

Hot Science Cool Talks

UT Environmental Science Institute

17

Geologic Wonders of Central Texas

**Dr. Leon Long
March 22, 2002**

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A photograph of a steep, rocky hillside. The rock face is composed of light-colored, fractured blocks. A prominent feature is a series of dark, parallel, tilted layers (possibly shale or sandstone) that run diagonally across the middle of the image. The top of the hill is covered with sparse green vegetation and trees under a clear blue sky.

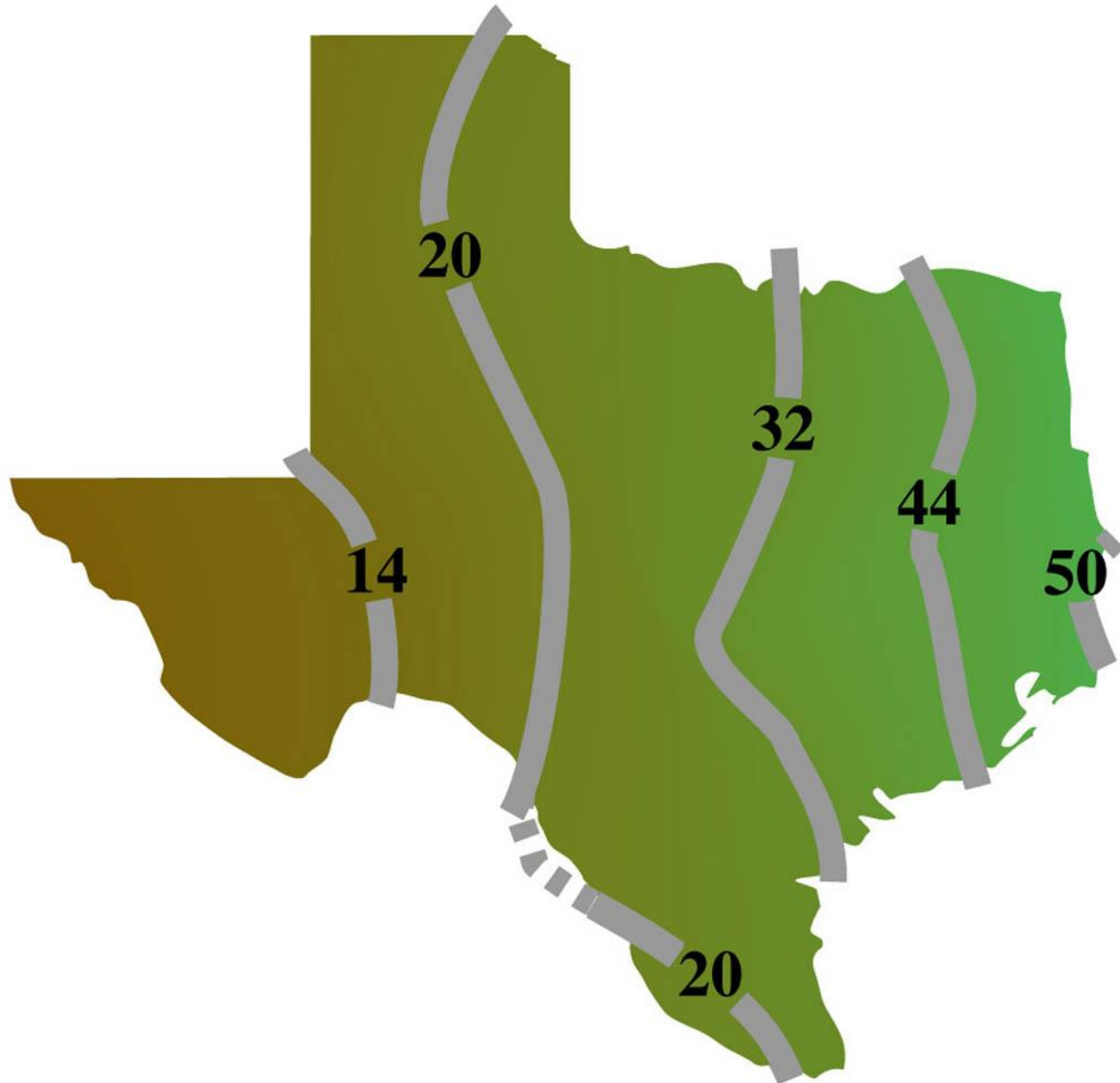
Geologic Wonders Of Central Texas

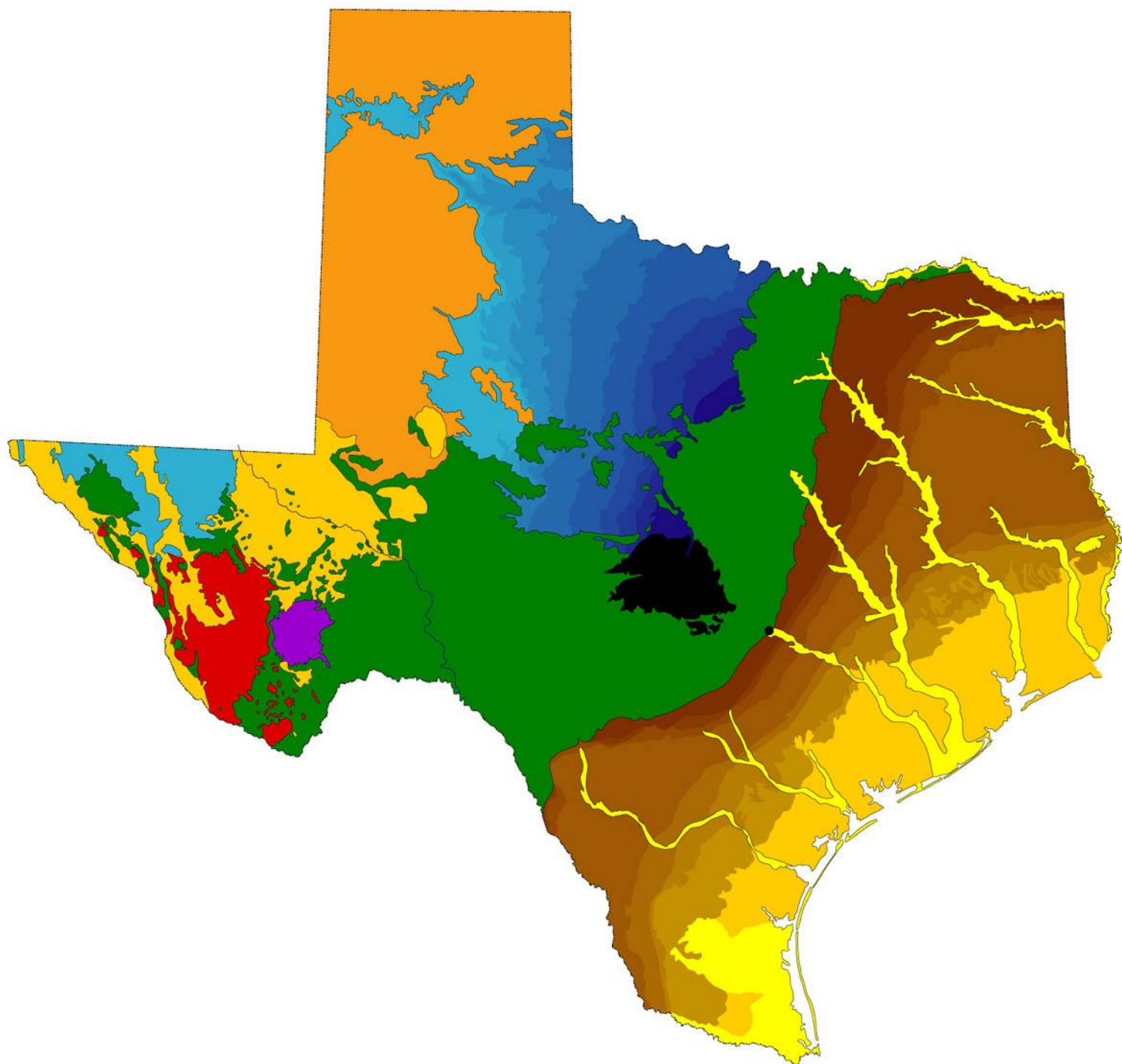
Dr. Leon E. Long

Department of Geological Sciences



Average Precipitation (inches / year)



