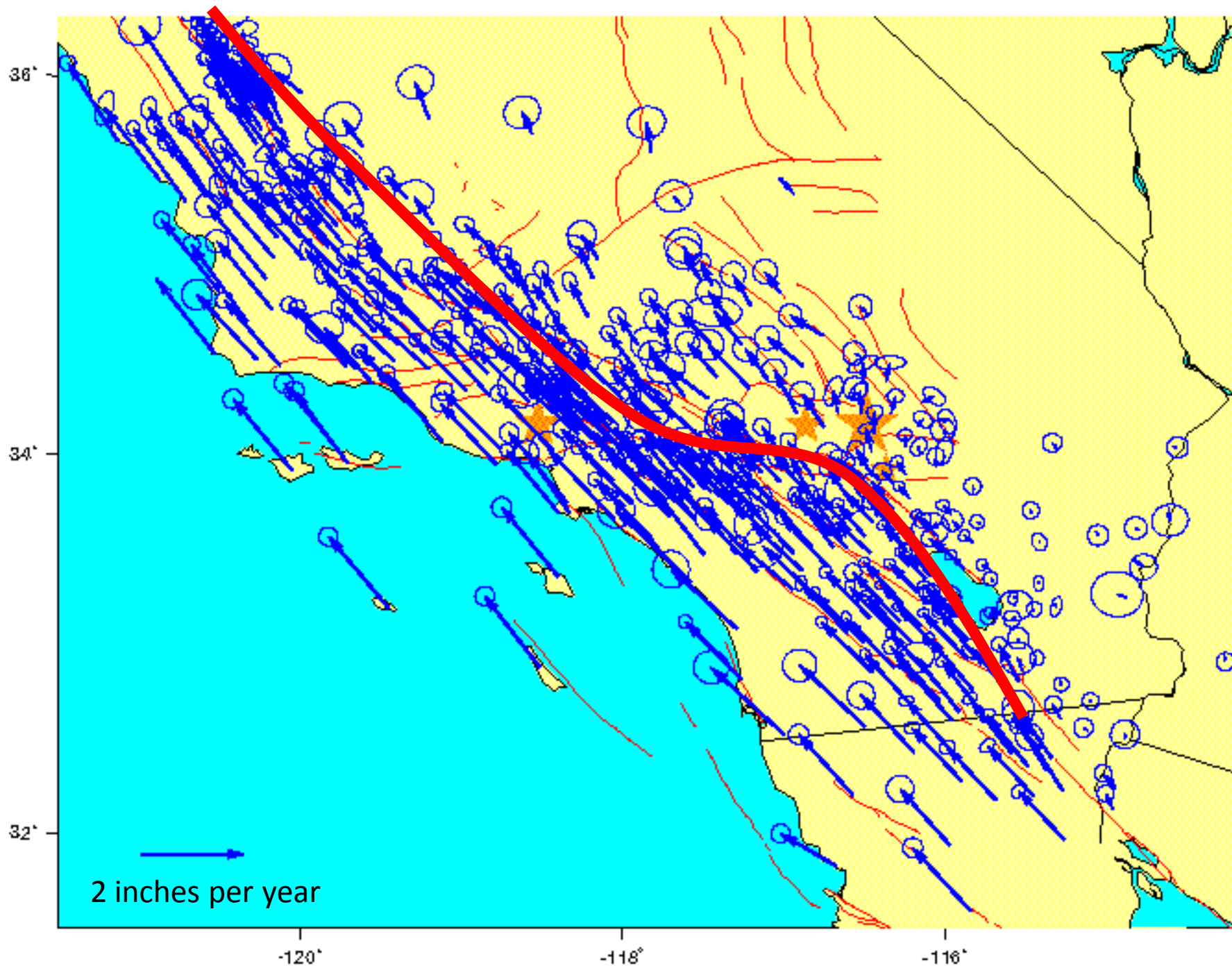
spilling of the
water, a
tsunami

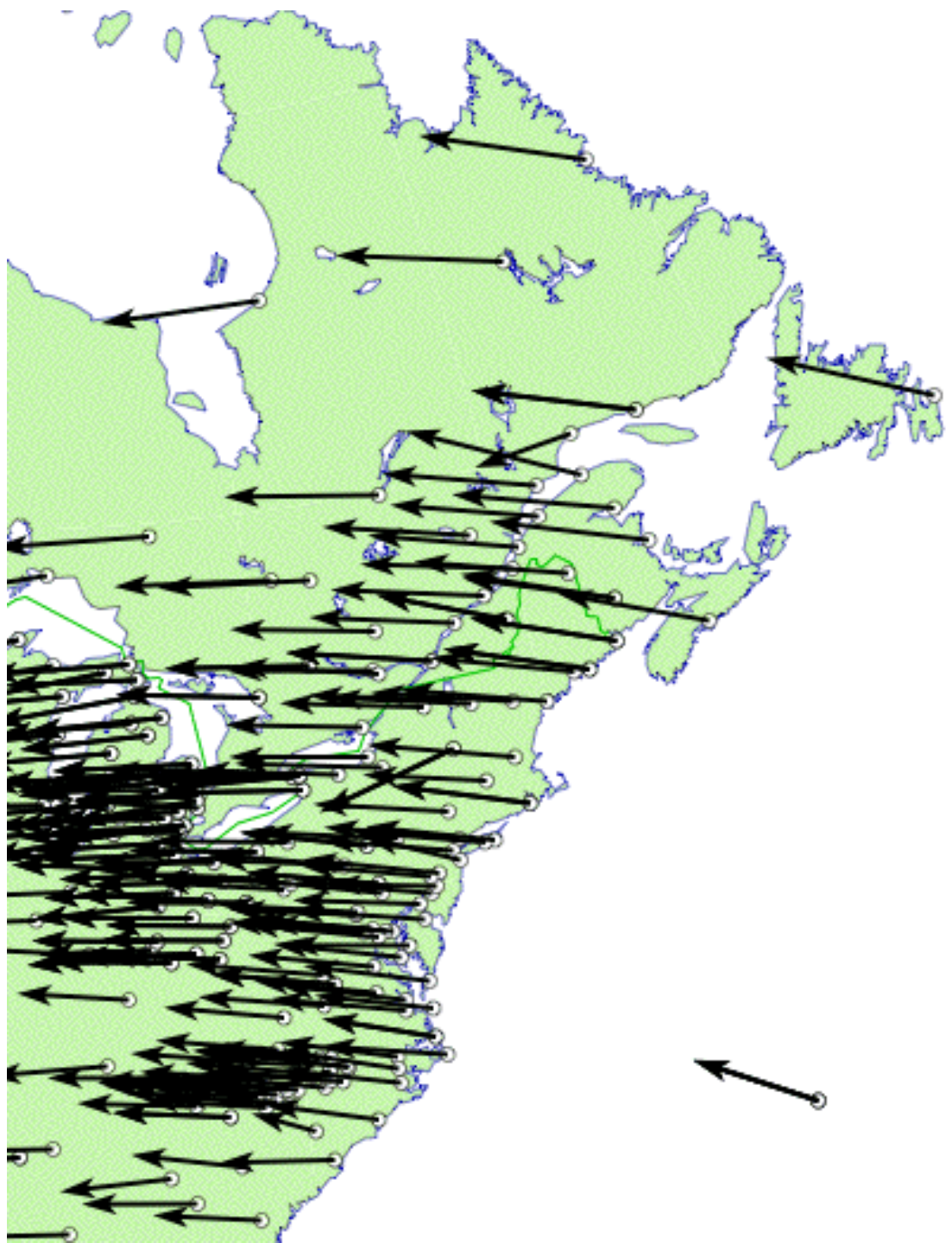
snap!

