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12.001 Introduction to Geology
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Ages of continental crust

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Archaean crust in red

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The Earth during the Archaean?

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Conflicting crustal growth curves

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Two forms of subduction-related magmatism

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Slab melting

*Hot slabs; typical of
the early earth?*

Dehydration melting

*Cool slabs; typical of
today?*

Primary arc lavas are fundamentally basaltic. So why is the crust mostly andesite? Differentiation followed by loss of the more basaltic component.

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(J.W. Valley; University of Wisconsin)

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copyright restrictions.

The logic:
Zircon = Granite =
Melts of Hydrous Sediments =
Aqueous Weathering =
Ocean and Continents = Cool

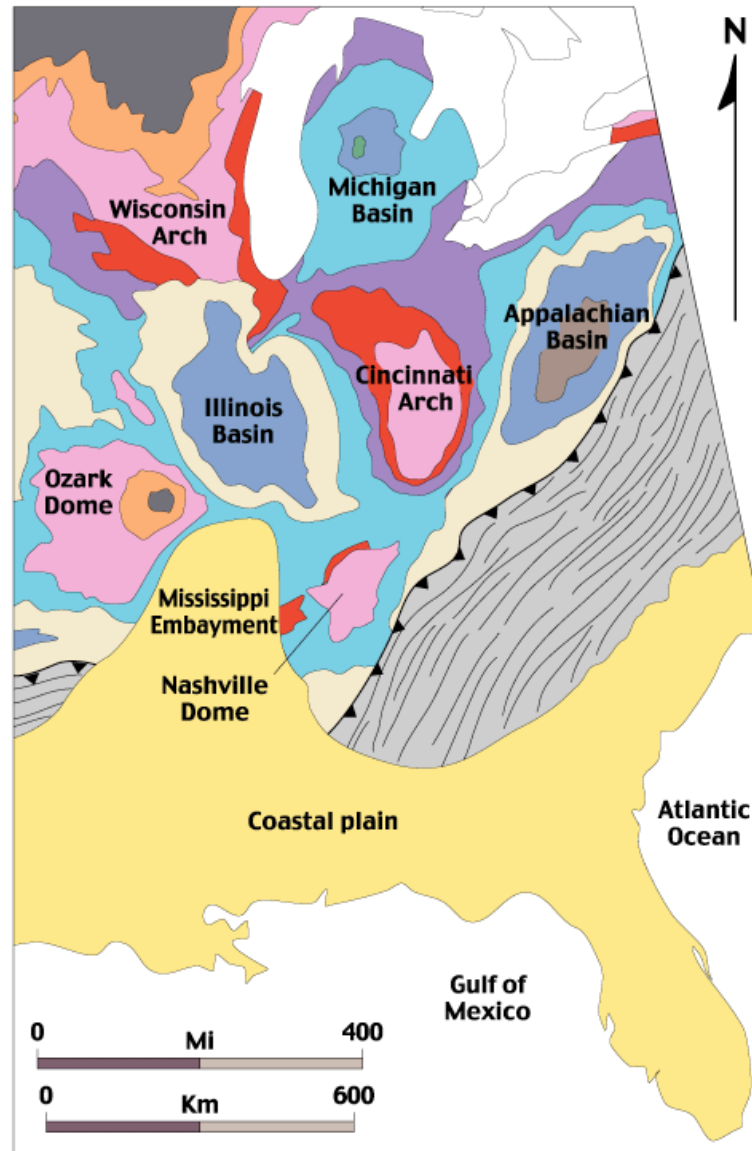
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Zircon: ZrSiO_4

- Common accessory mineral in igneous rocks, especially granitoids
- Rich in U, Th; poor in Pb
- Highly refractory (melts at high T) and retentive (holds in its U, Th, Pb)
- Therefore ideal for U-Pb geochronology