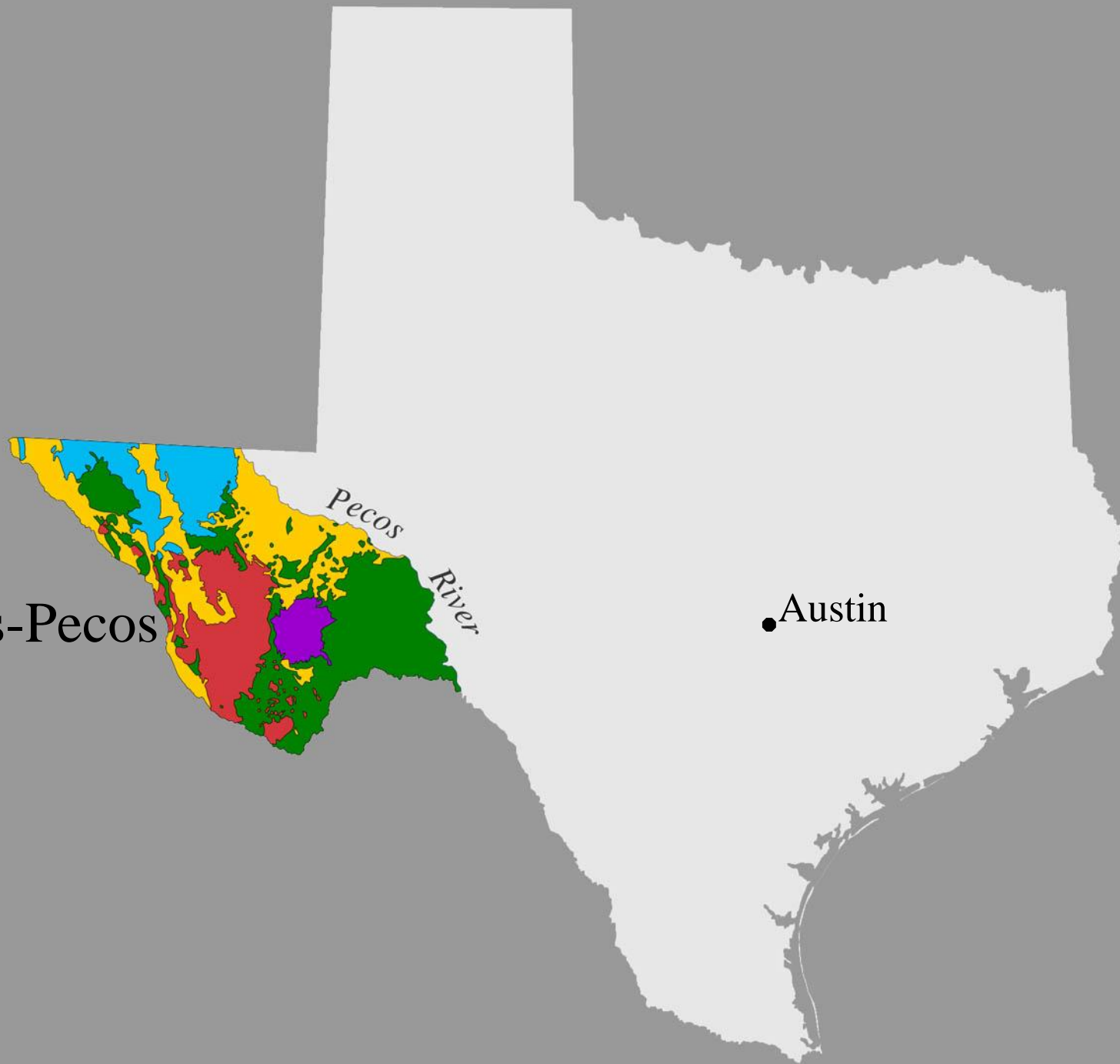


North-Central Texas

• Austin







Trans-Pecos

Pecos
River

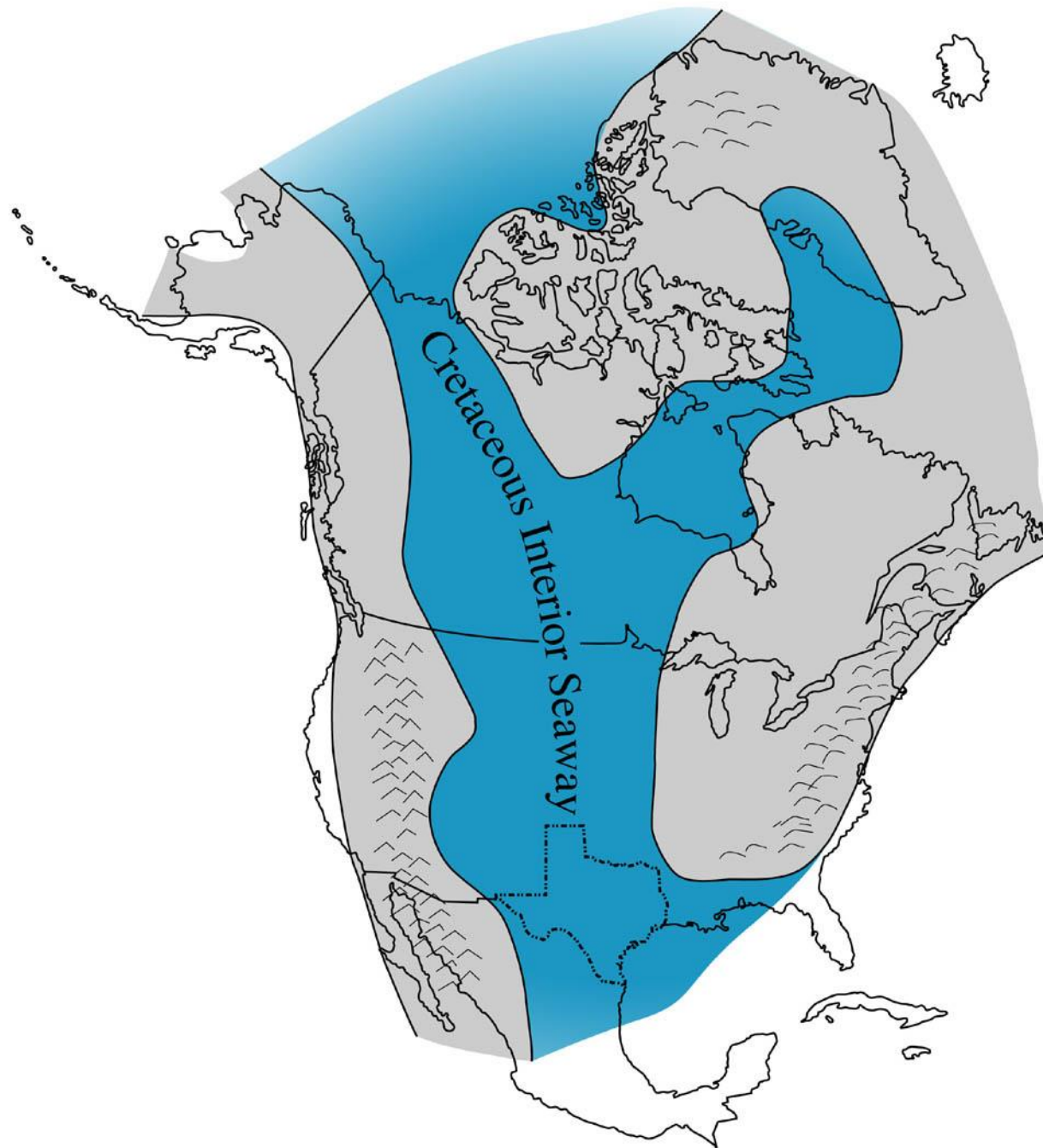
• Austin



High
Plains

Austin

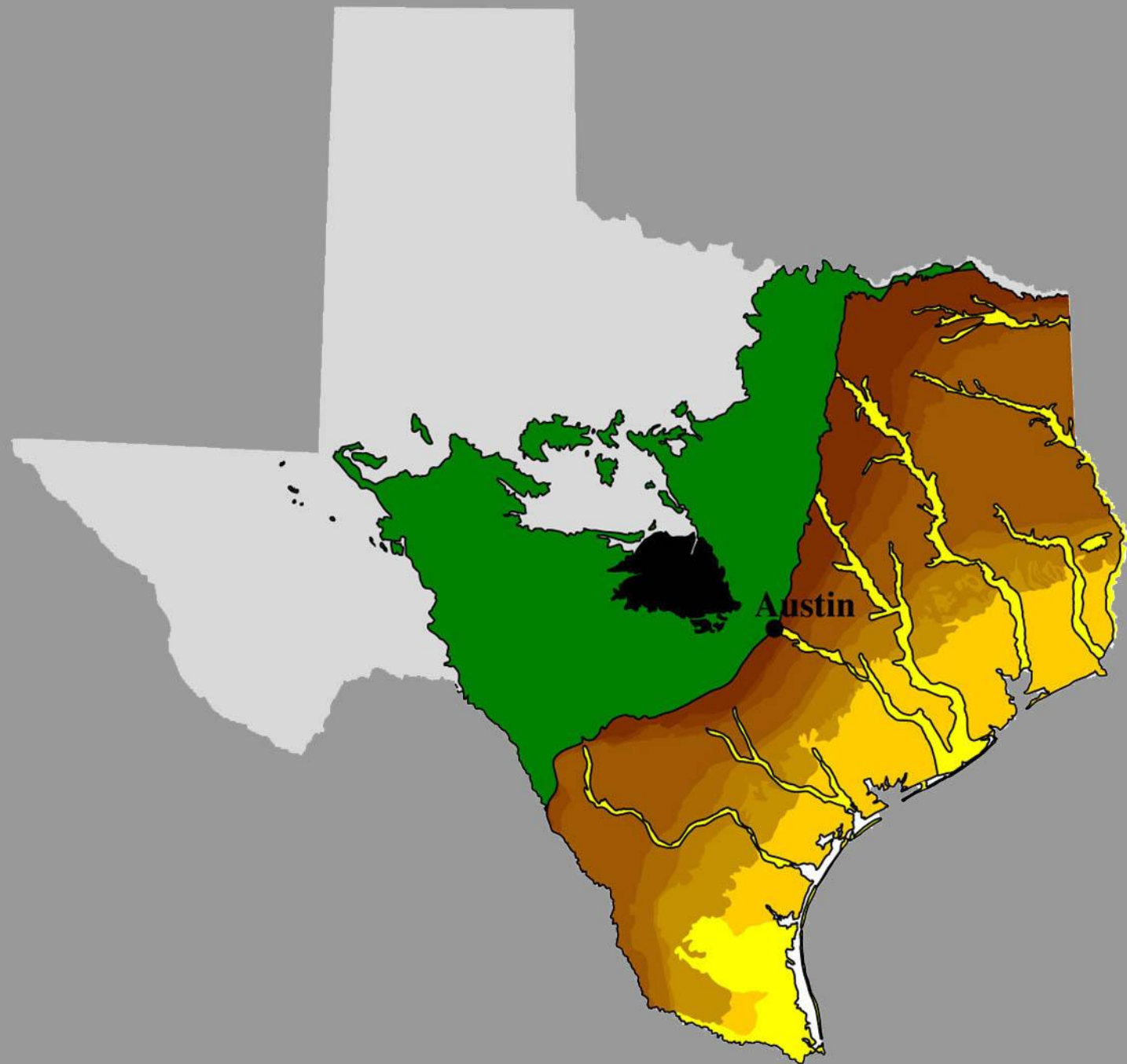




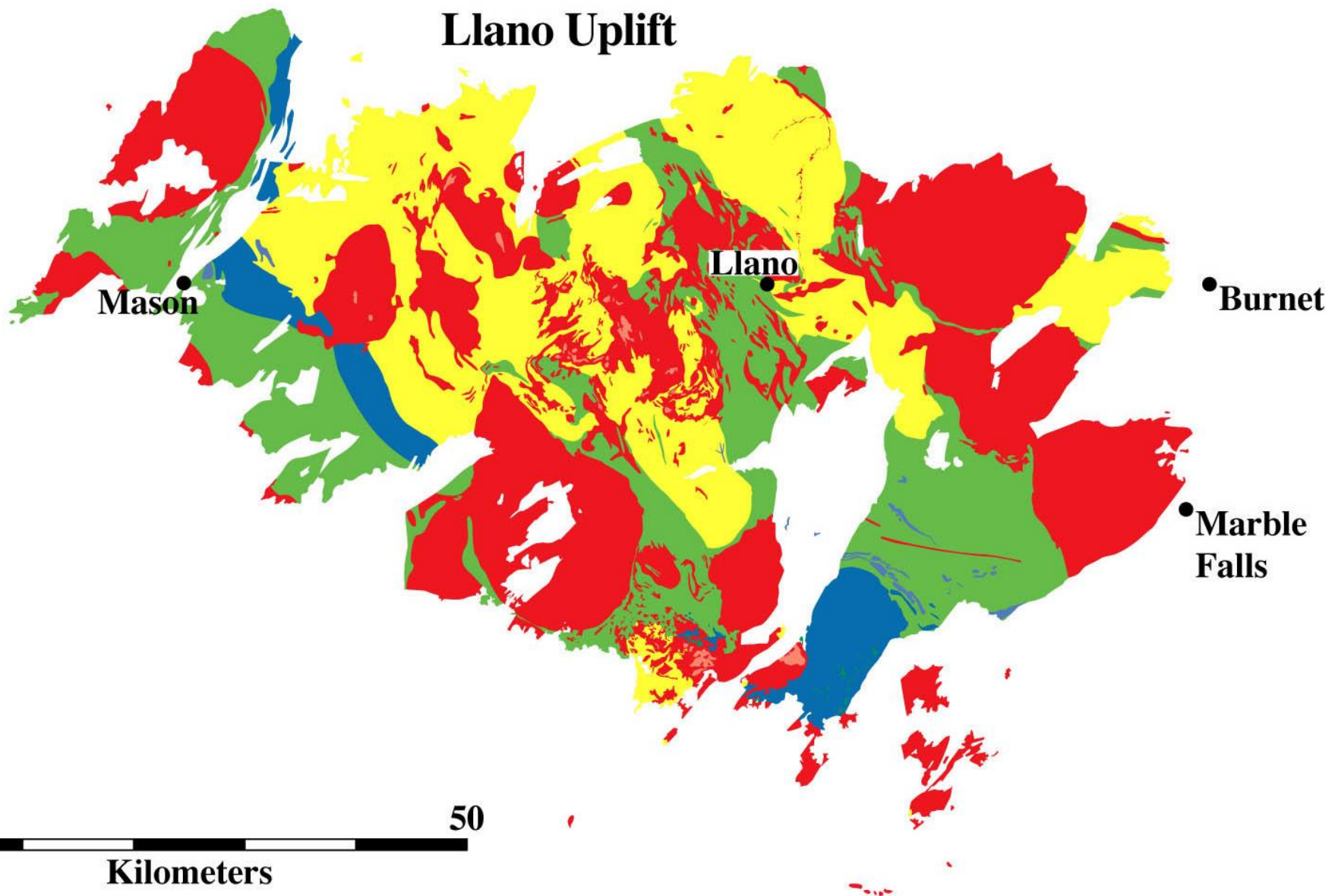


Llano
Uplift

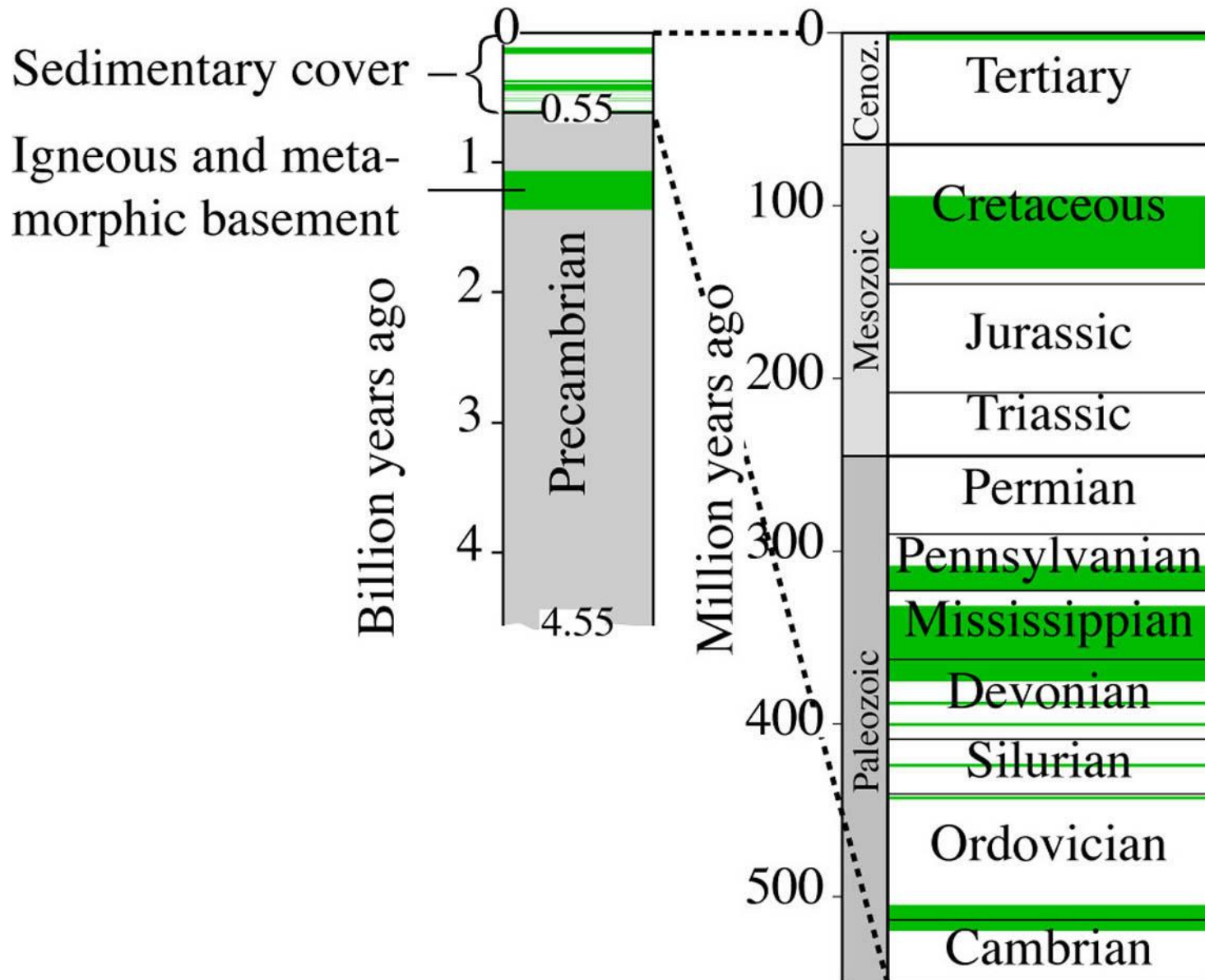
Austin



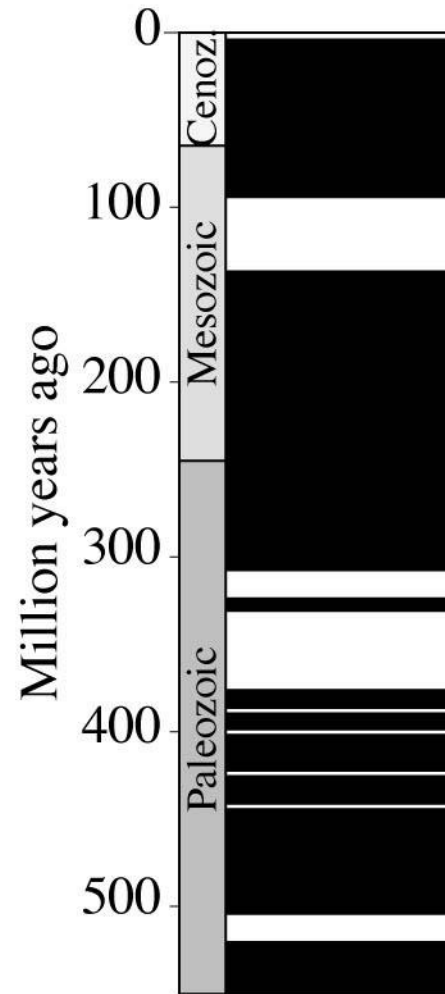
Llano Uplift

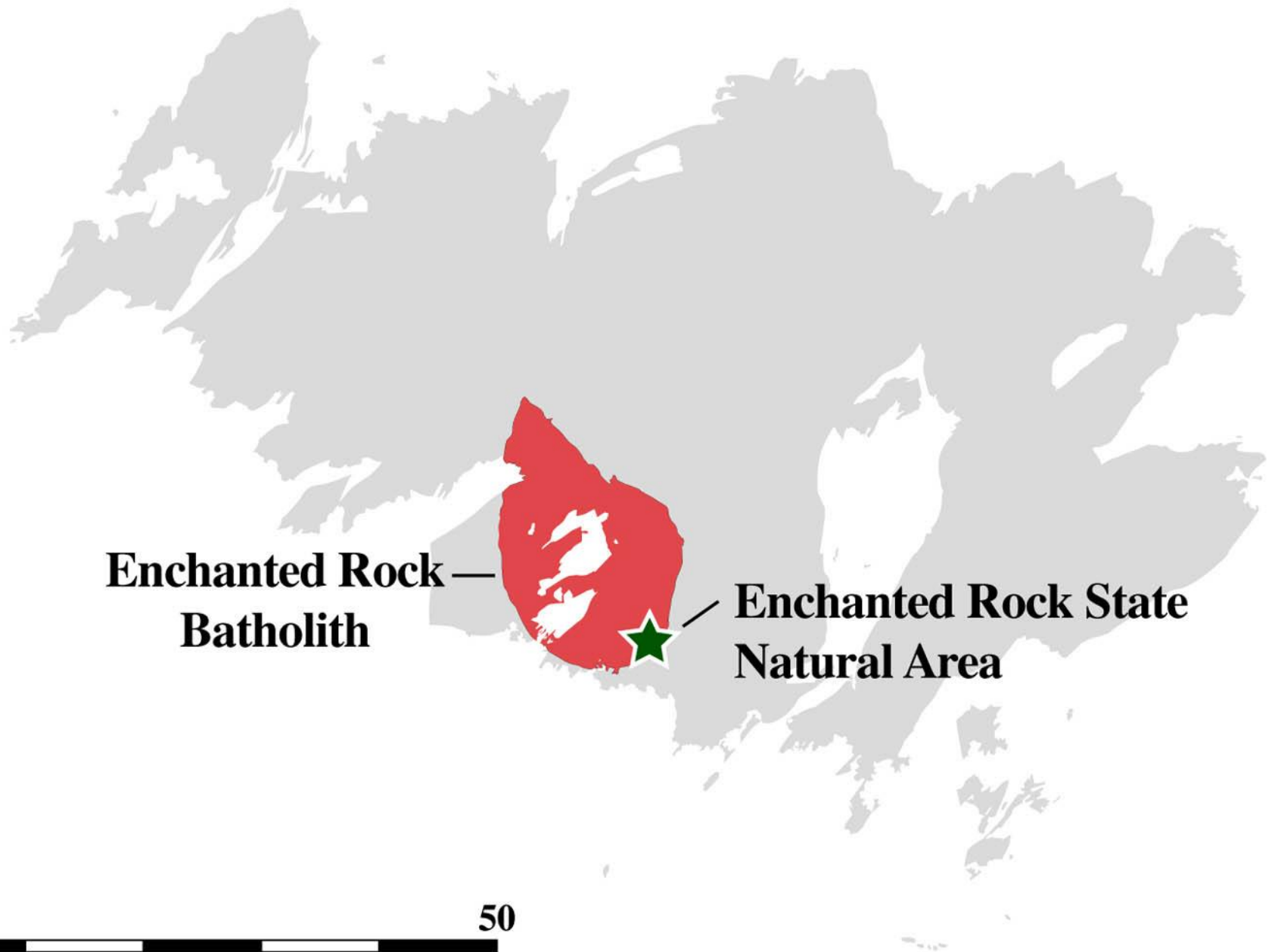


Ages of rocks in the Llano Uplift



Erosion or non-deposition, Llano Uplift





**Enchanted Rock —
Batholith**

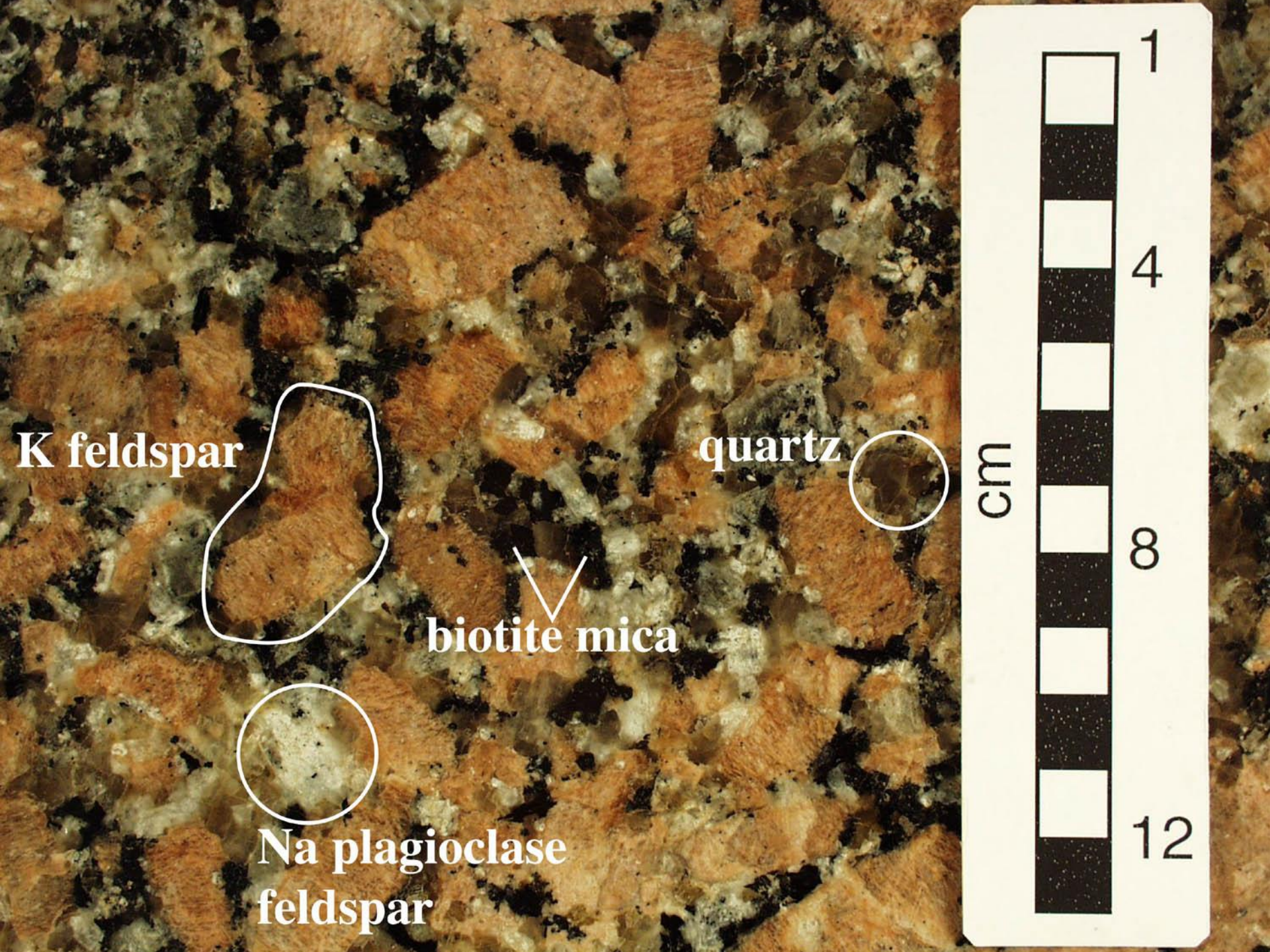
**Enchanted Rock State
Natural Area**



0 50

Kilometers





K feldspar

quartz

biotite mica

Na plagioclase
feldspar

cm

1

4

8

12

[schematic cross section]

Earth's surface 1.08 billion years ago

Volcanic field (?)