floor

snap!

leg sliding on the floor, the faulting





2 inches in a year

30 miles in a million years

12600 miles in 400 Million Years



Pertica quadrifaria

Tropical Plants

Maine on the Equator

Part 3

Maine's "Mt Shasta" Volcanoes

gave Maine great views

California's Active Volcanoes

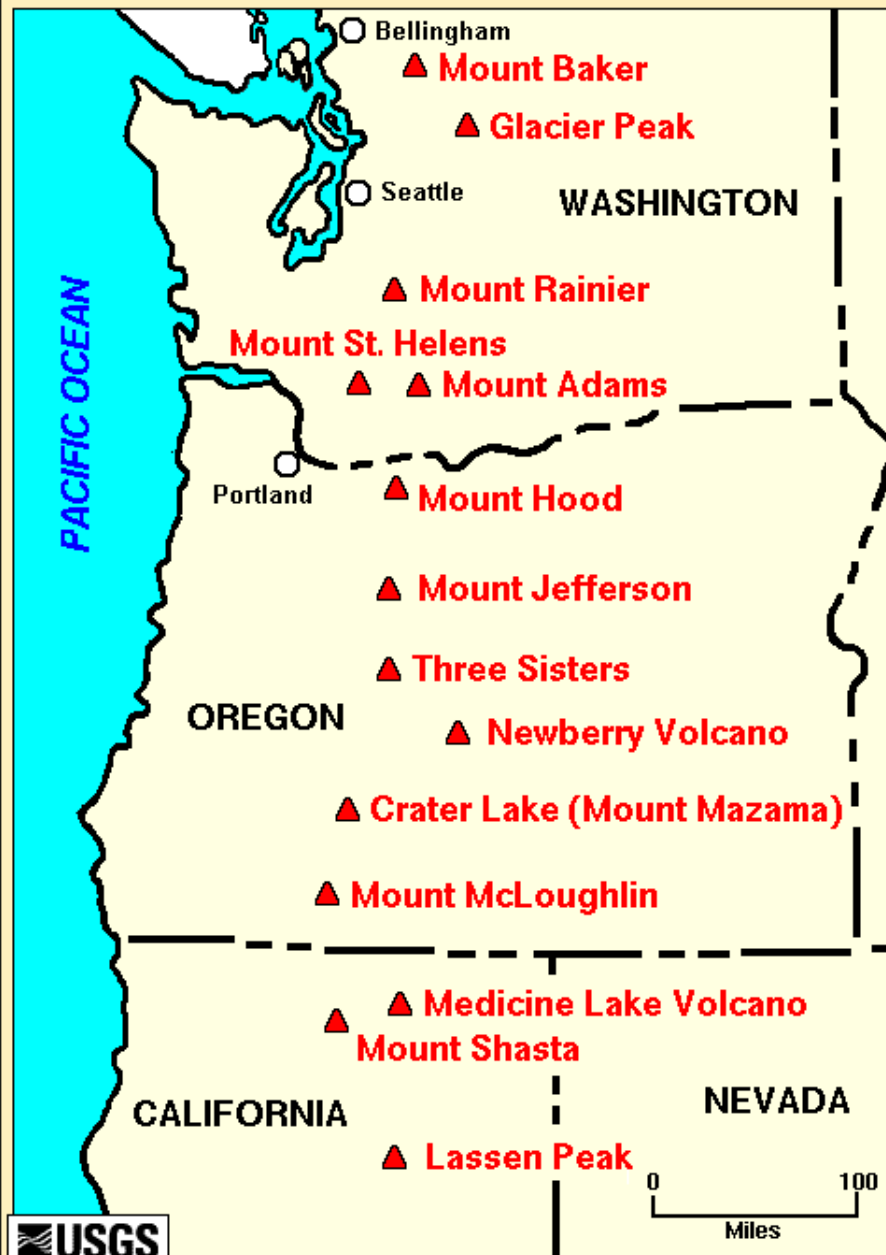


Lassen Peak



Mount Shasta

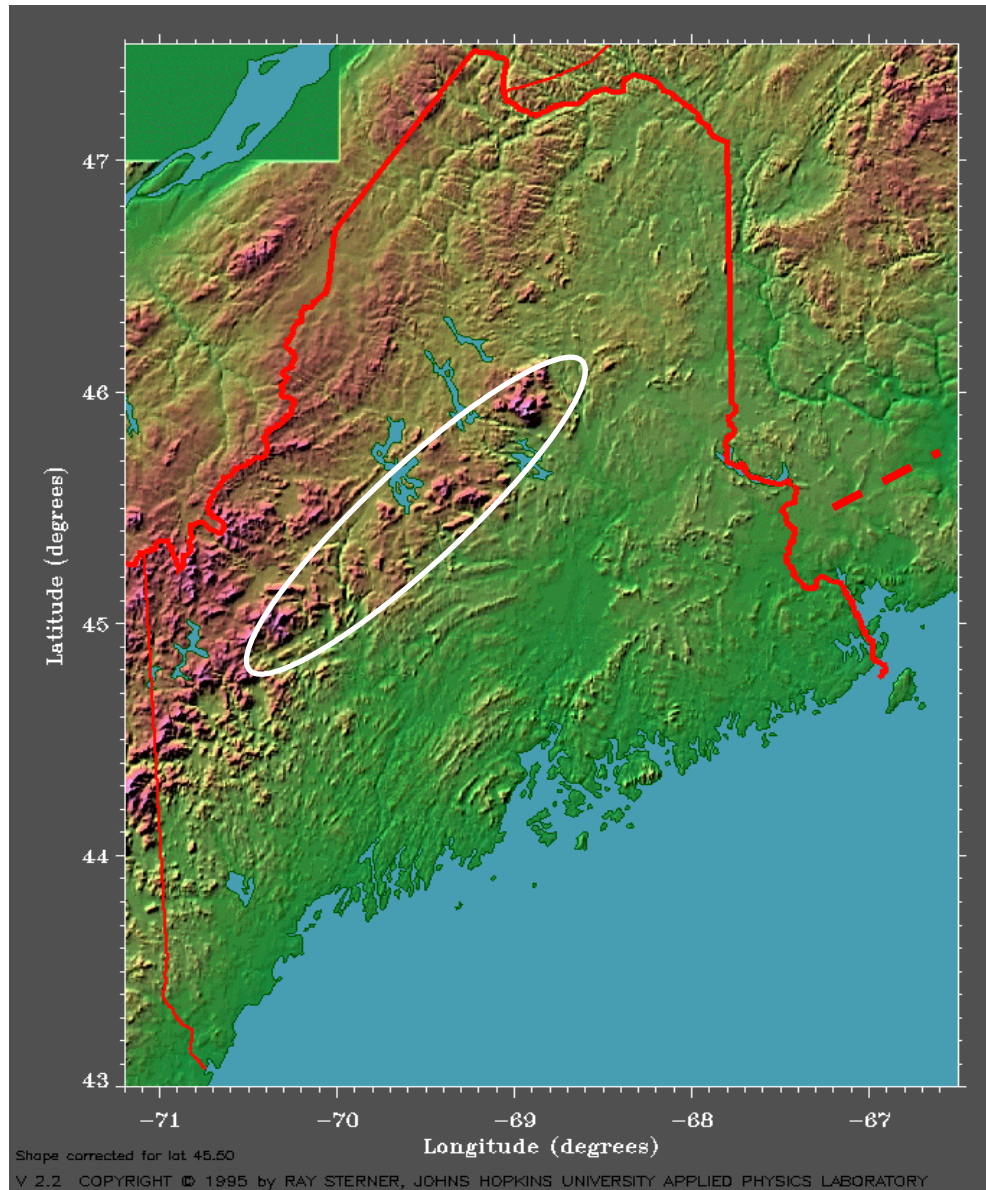
Major Cascade Range Volcanoes of Washington, Oregon, and Northern California