The early Paleozoic western US

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Bedrock

Adapted from Geologic
Map of the United
States, U.S. Geological
Survey

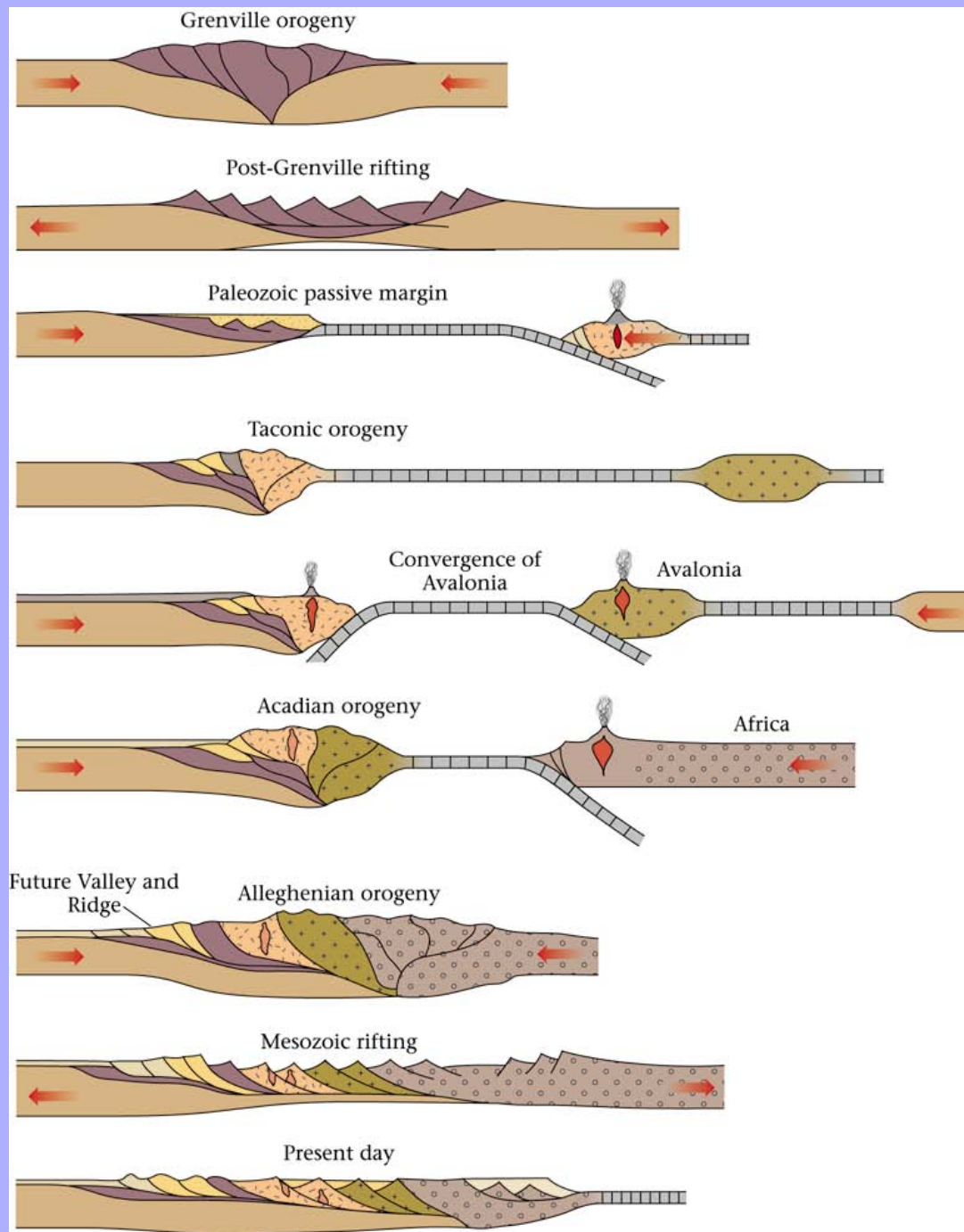


Image courtesy of NOAA.