Metamorphic
host
rock

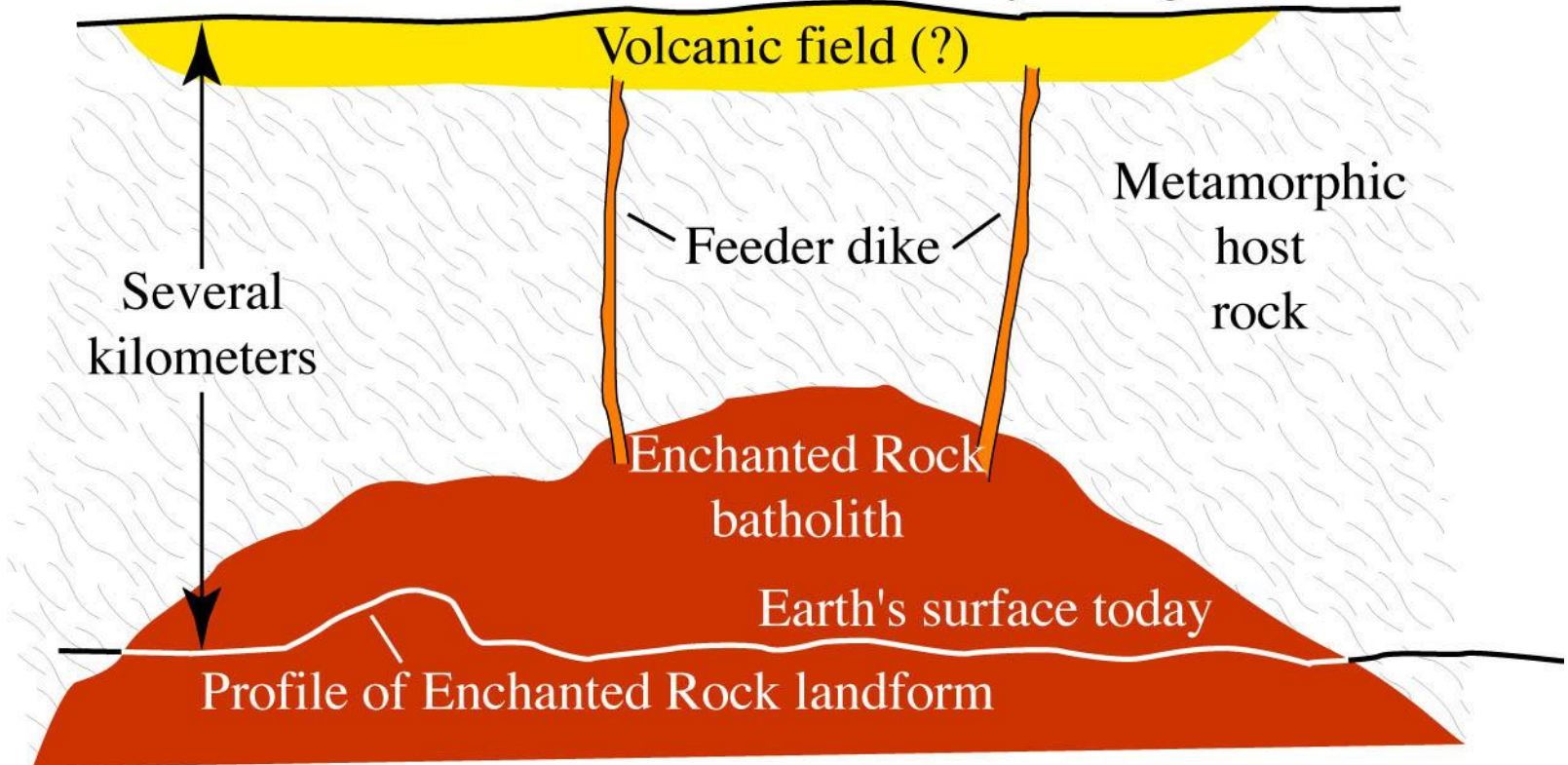
Feeder dike

Several
kilometers

Enchanted Rock
batholith

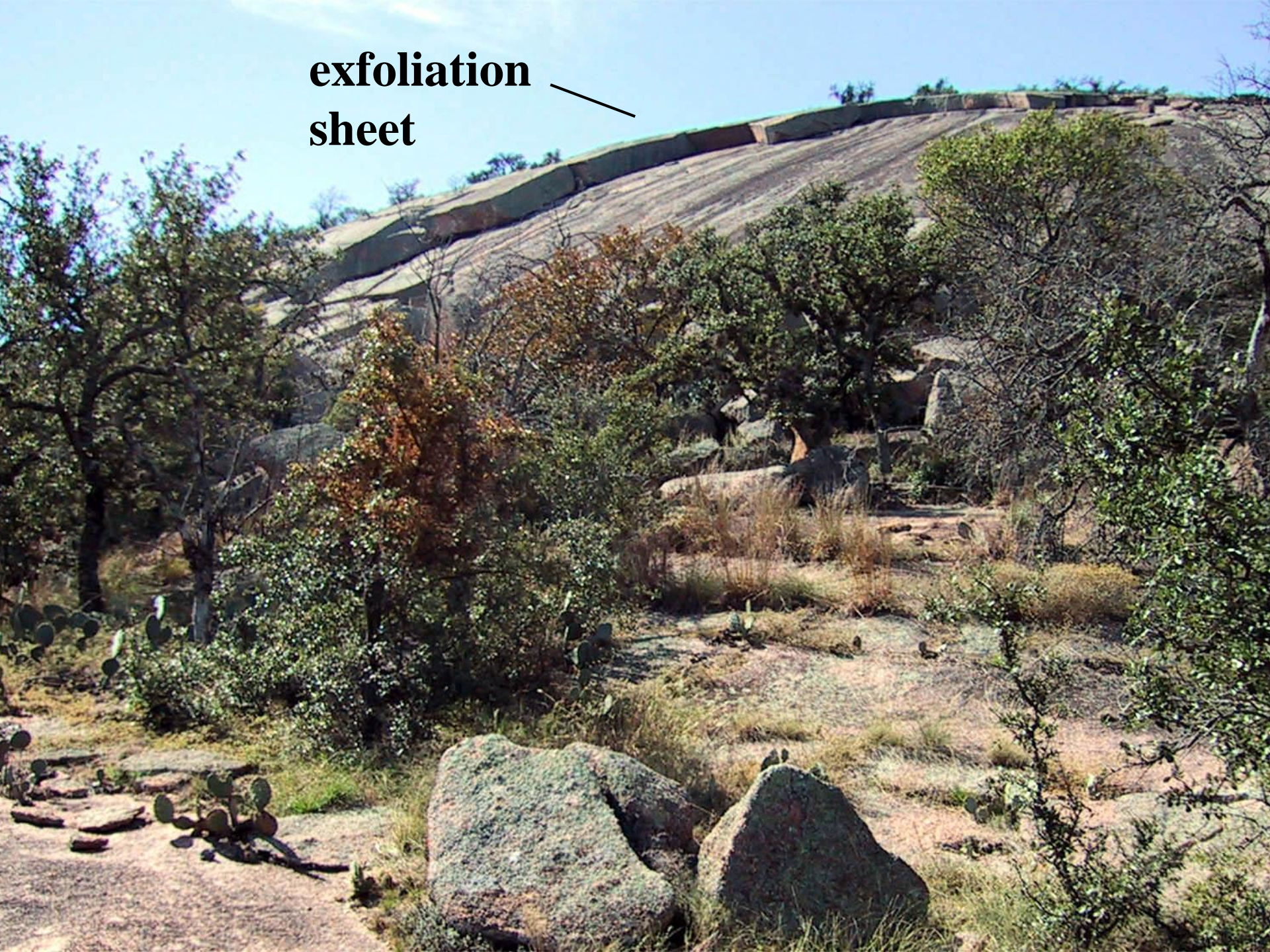
Earth's surface today

Profile of Enchanted Rock landform

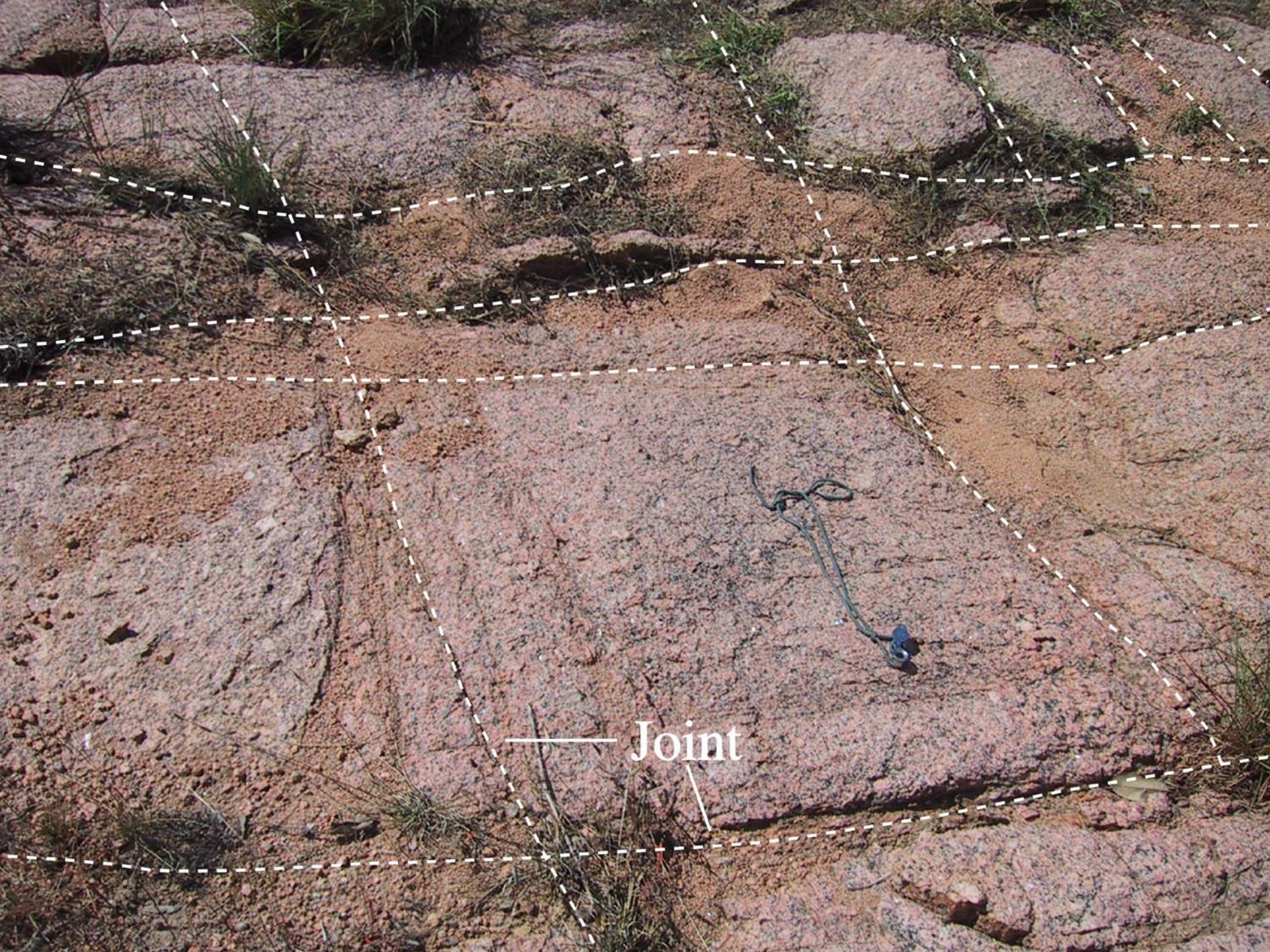




**exfoliation
sheet** —





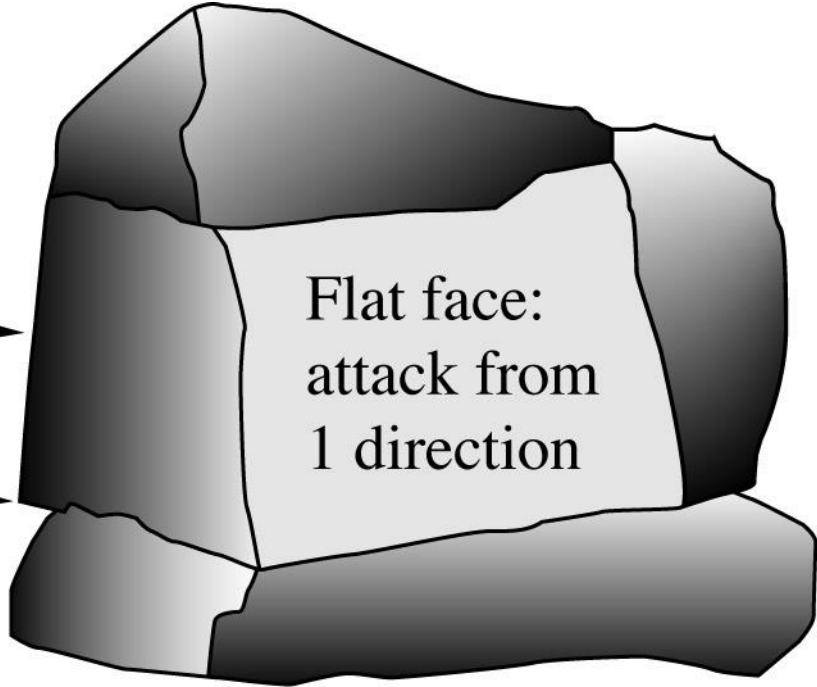


Joint

Edge:
attack from
2 directions

Corner: →
attack from
3 directions

Flat face:
attack from
1 direction

A 3D diagram of a rock with several flat faces and sharp edges. The rock is shaded with a gradient from light gray to dark gray to give it a three-dimensional appearance. Three labels with arrows point to specific features: 'Edge: attack from 2 directions' points to a vertical edge on the left; 'Corner: attack from 3 directions' points to a corner on the left; and 'Flat face: attack from 1 direction' is placed on a large, light-colored flat face in the center.







View to the south

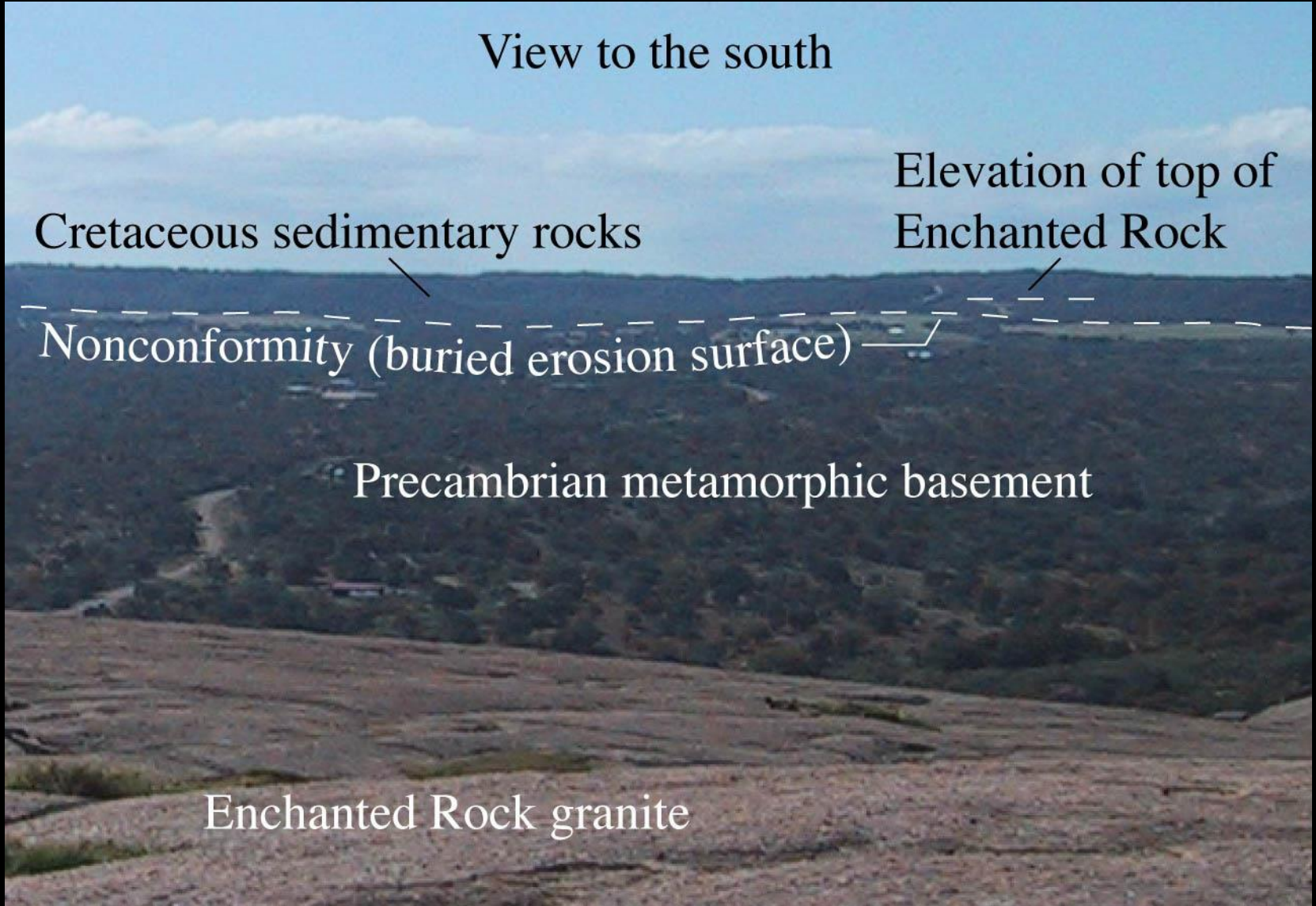
Cretaceous sedimentary rocks

Elevation of top of
Enchanted Rock

Nonconformity (buried erosion surface)