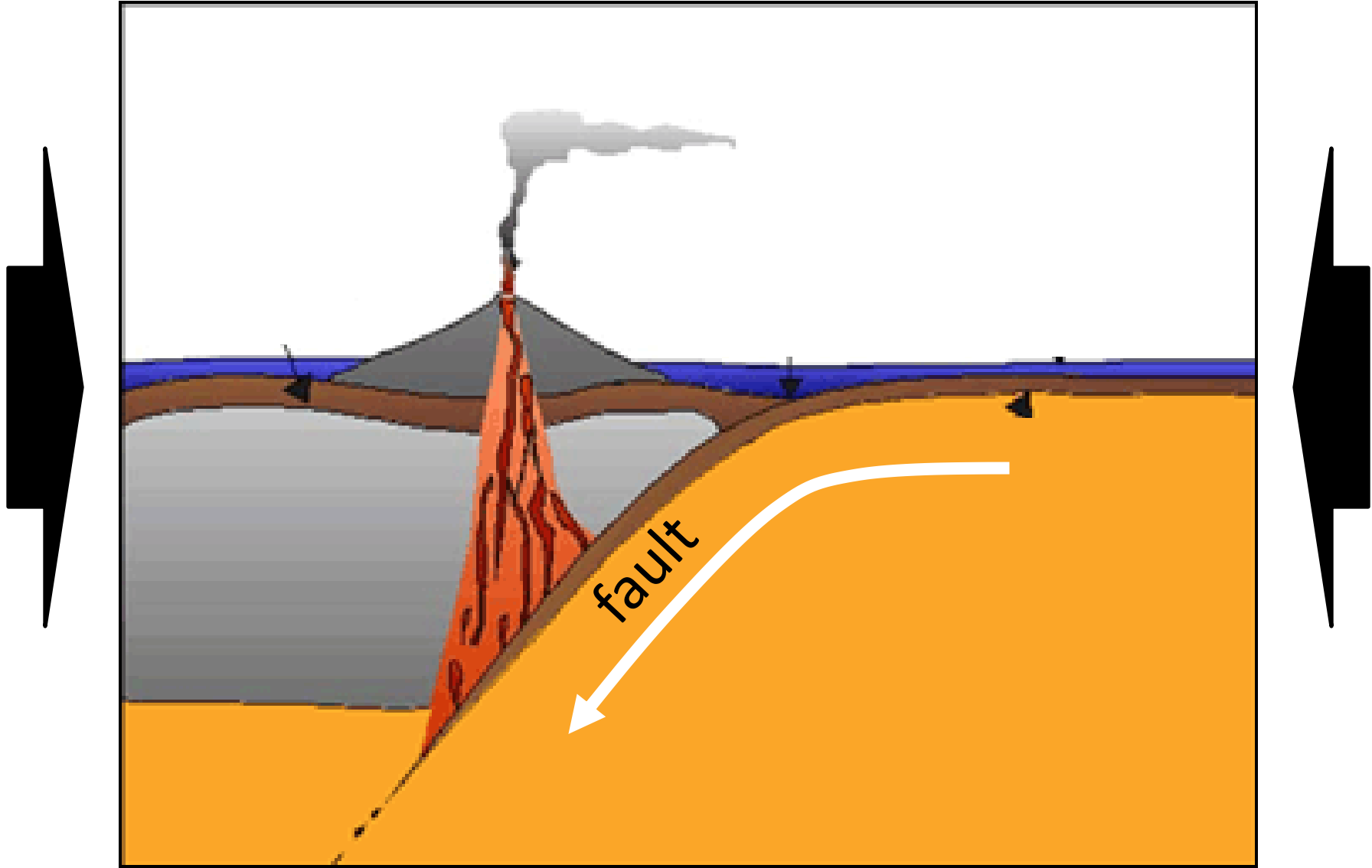


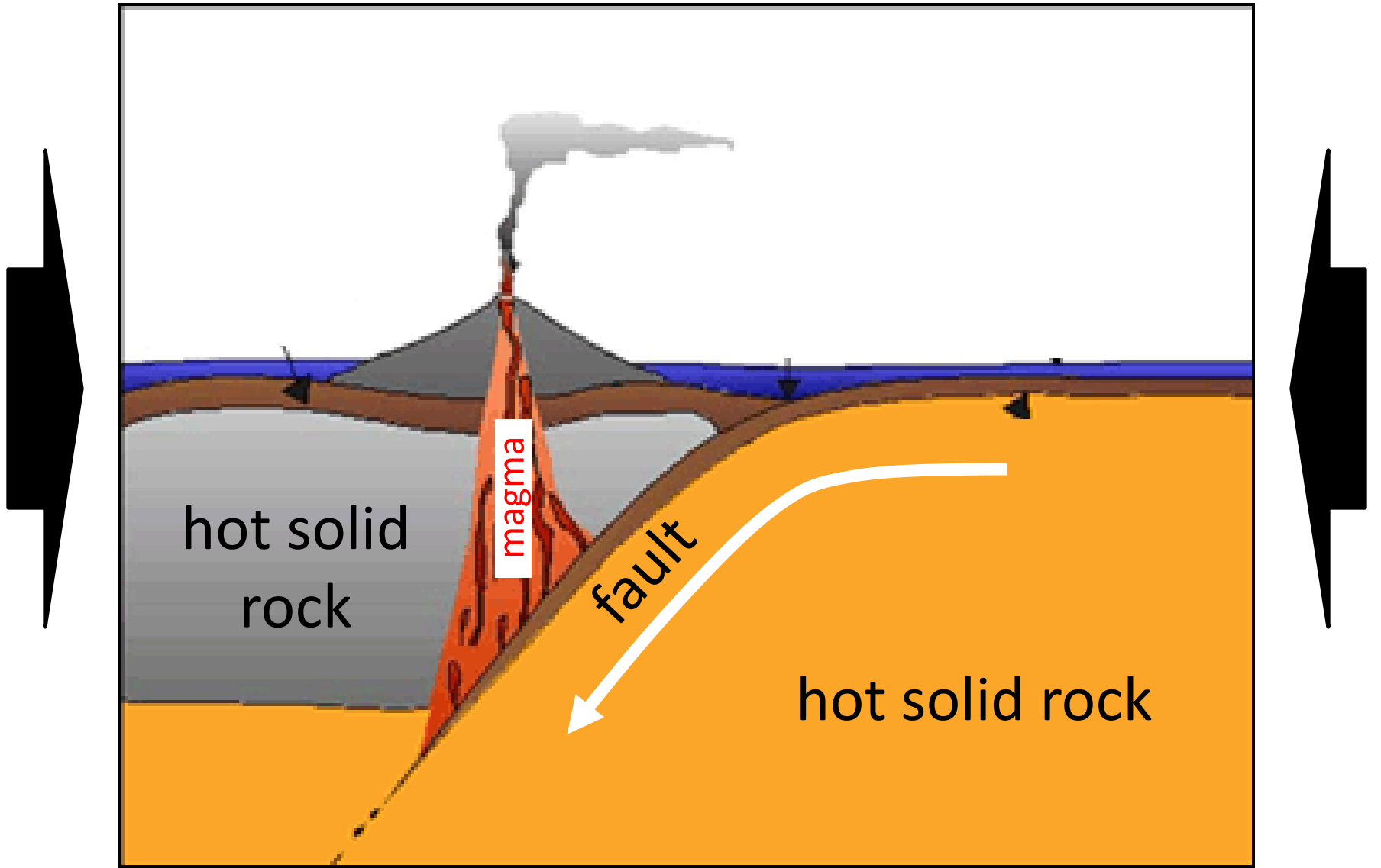
Major Cascade Range Volcanoes of Washington, Oregon, and Northern California