Precambrian metamorphic basement

Enchanted Rock granite





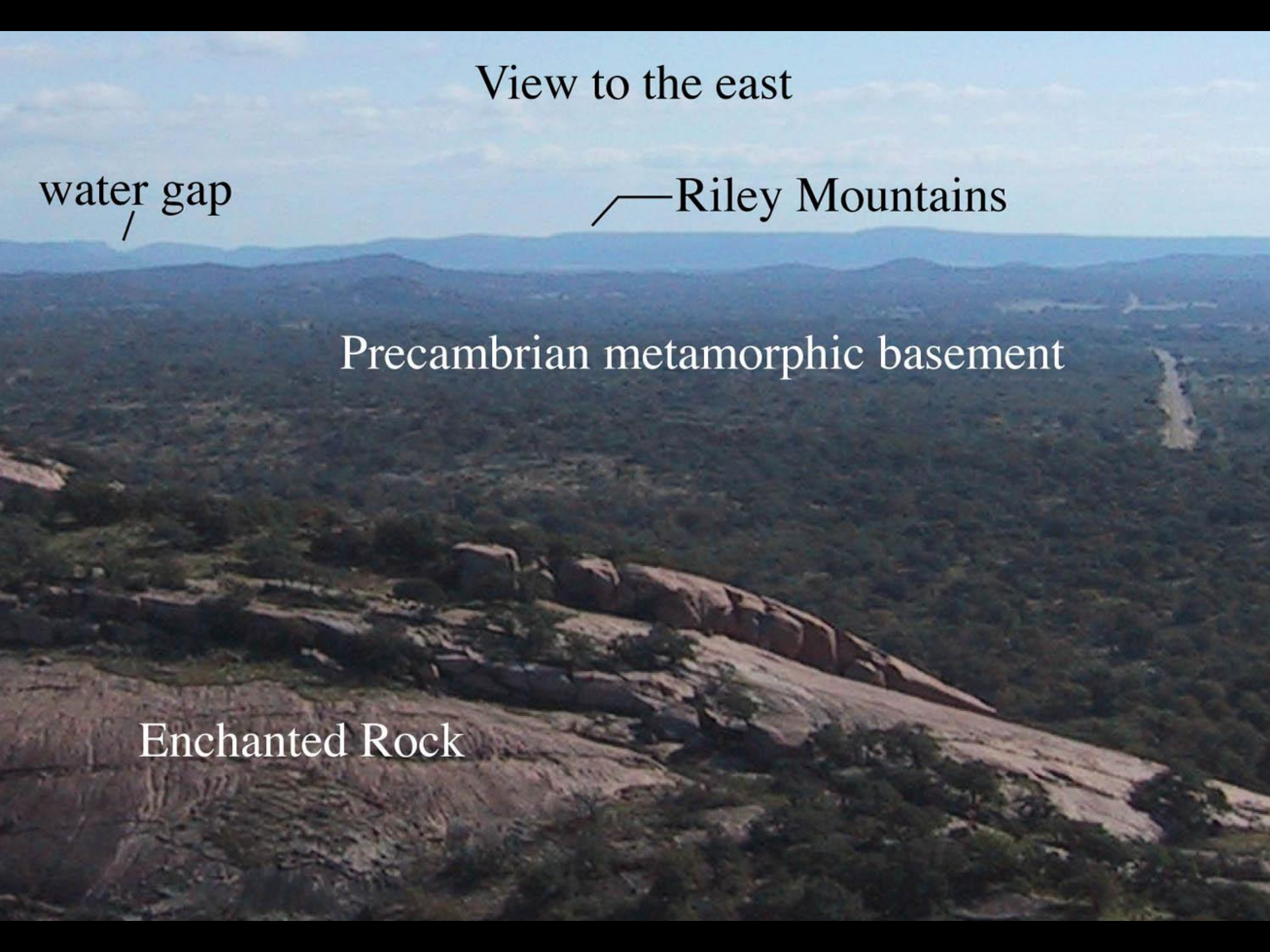
View to the east

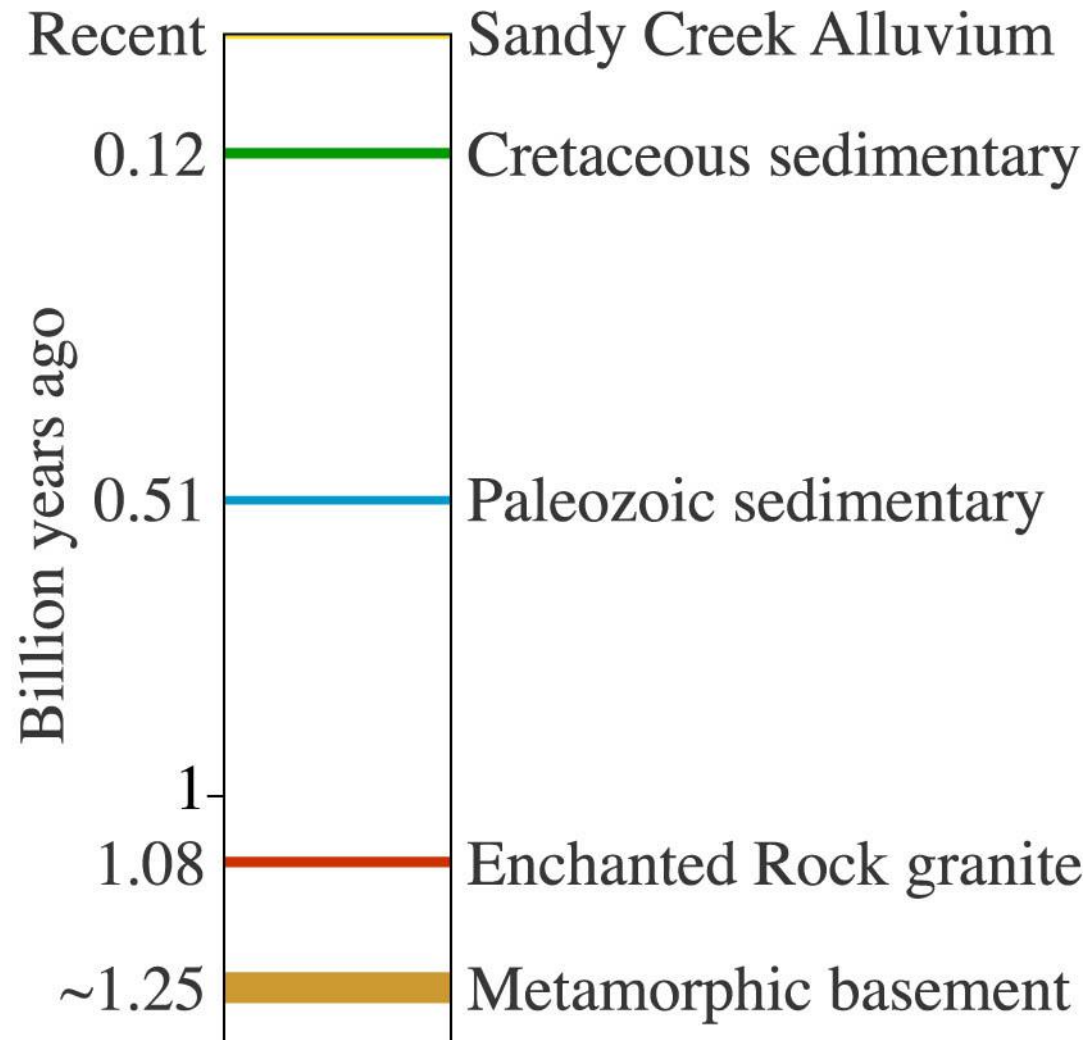
water gap
/

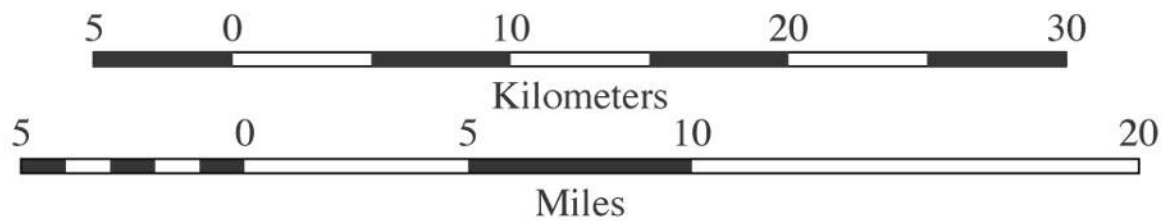
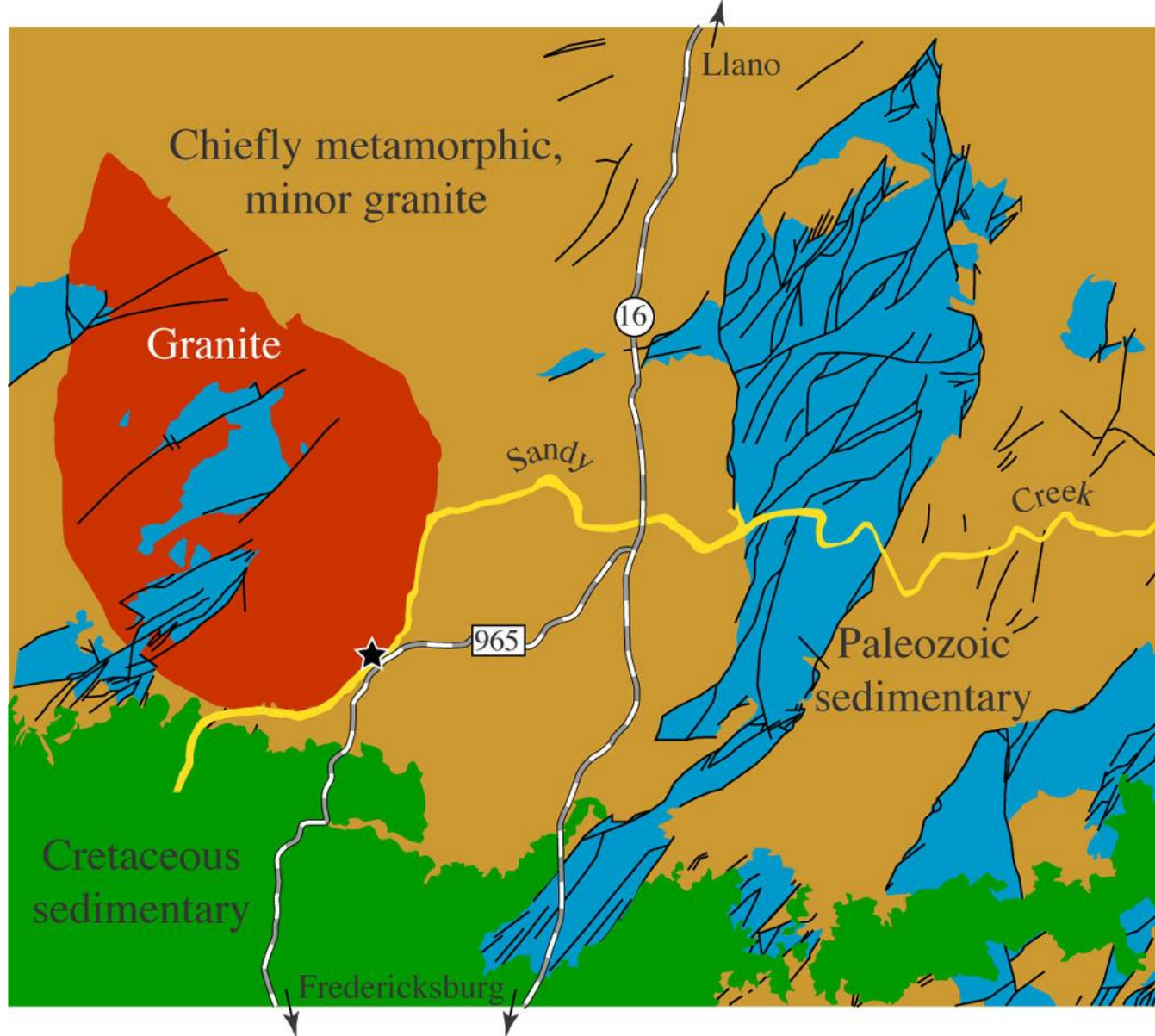
— Riley Mountains

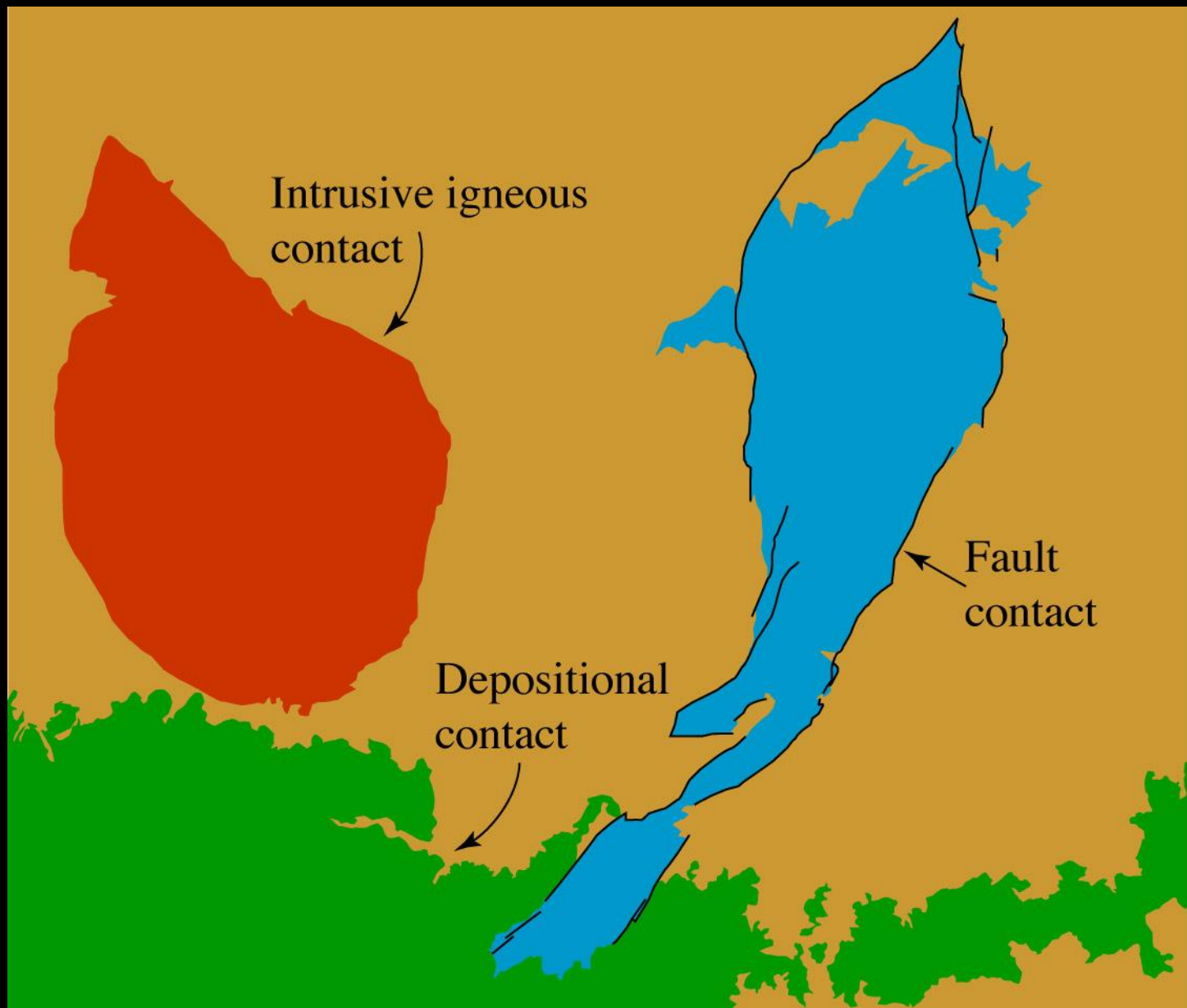
Precambrian metamorphic basement

Enchanted Rock

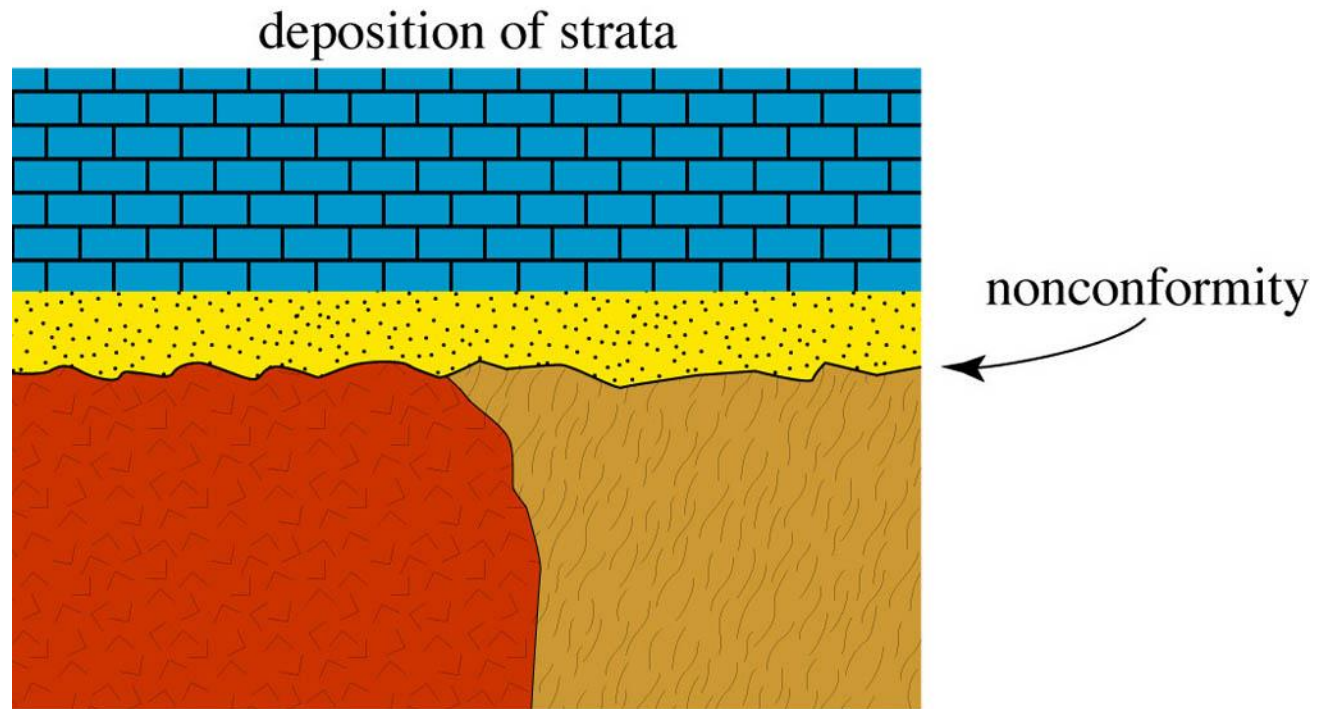
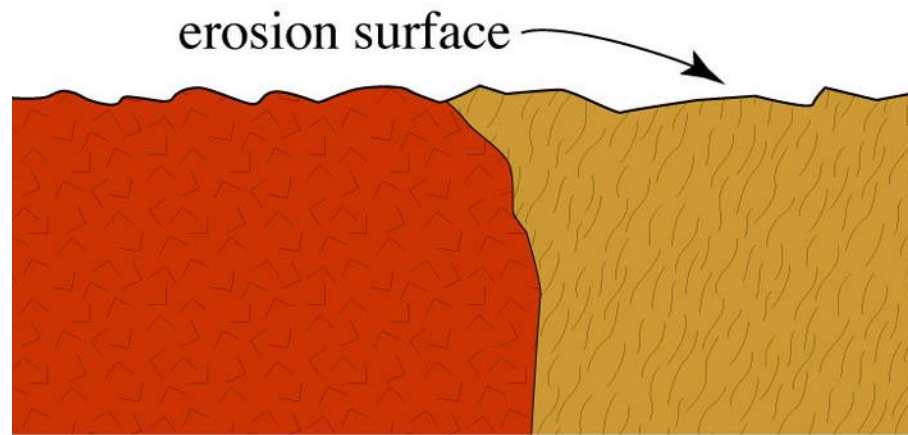






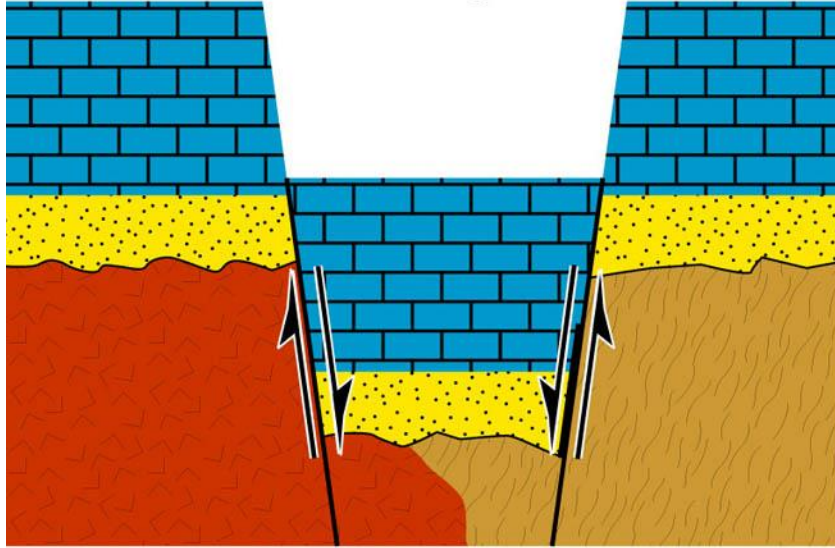


Stage 1: form the rocks



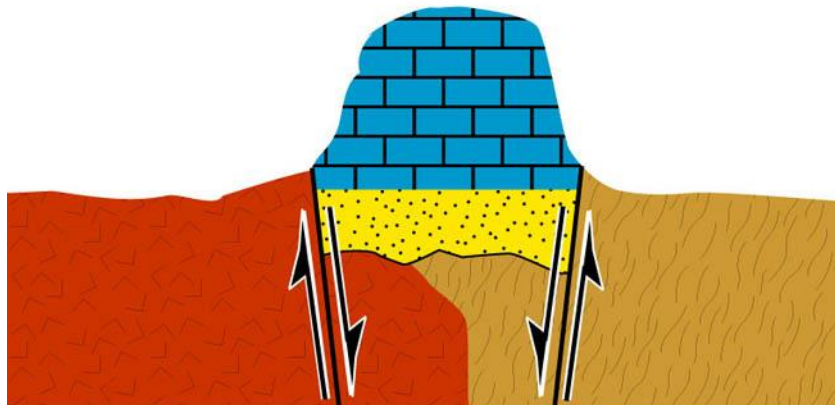
[cross sections]

Stage 2: deform the rocks
faulting



[cross section]

Stage 3: erode the rocks
inversion of topography



[cross section]





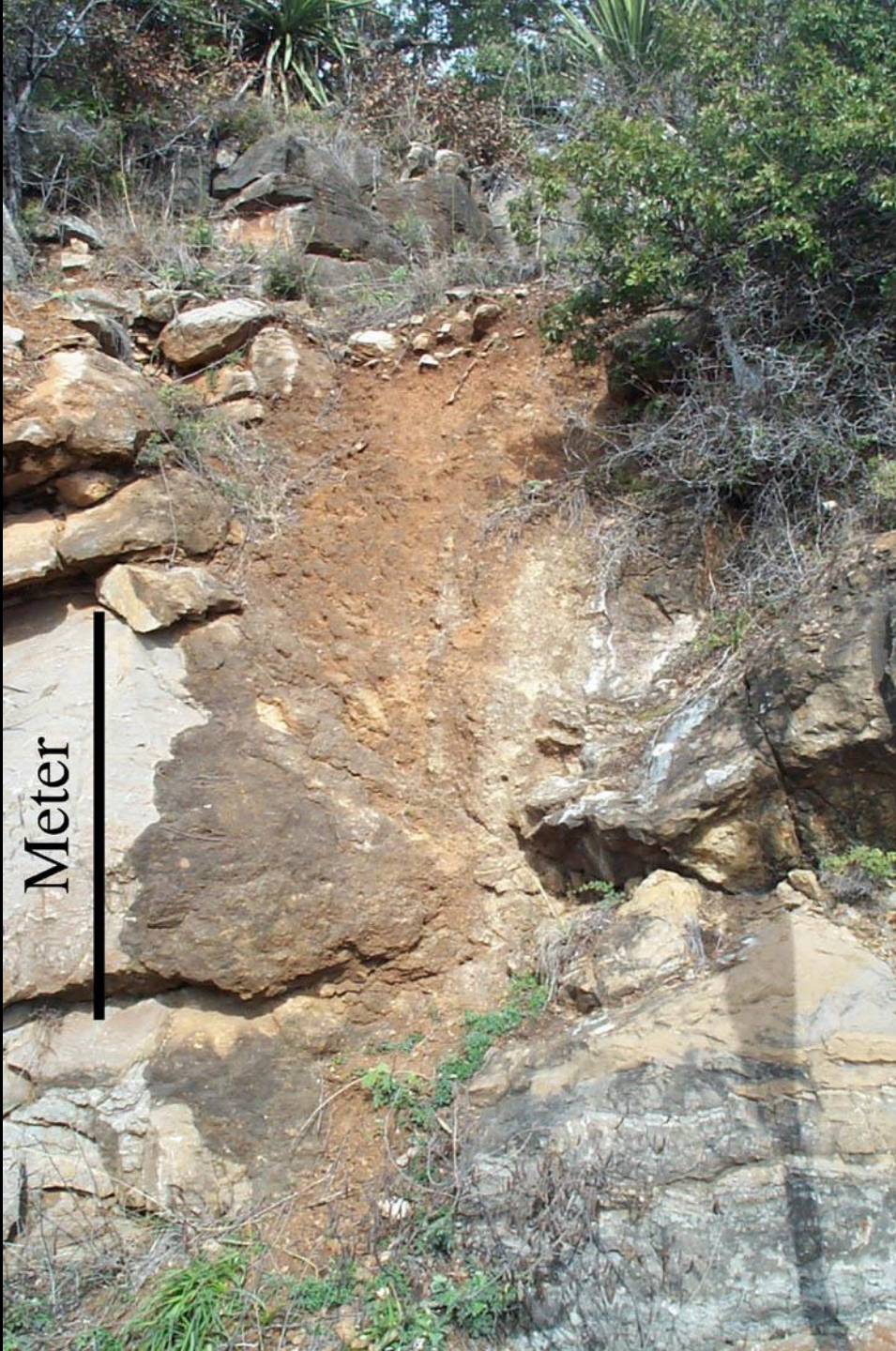
Weathered glauconite
sandstone

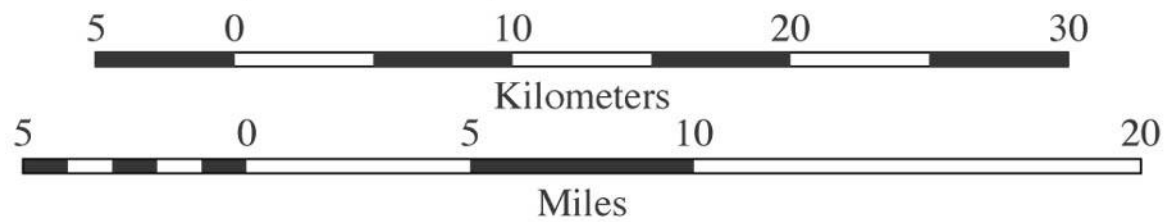
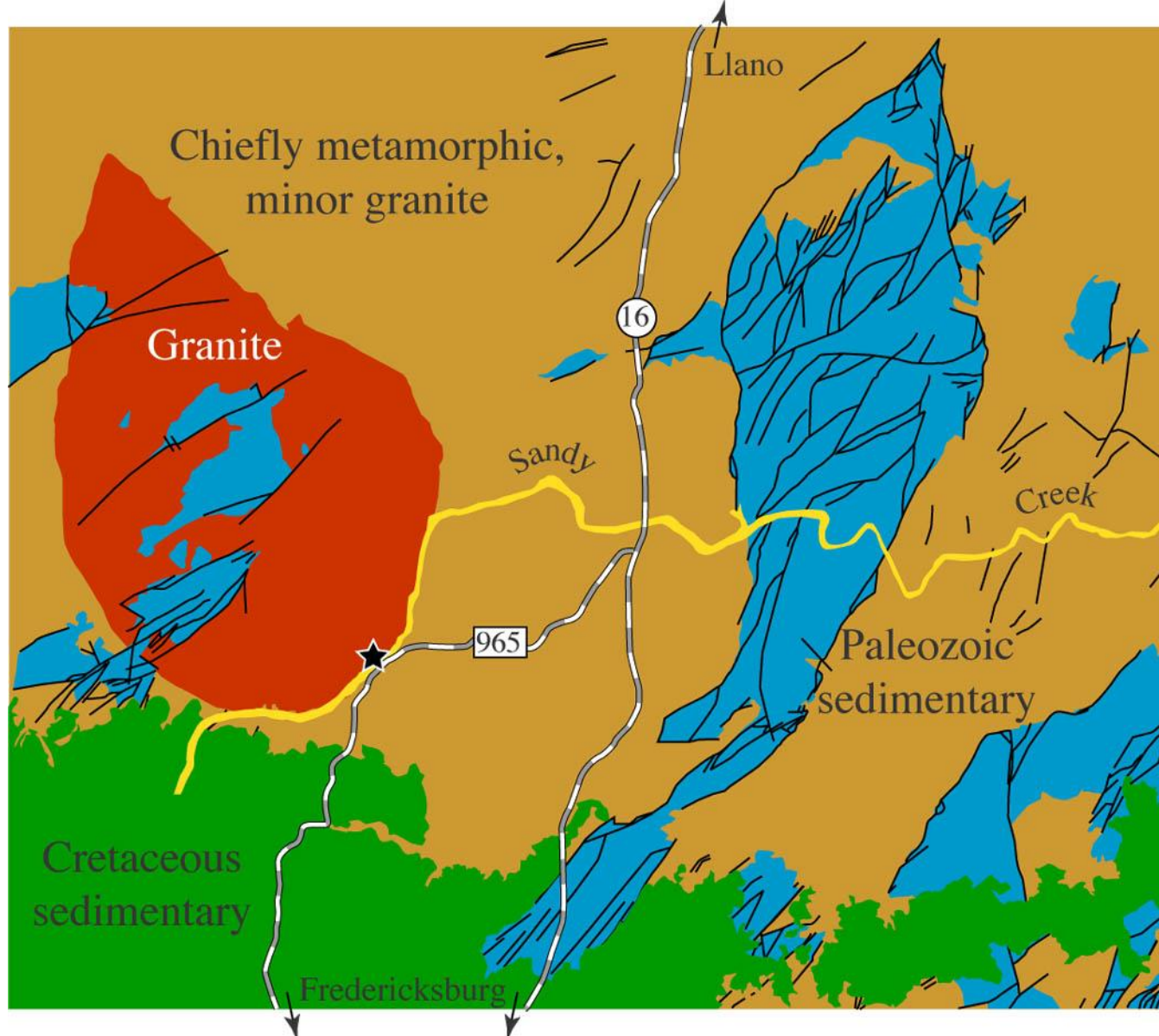
Glauconite sandstone