Piscataquis Volcanic Arc



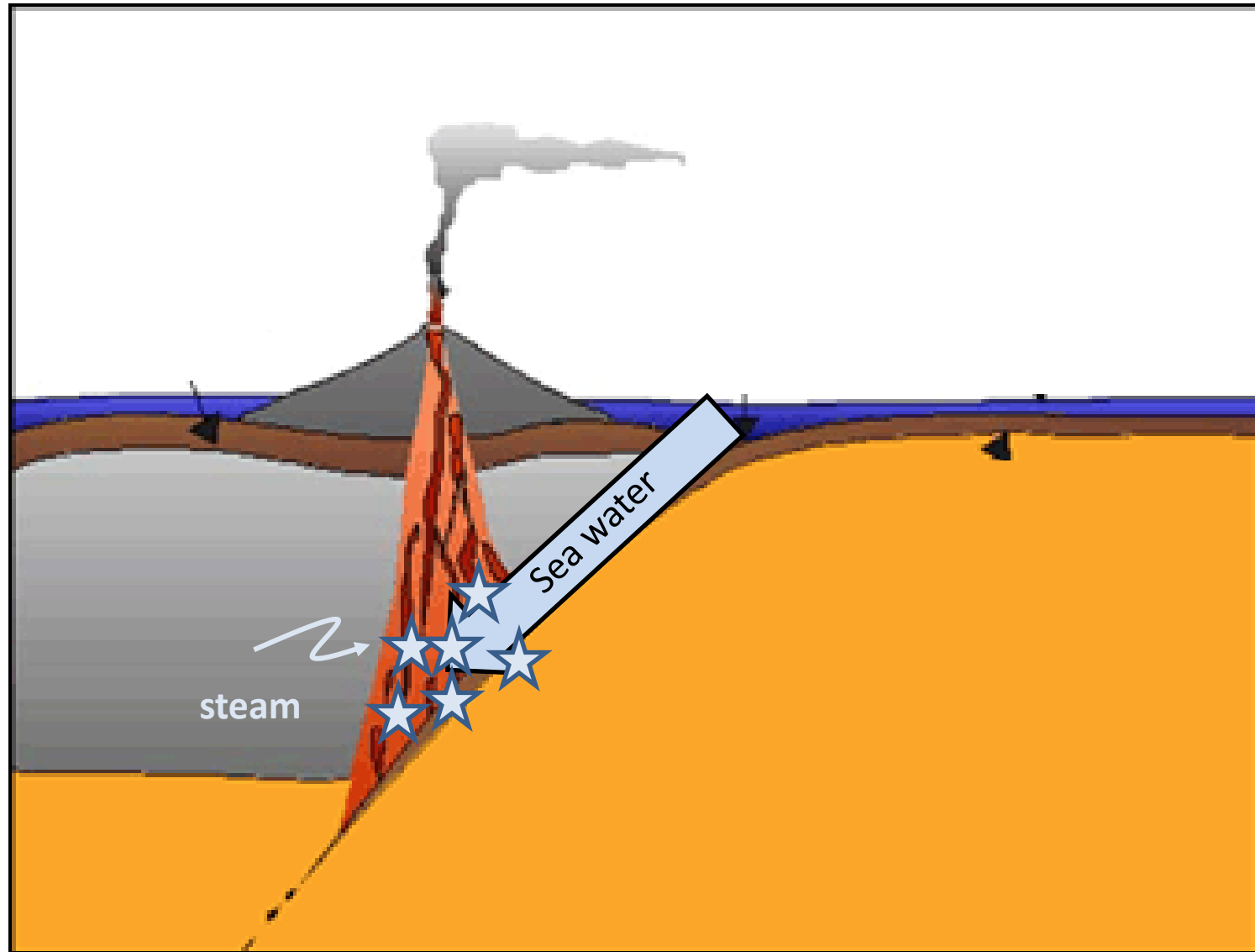


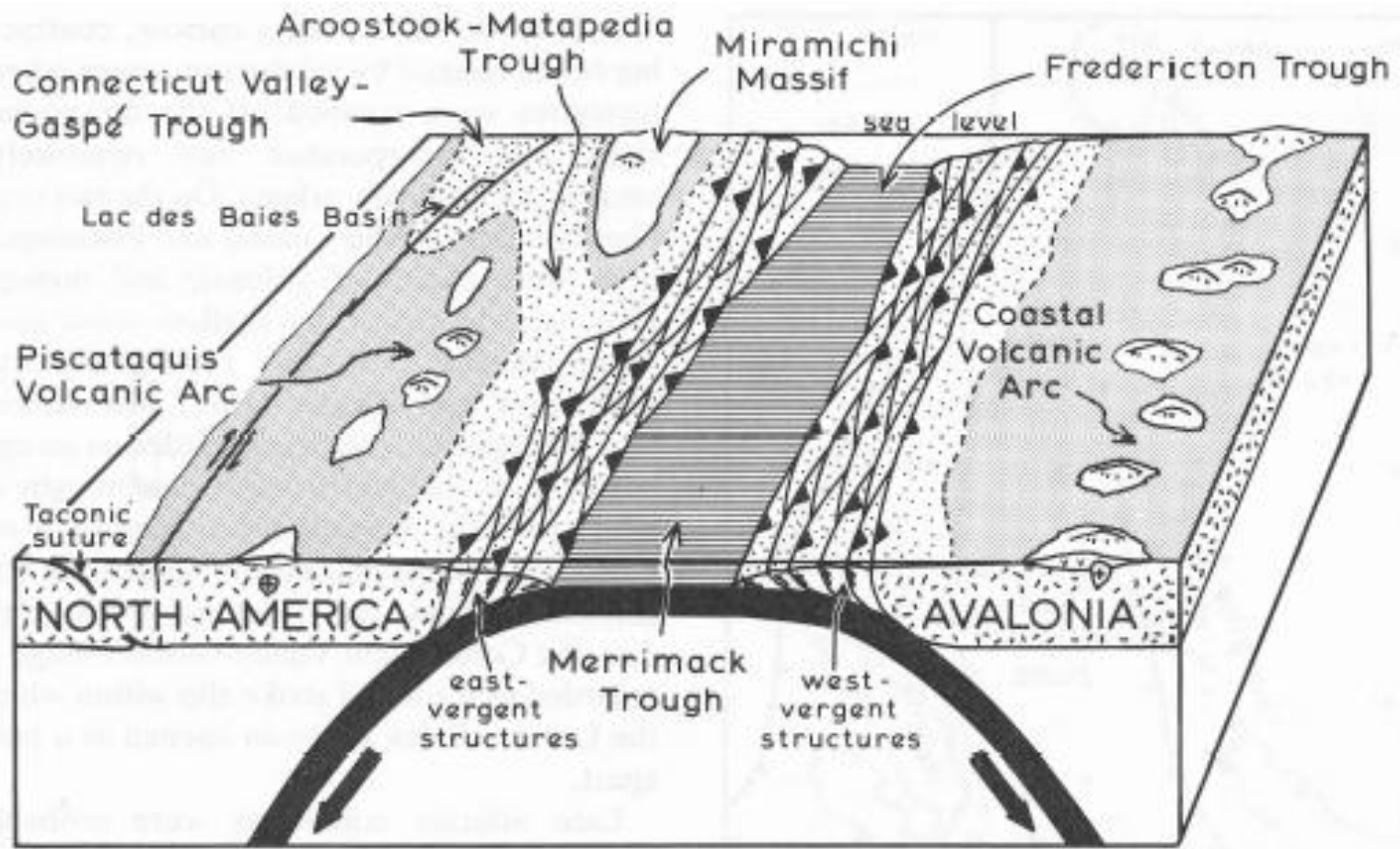


Salt causes winter ice to melt