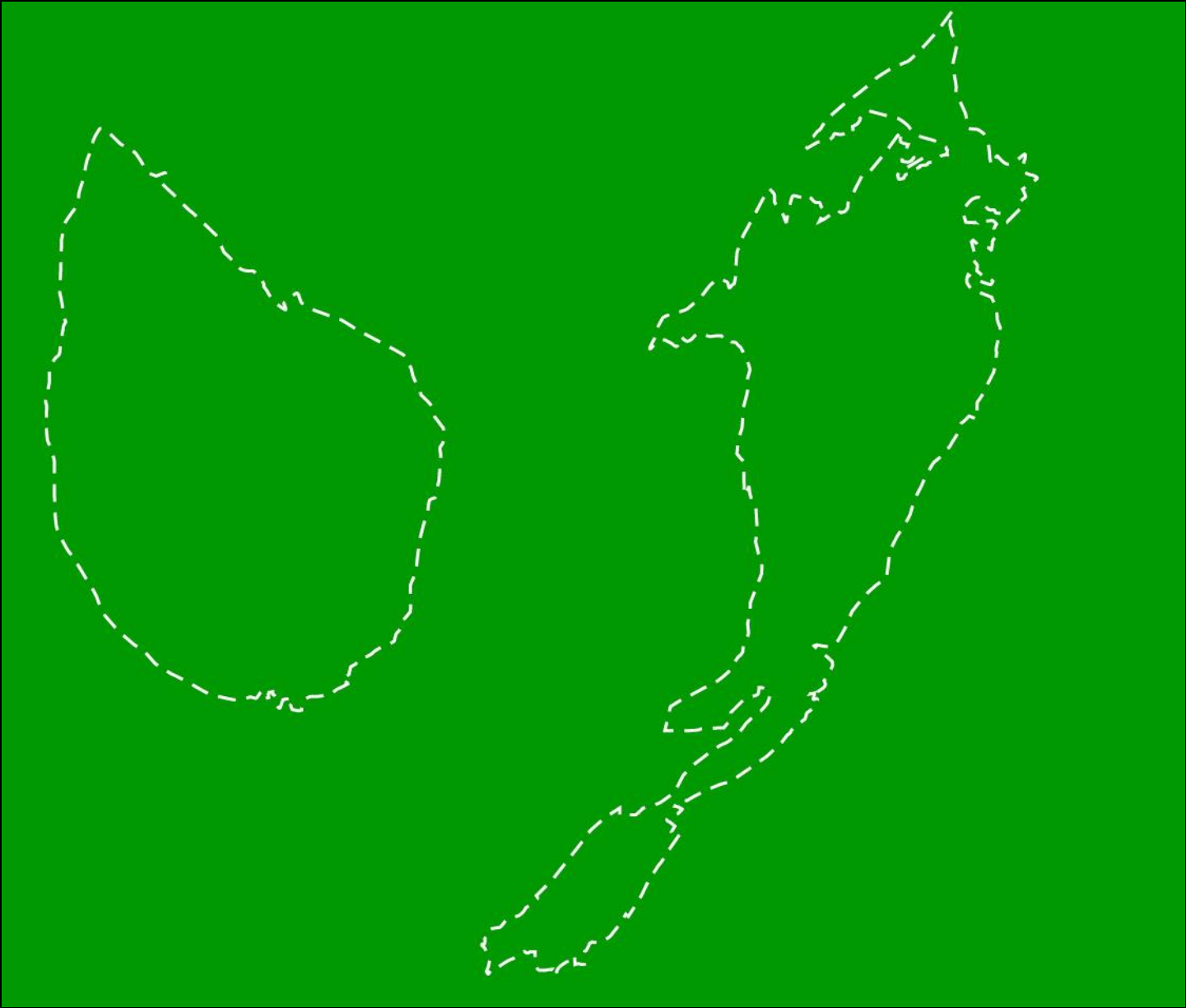
Fault drag

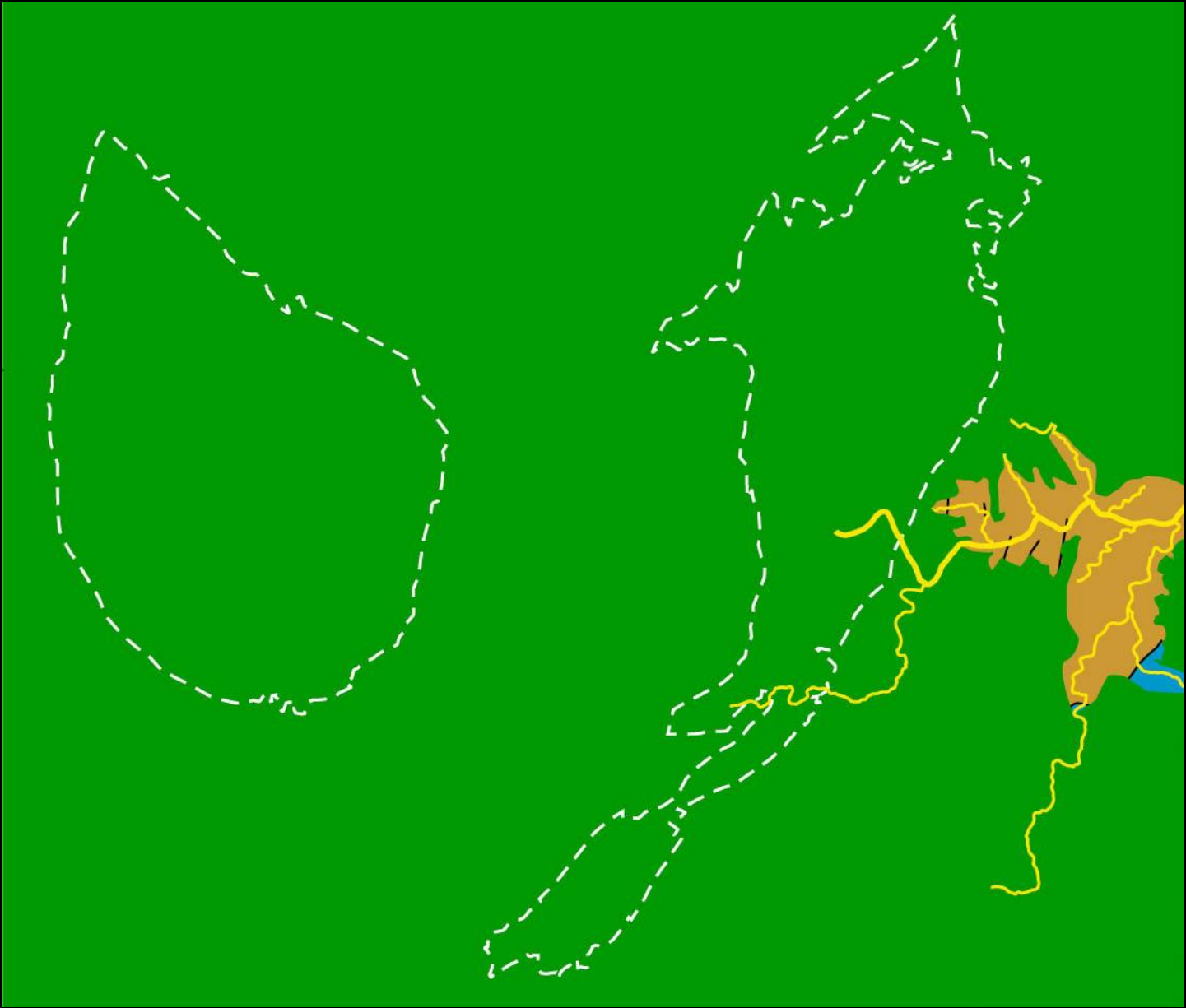
Fault

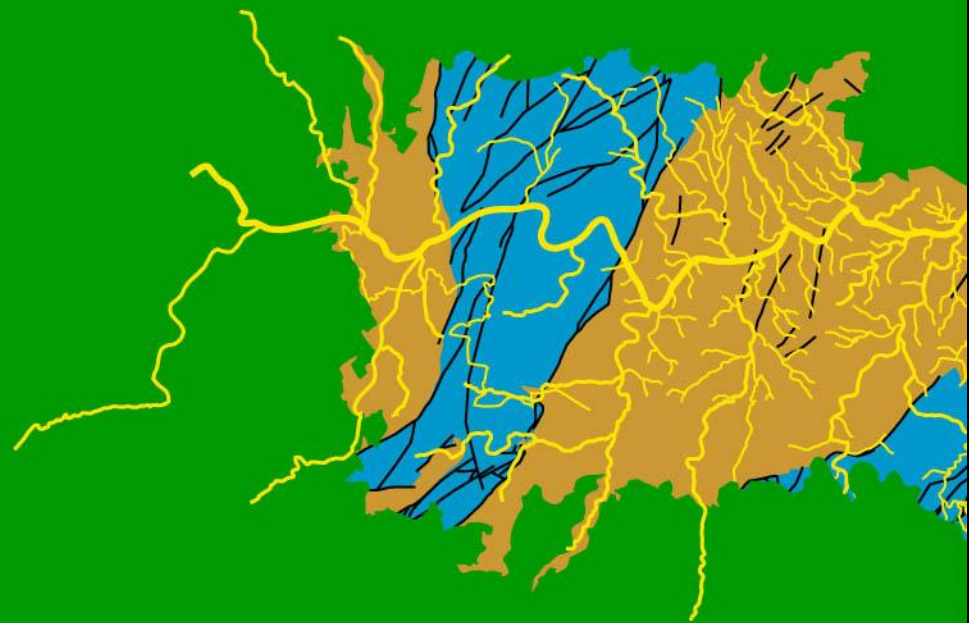
Meter

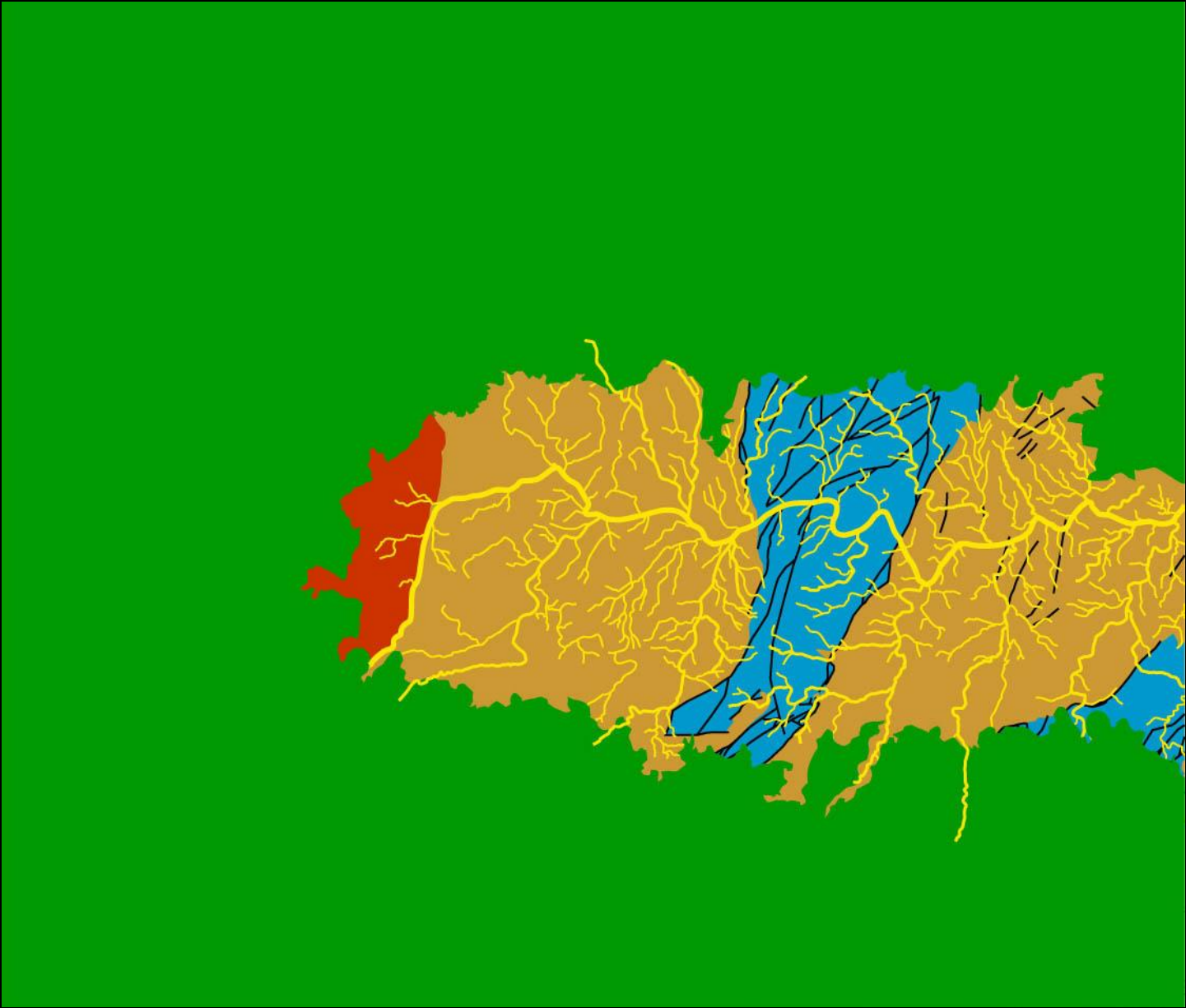






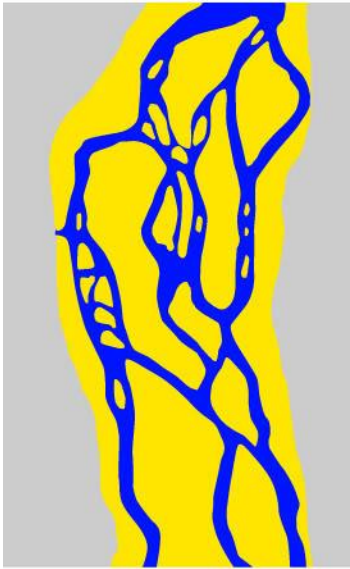




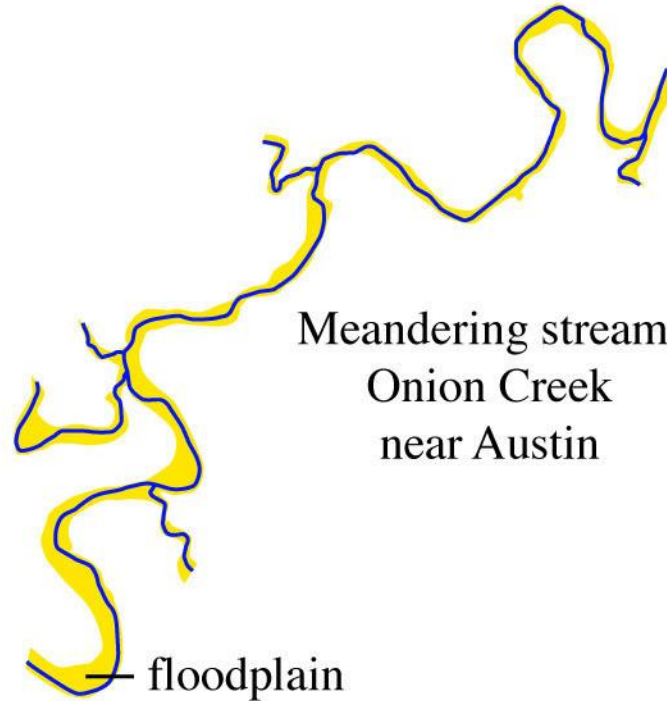




[maps not to the same scale]



Braided stream:
Sandy Creek
(schematic)

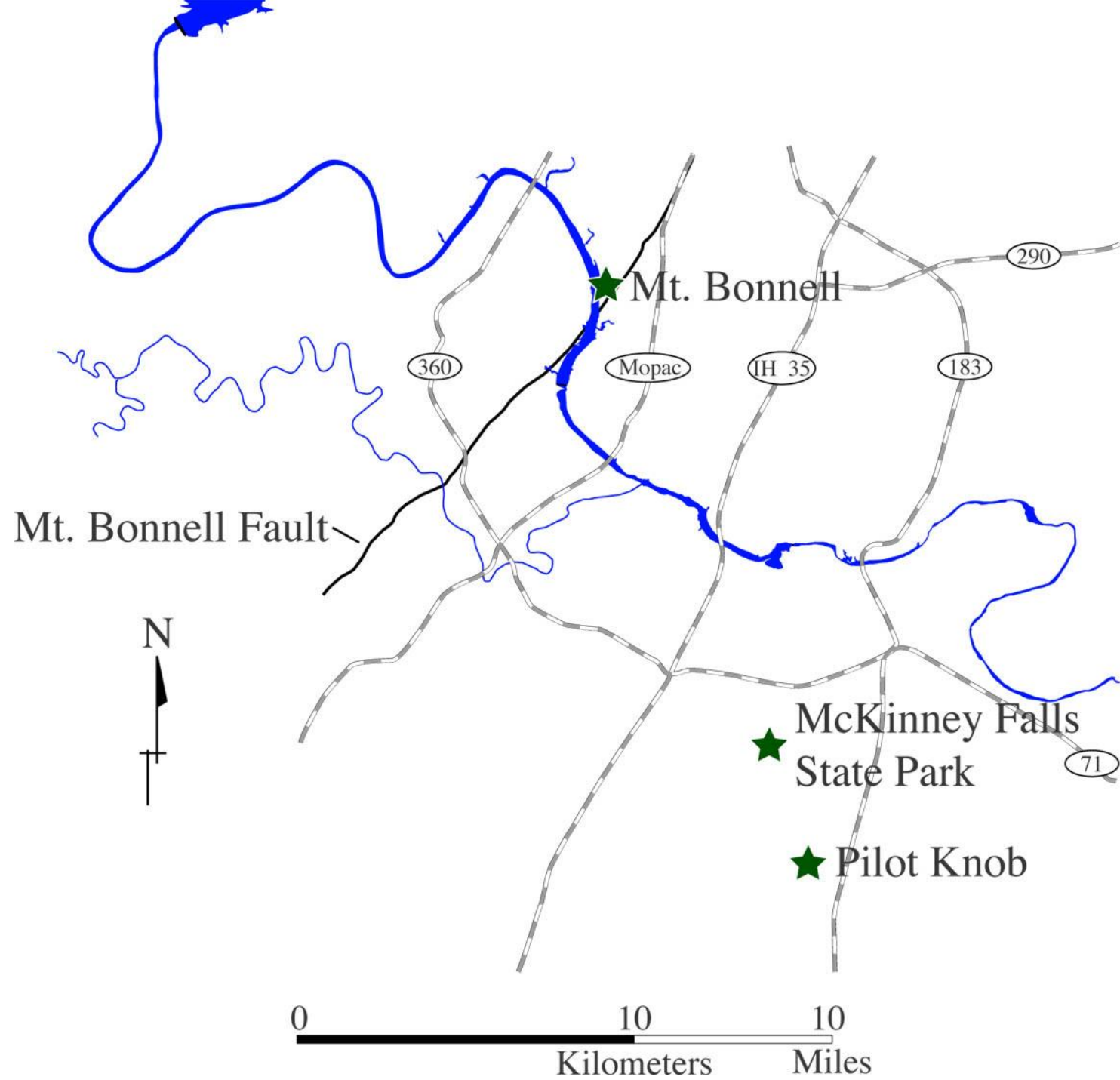


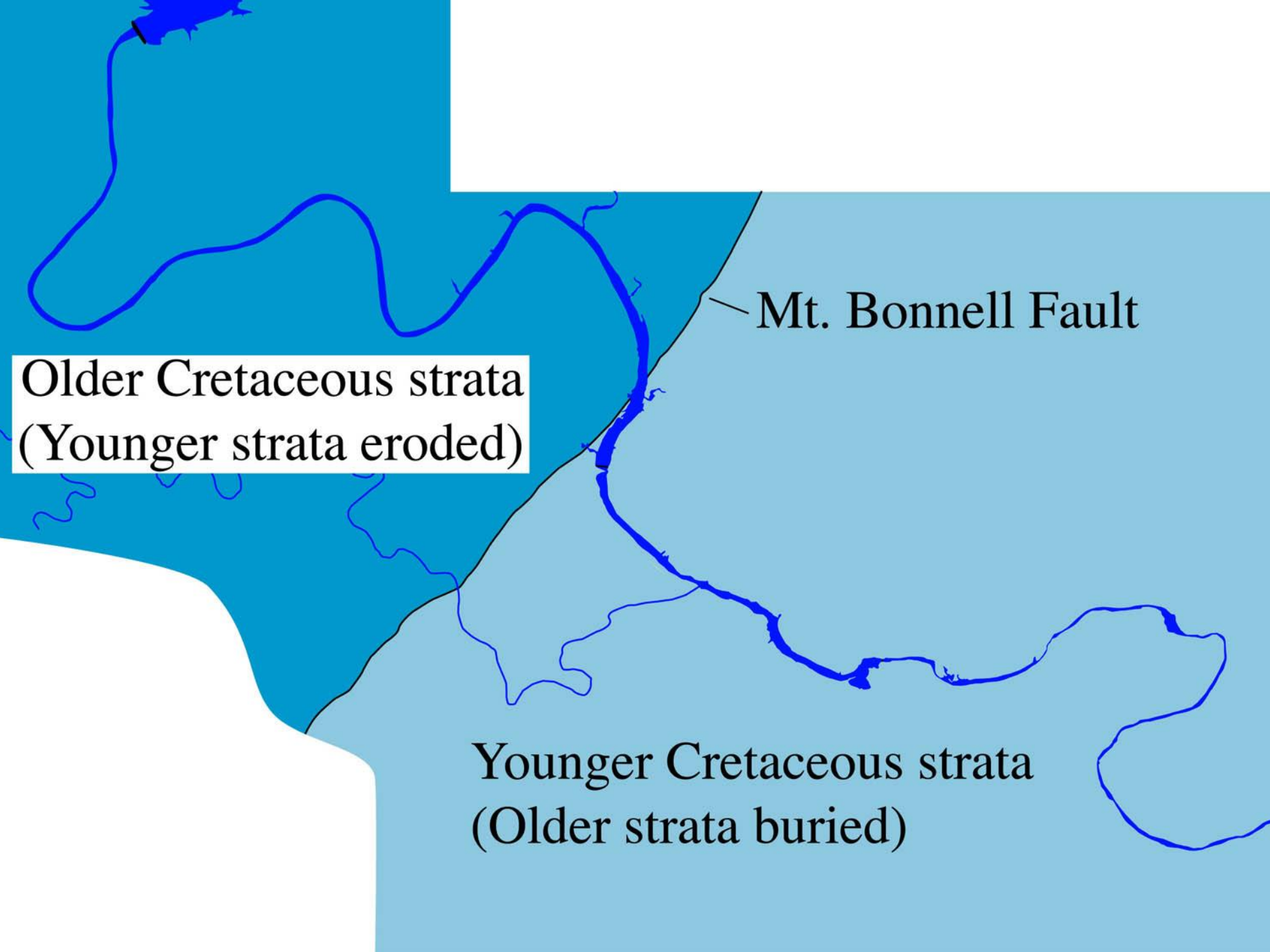
Meandering stream:
Onion Creek
near Austin











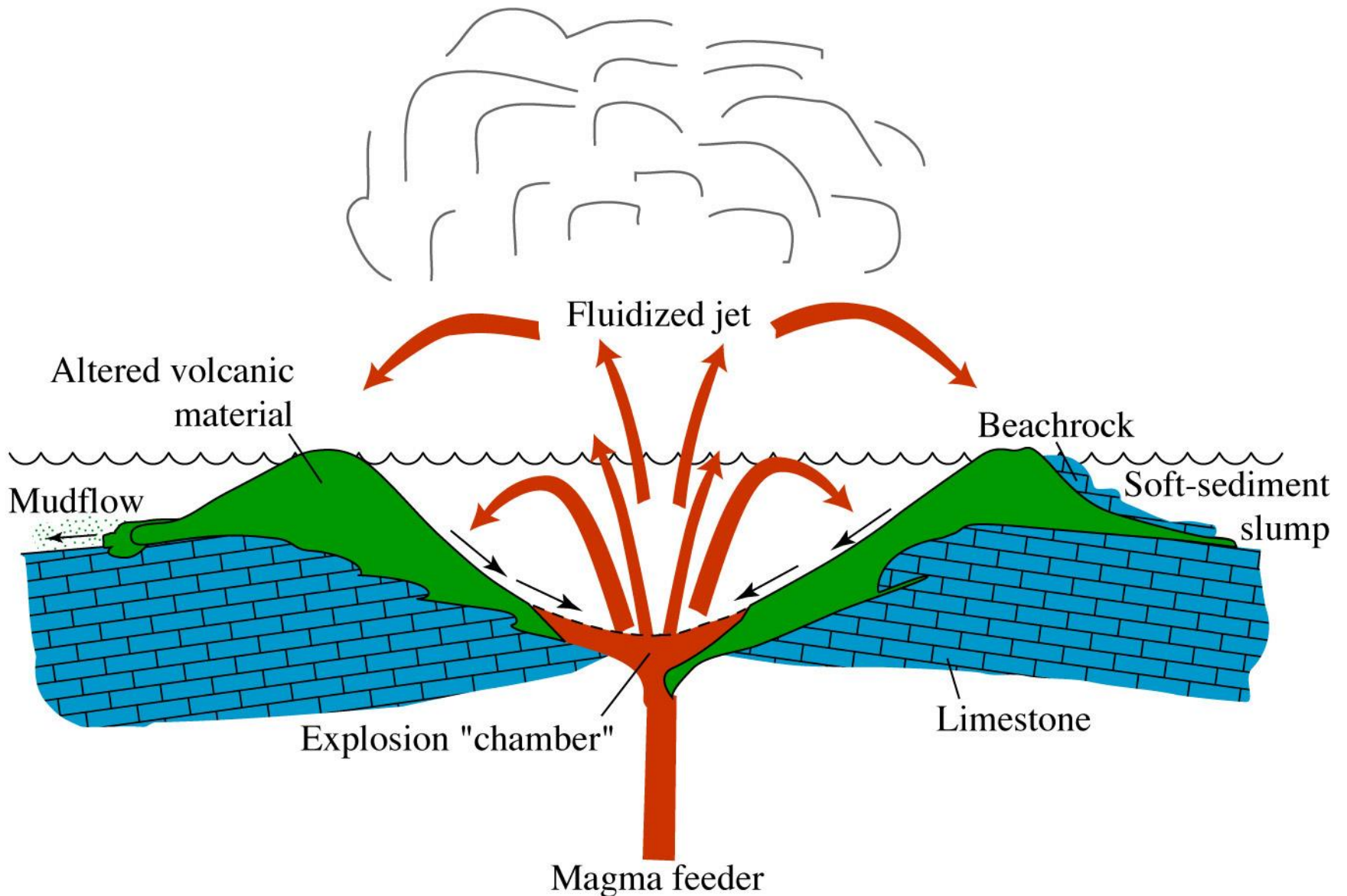
Mt. Bonnell Fault

Older Cretaceous strata
(Younger strata eroded)

Younger Cretaceous strata
(Older strata buried)



PILOT KNOB VOLCANO



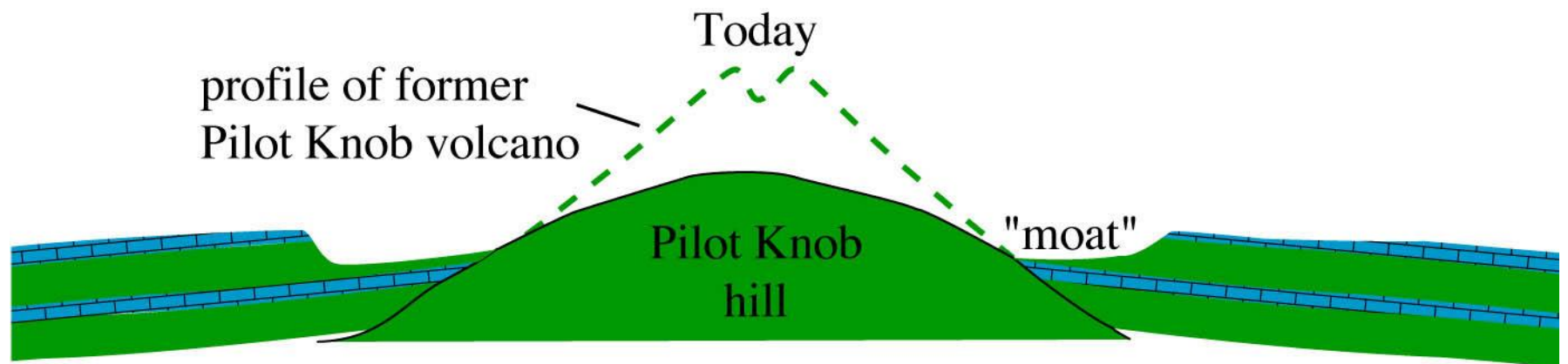
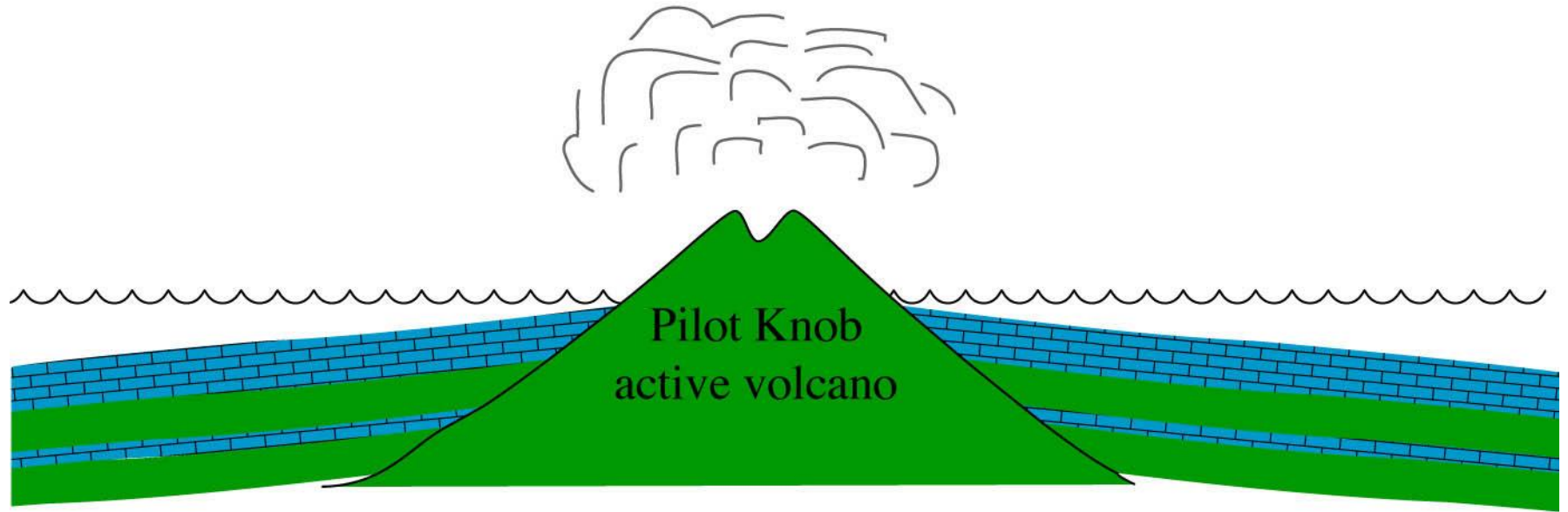
Vertical exaggeration: 4.5x

[schematic cross section]



[schematic cross sections]

80 million years ago



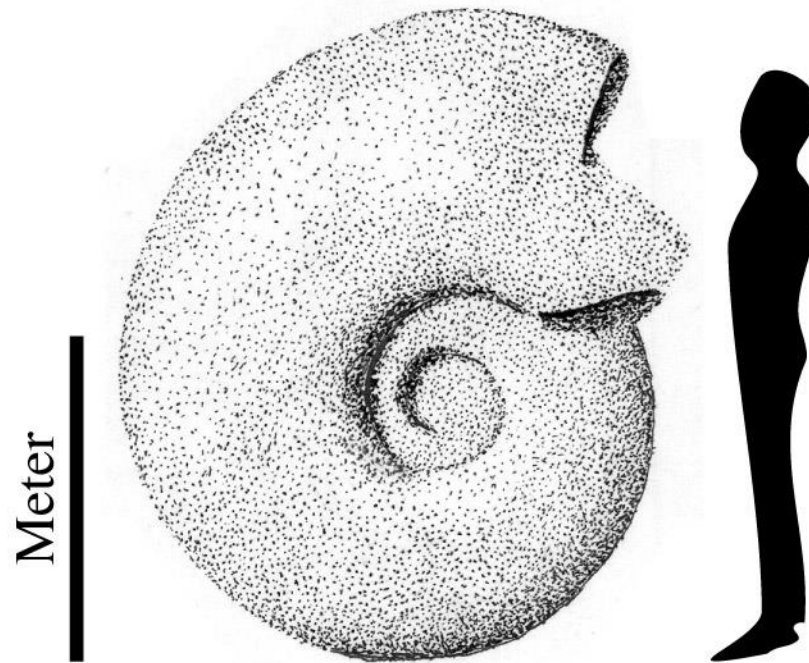






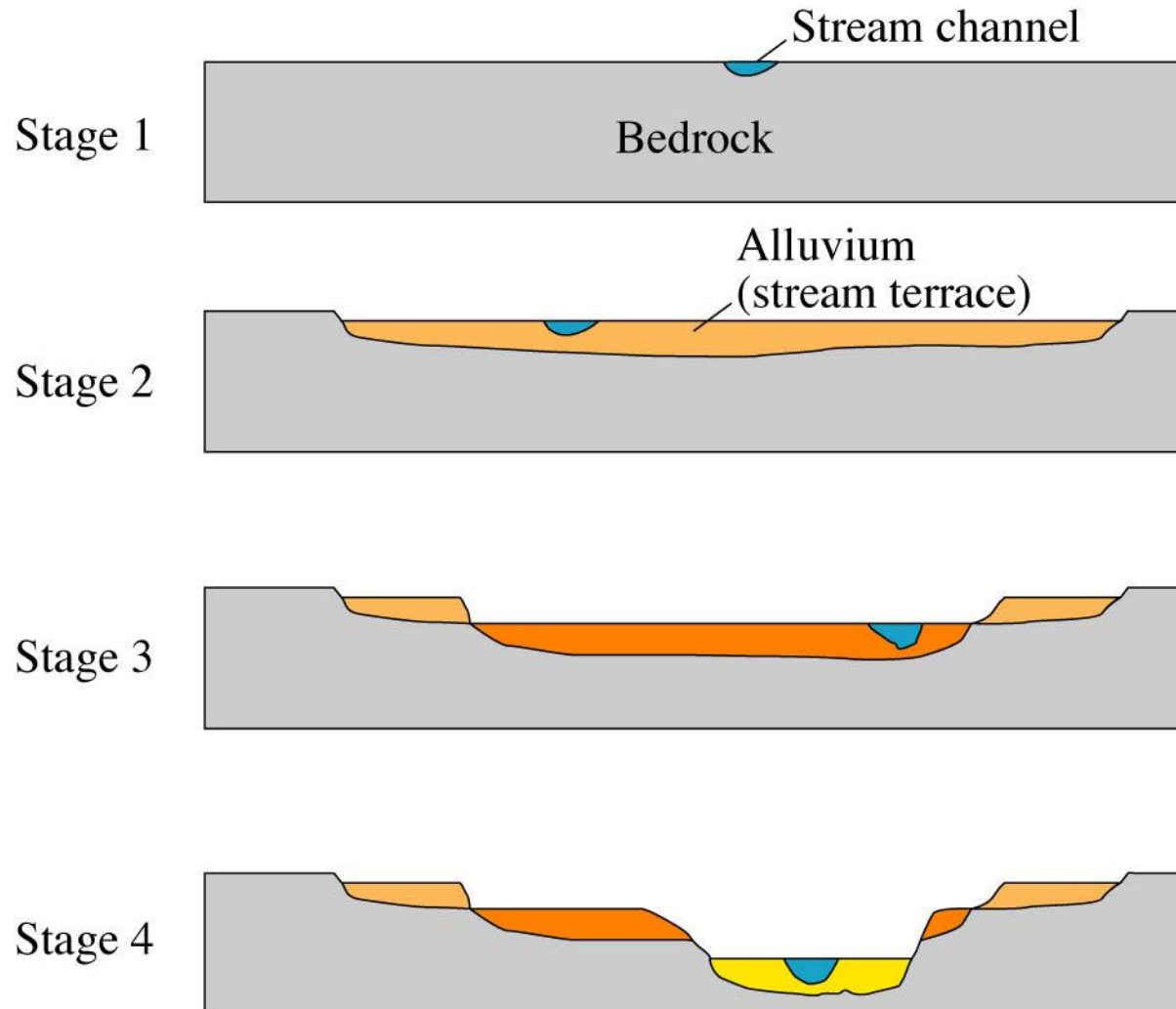


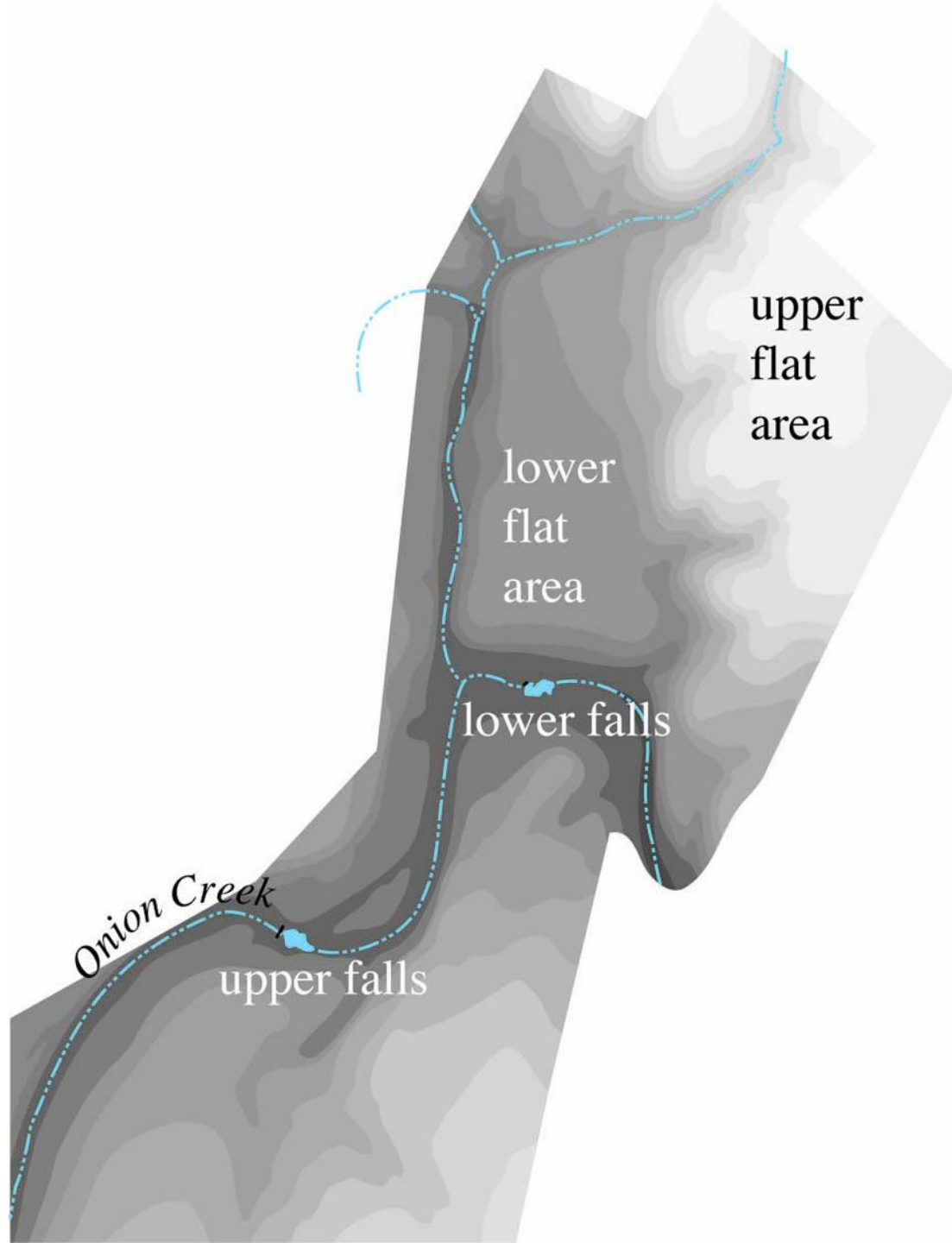


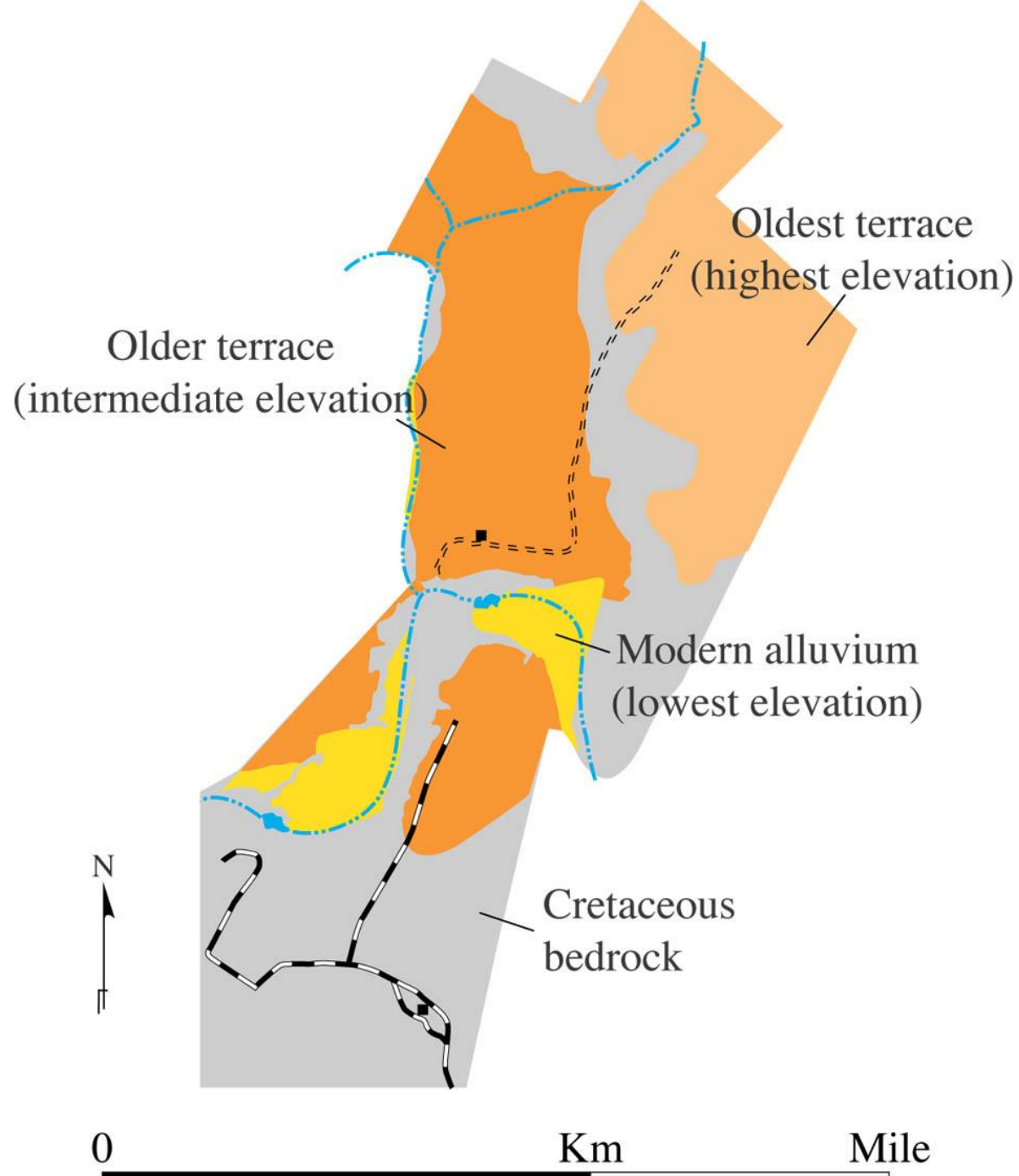


Ammonite: *Parapuzosia americana* Scott and Moore, 1928

[schematic cross sections]