Steam causes hot rock to melt





Mount Katahdin



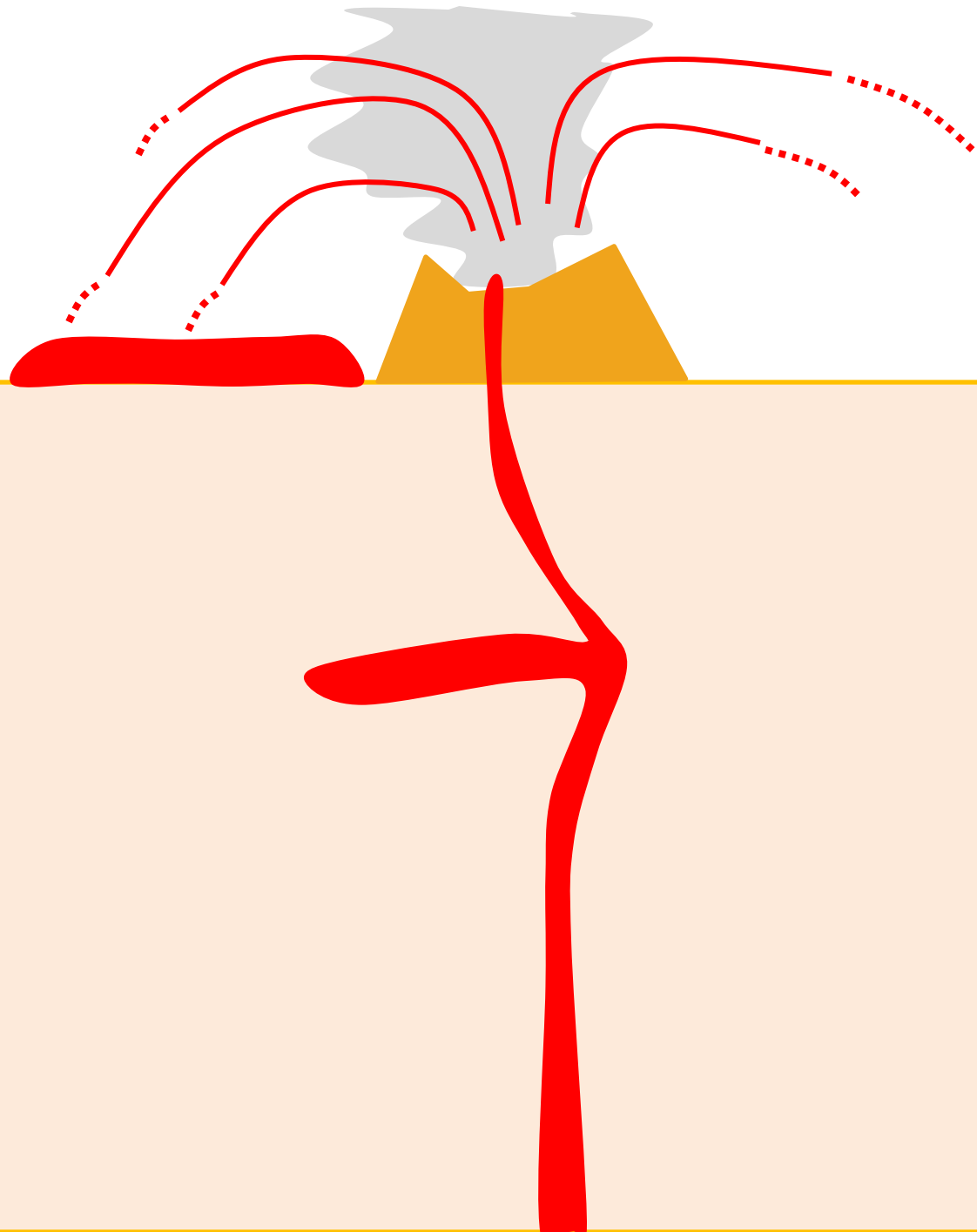
Magma that pooled and hardened underground

South Branch Falls

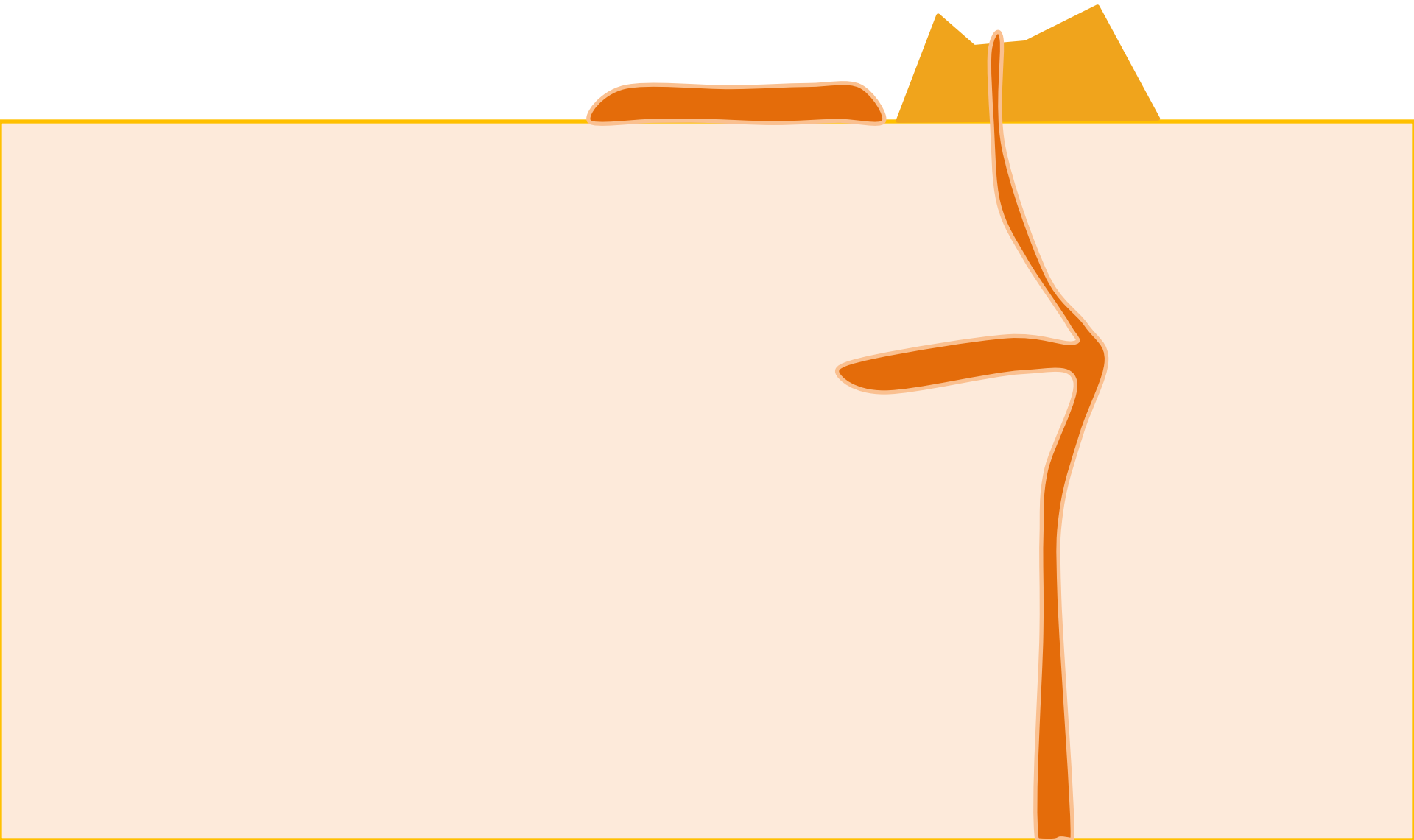


Old Volcanic Ash Fall

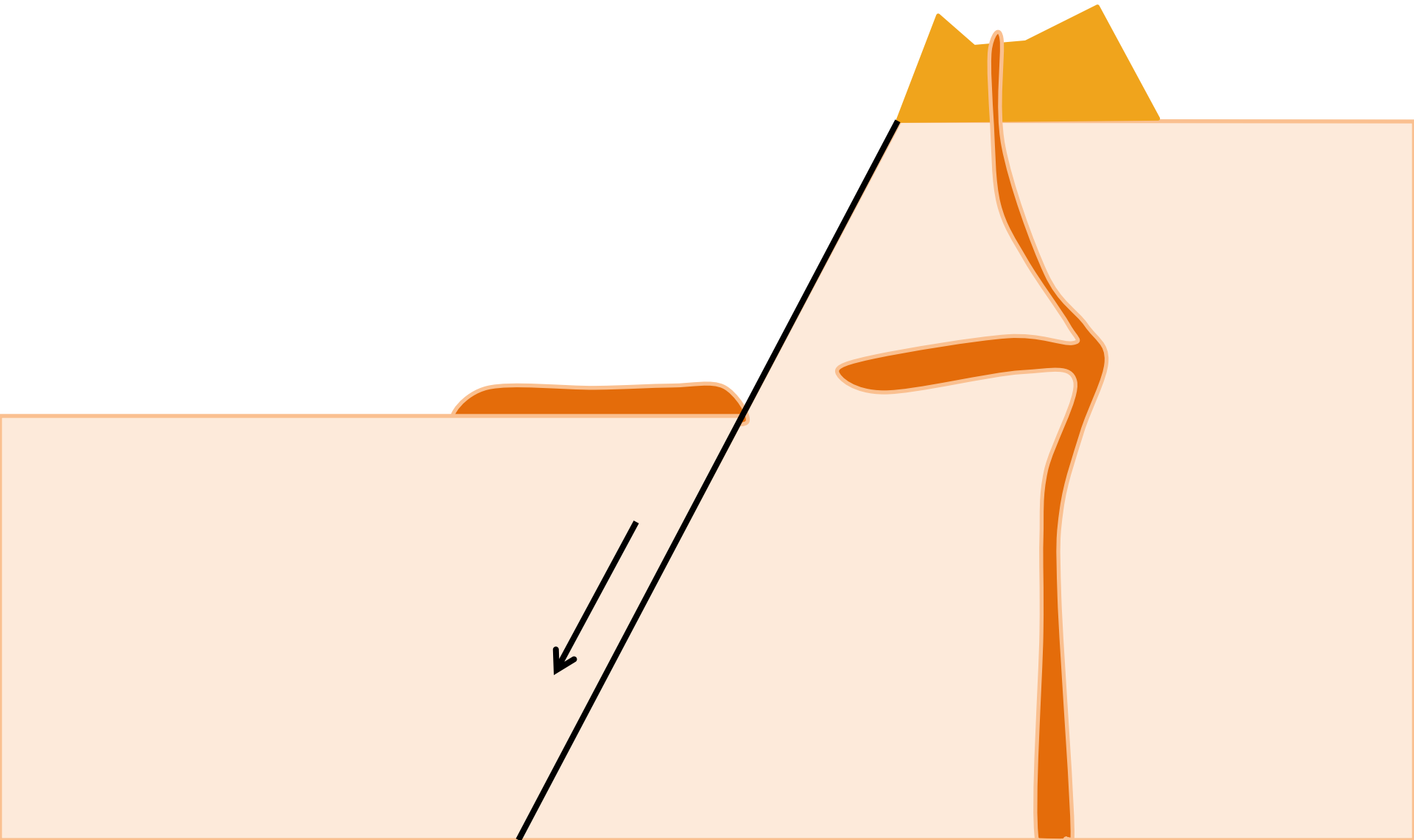
Volcanism