Mansfield Dam

Lake Travis

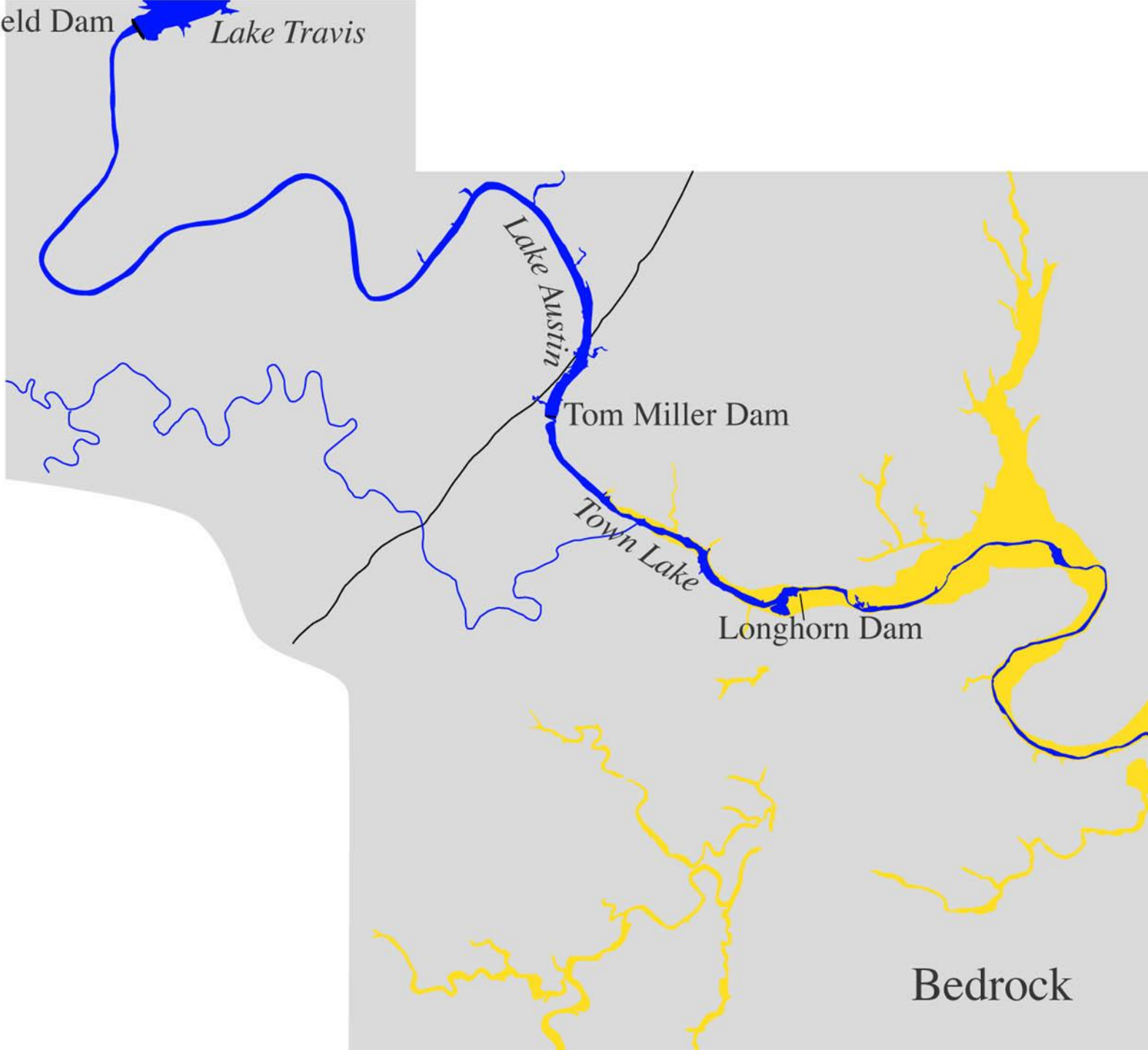
Lake Austin

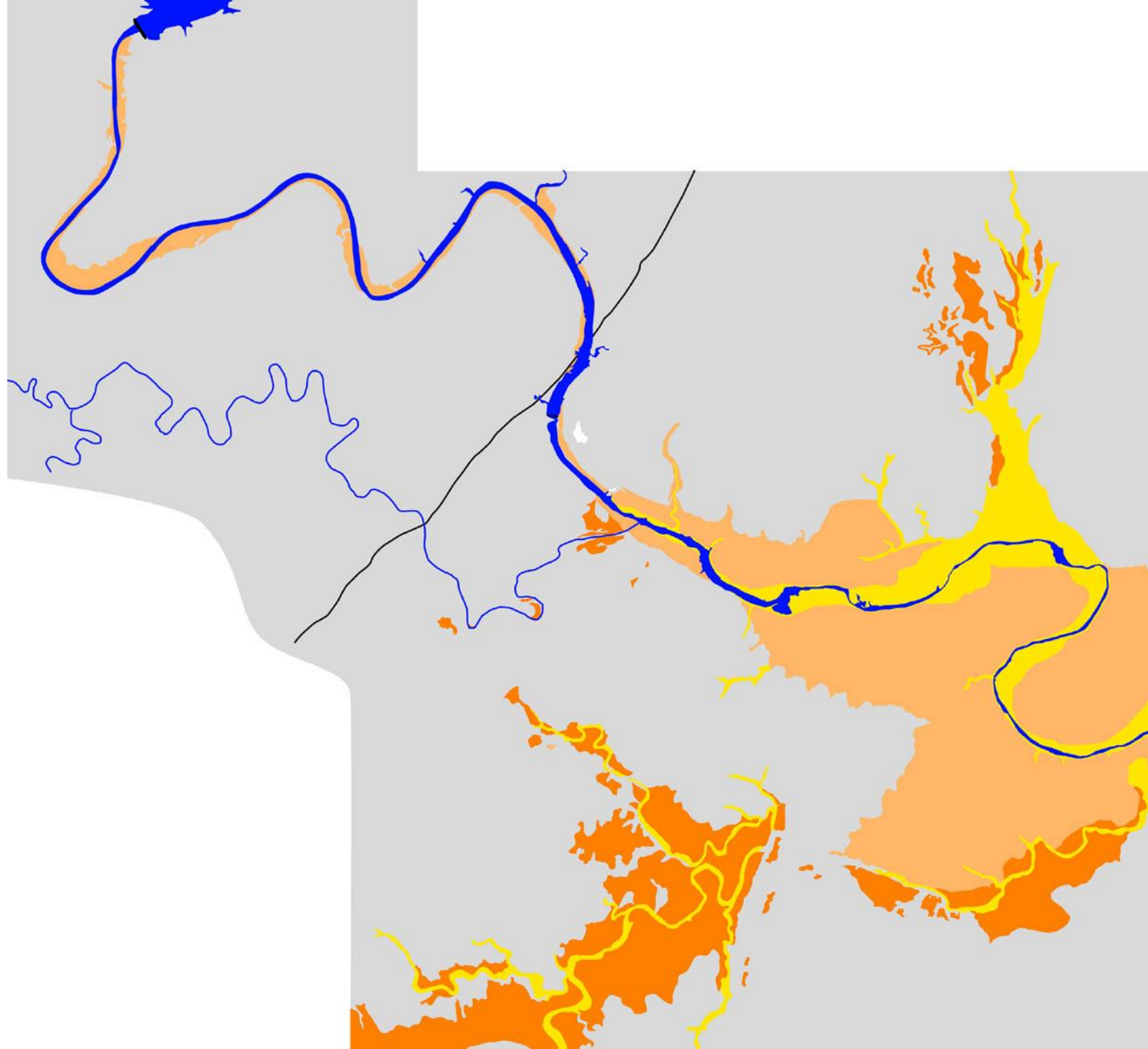
Tom Miller Dam

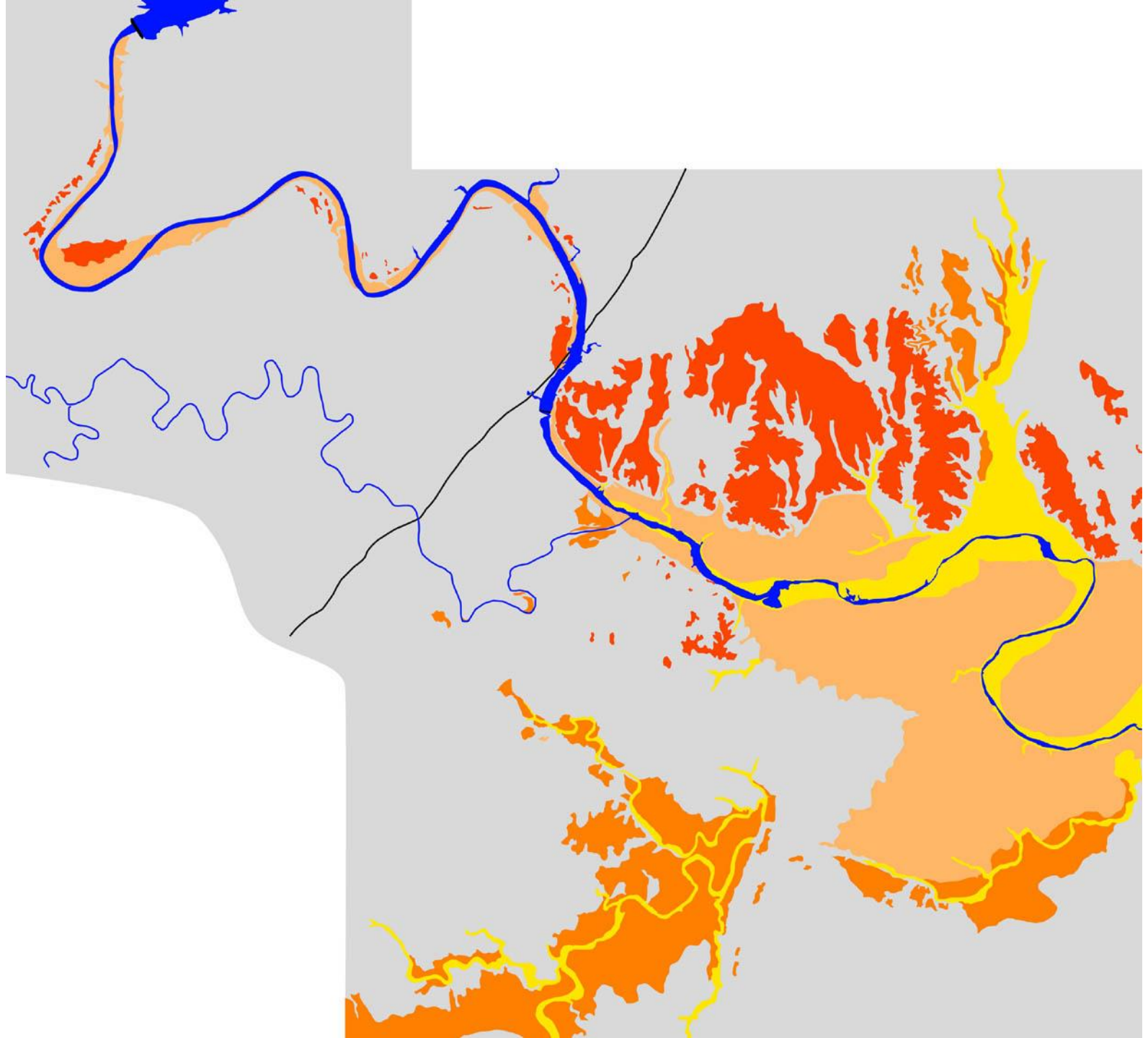
Town Lake

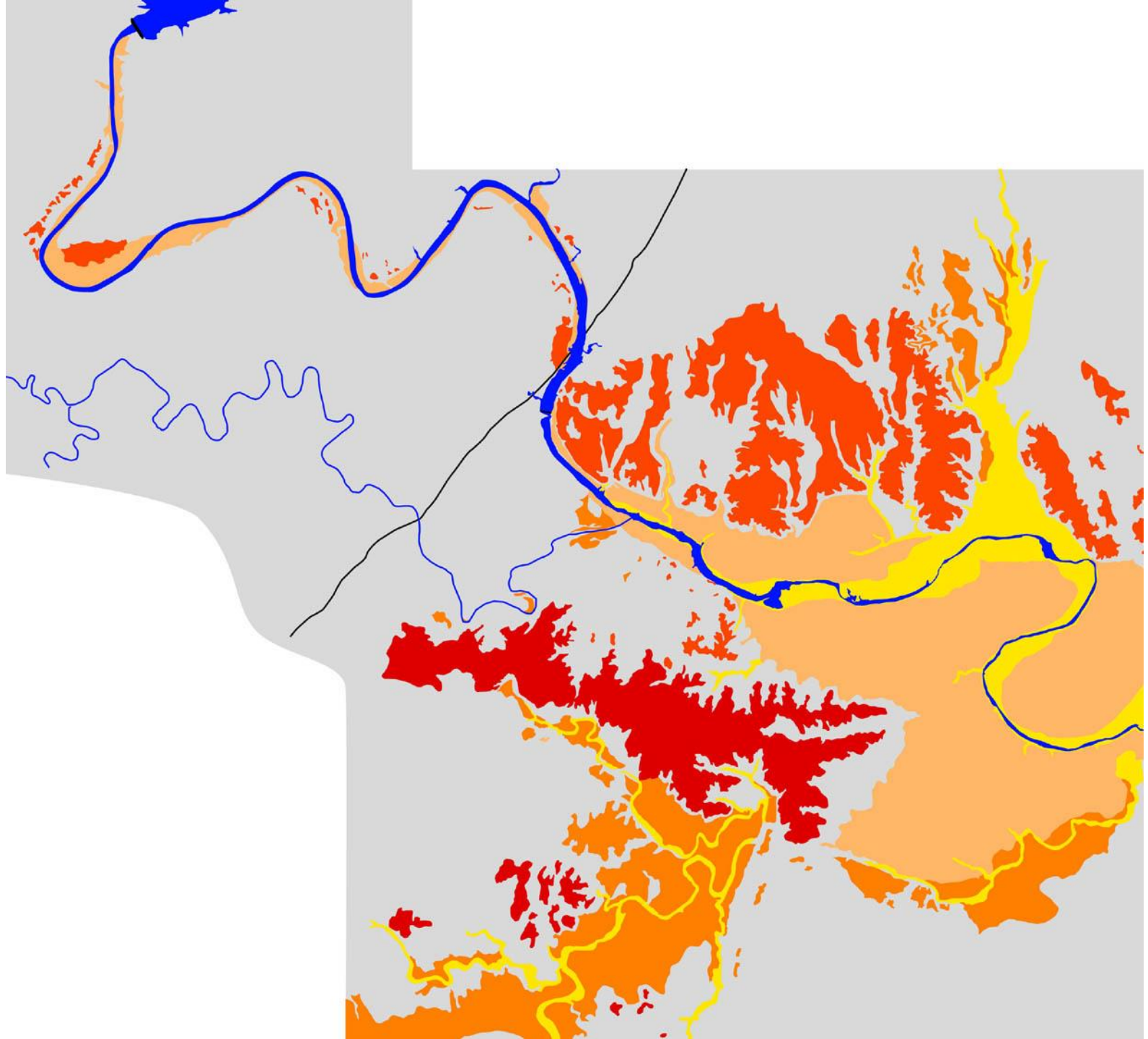
Longhorn Dam

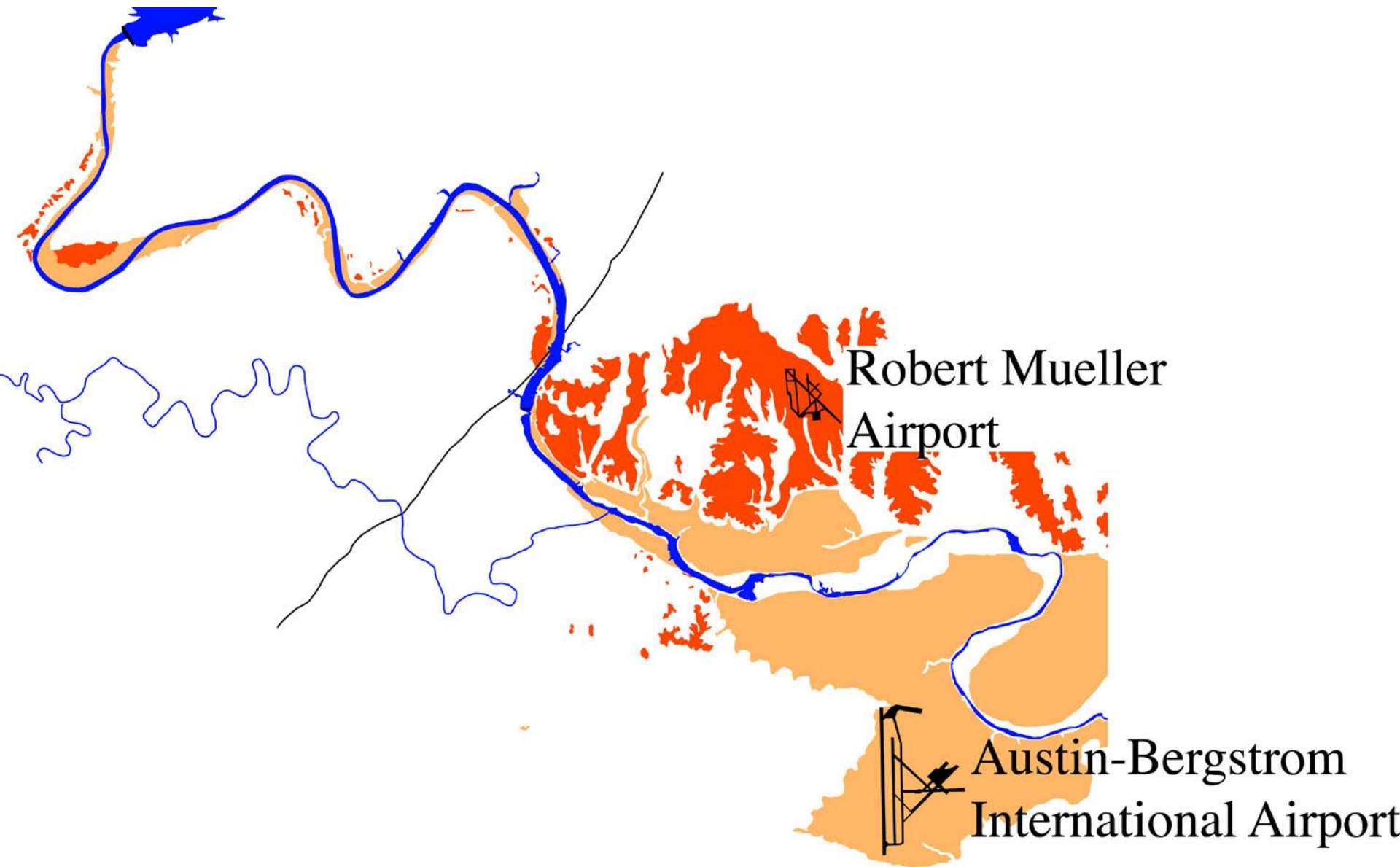
Bedrock













Water Treatment Plant

Mt. Bonnell Fault

Downfaulted

Lake Austin

Upfaulted





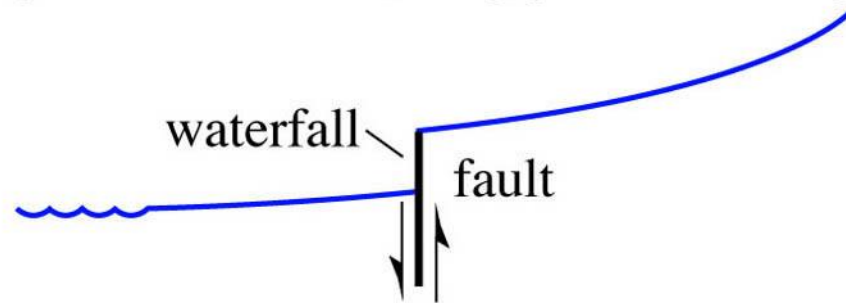


[schematic cross sections]

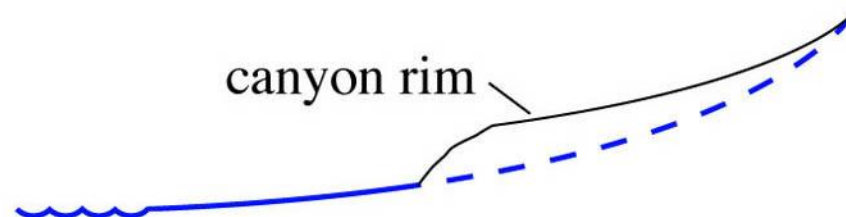
Stage 1: initial condition

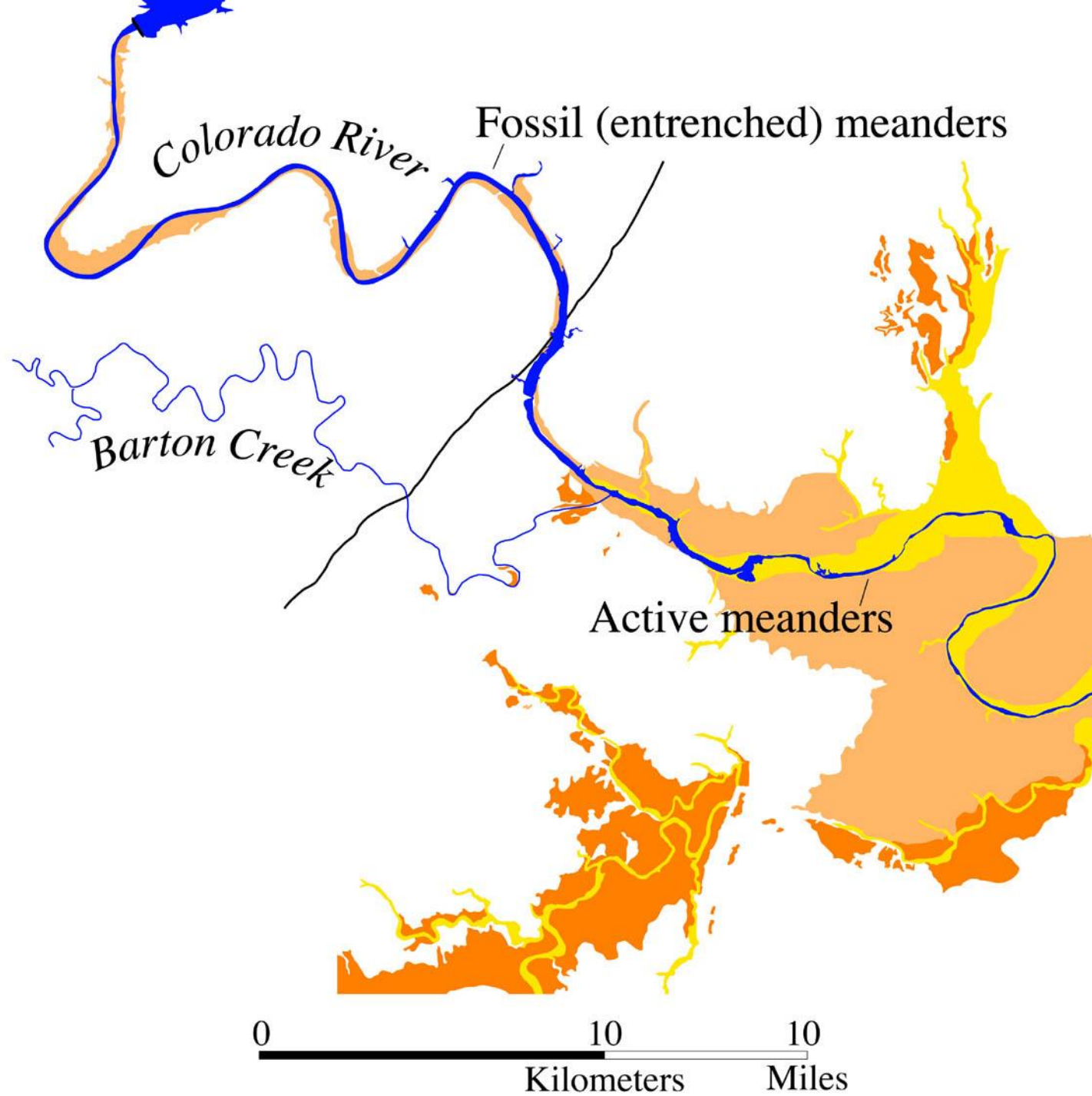


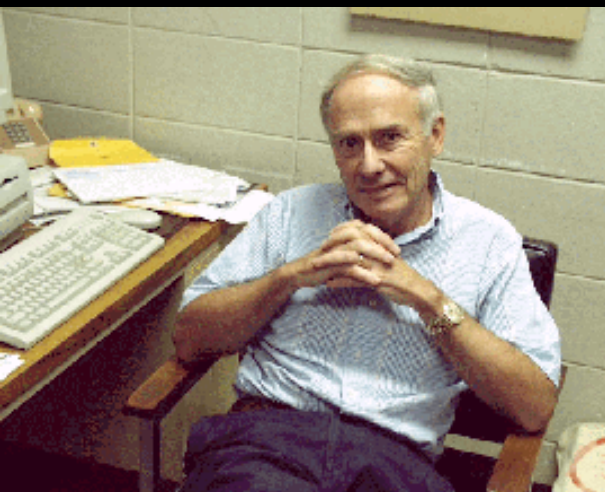
Stage 2: fault offset, long profile interrupted



Stage 3: entrenchment, long profile regained







Dr. Leon Long

**Professor and The Second Mr. and Mrs.
Charles E. Yager Professorship and
member of the Academy of
Distinguished Teachers**

Dr. Leon Long is a geology professor at the University of Texas at Austin whose research interests include isotope geology, especially to use naturally occurring radioactivity and its daughter products as a geologic clock, and as a geochemical tracer. He is also interested in applying the Rb-Sr isotopic age method to clay minerals with a possibility of dating when weathering had produced an ancient soil zone. As the department's generalist, Dr. Long has also written the textbook for the introductory course.