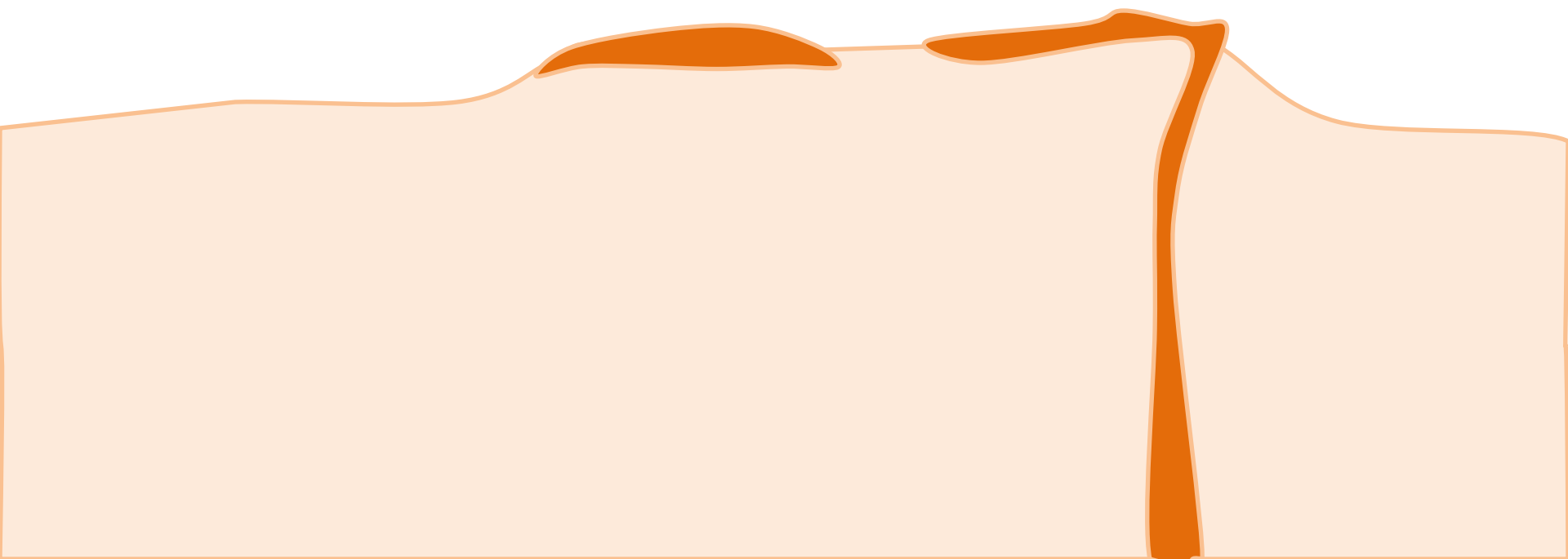
Cooling



Faulting



Erosion

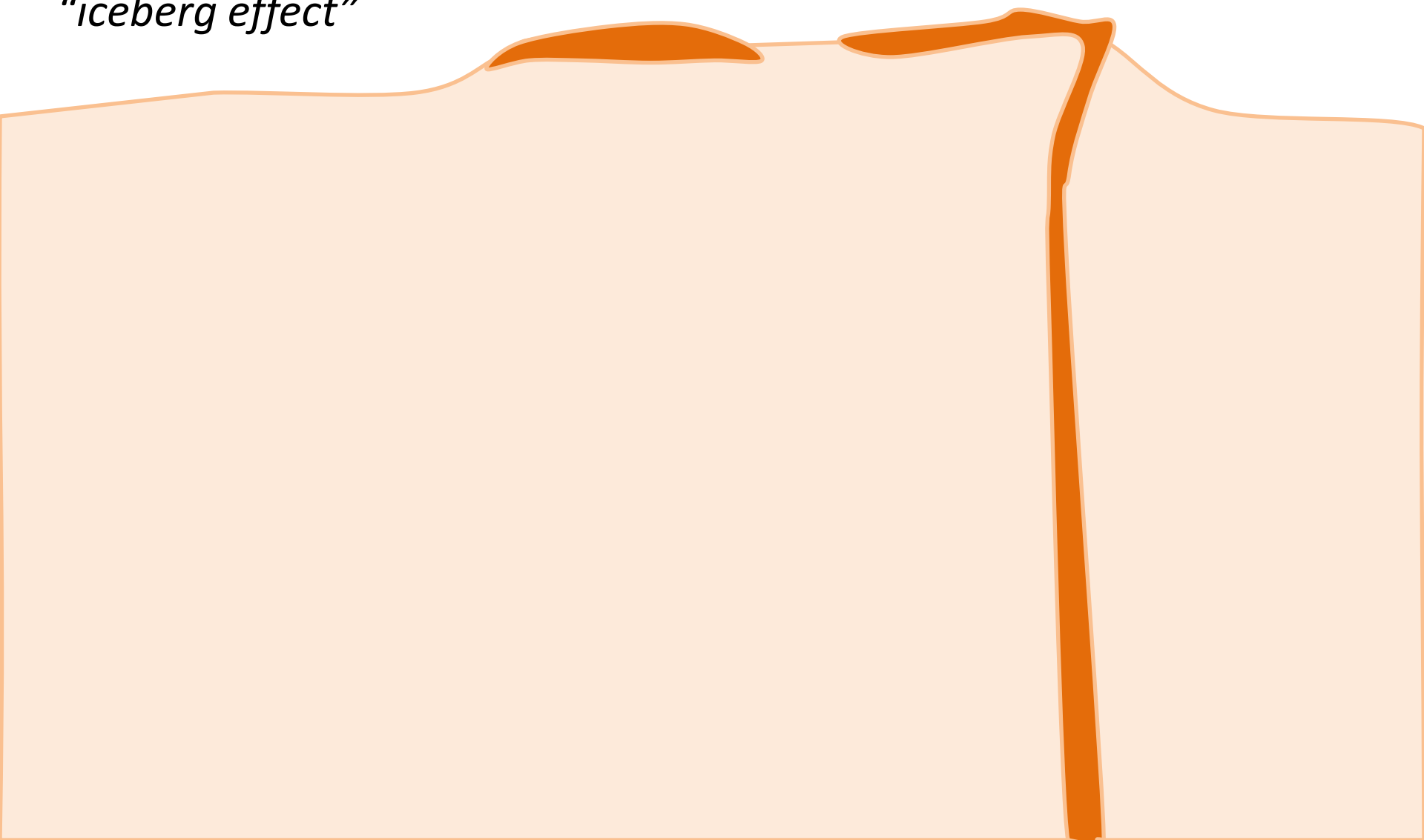


Uplift

"iceberg effect"

South Branch
Falls

Mount
Katahdin





Part 3

Maine's Hot Springs

left treasures ... or maybe problems



Calistoga Geyser

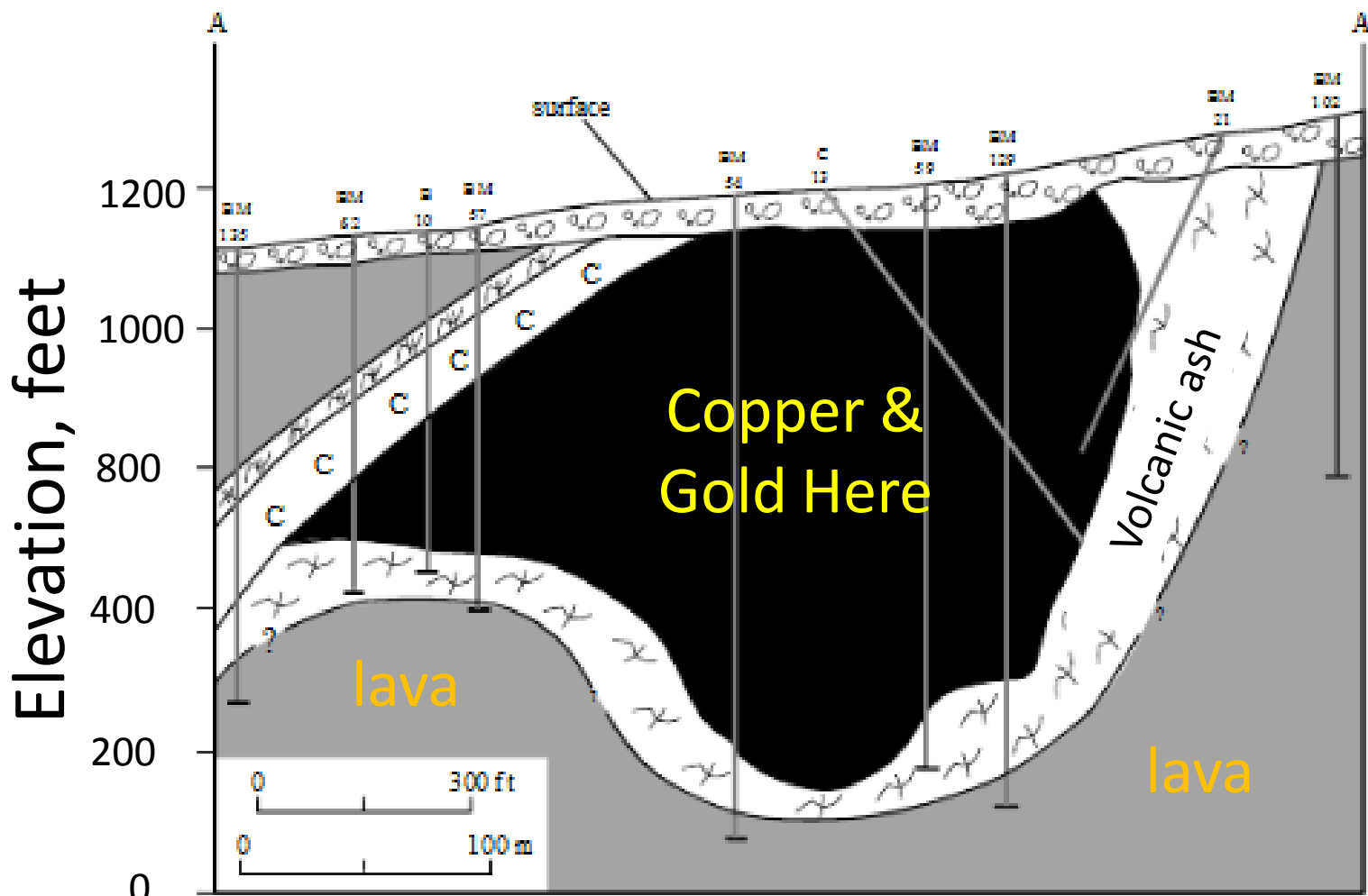


Long Valley









Undersea Hot Spring





EXPLANATION

- | | | |
|---|--|---|
|  Glacial till |  Red and gray chert |  Footwall Ignimbrite |
|  Hanging Wall Ignimbrite |  Massive sulfide |  Mafic lava flows |

Copper Ore from Blue Hill, Maine



James Irving addresses Maine mining interests at UMFK forum

By Julia Bayly, BDN Staff
Posted May 03, 2012, at 1:15 p.m.
Last modified Jan. 17, 2013, at 4:47 p.m.

FORT KENT, Maine — Mining in Aroostook County has come at the expense of the environment.

Portland Press Herald



Maine Mining

About face: How a mine moved toward operating in Maine

by Thomas R. Doyle, Matthew D. Manahan, Avery T. Day and Pierce Atwood



legislative debates regarding expanding mining opportunities in Maine. In 1968, the Callahan Mining Corp. began open-pit mining in Brooksville, ME. This mine yielded copper, zinc, lead and a small amount of silver. This open-pit mine was active until 1972, when the mineral reserve became depleted. As early as 1975, there were indications of contamination at this site, though efforts to clean up this (what is now) Superfund

Fiery debate over proposed Maine mine

Business groups and the LePage administration see economic opportunity, but others fear heavy pollution, including near J.D. Irving's Bald Mountain.

Closing Thoughts

Maine was shaped long ago by geologic processes similar to those now active in California

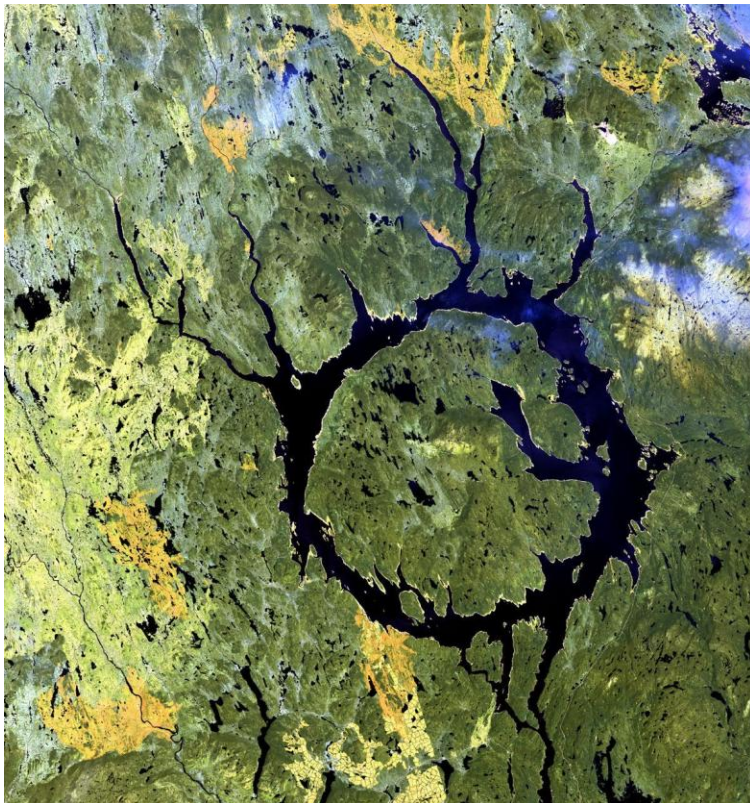
Had things gone slightly differently, Maine would be very different place.

Change is inevitable. We hardly notice slow change, even if profound. Only rapid change is hard to accommodate.



a final thought ...

215 Million years ago, an
asteroid hit Quebec



Manicouagan Crater

How different would Maine
be if it had hit here, instead?