Geologic Overview: Park City, Heber Valley, Strawberry Valley, Utah

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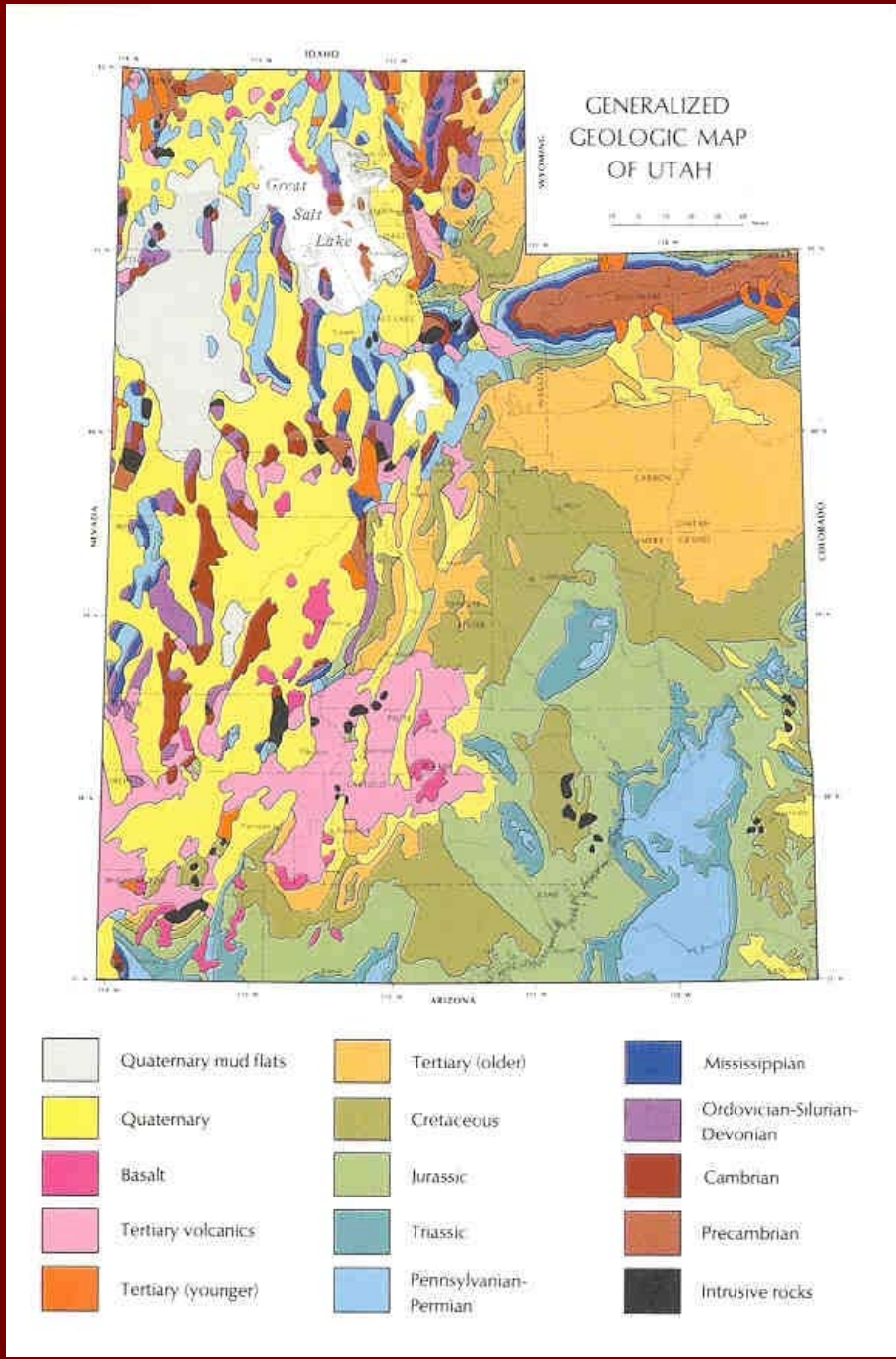
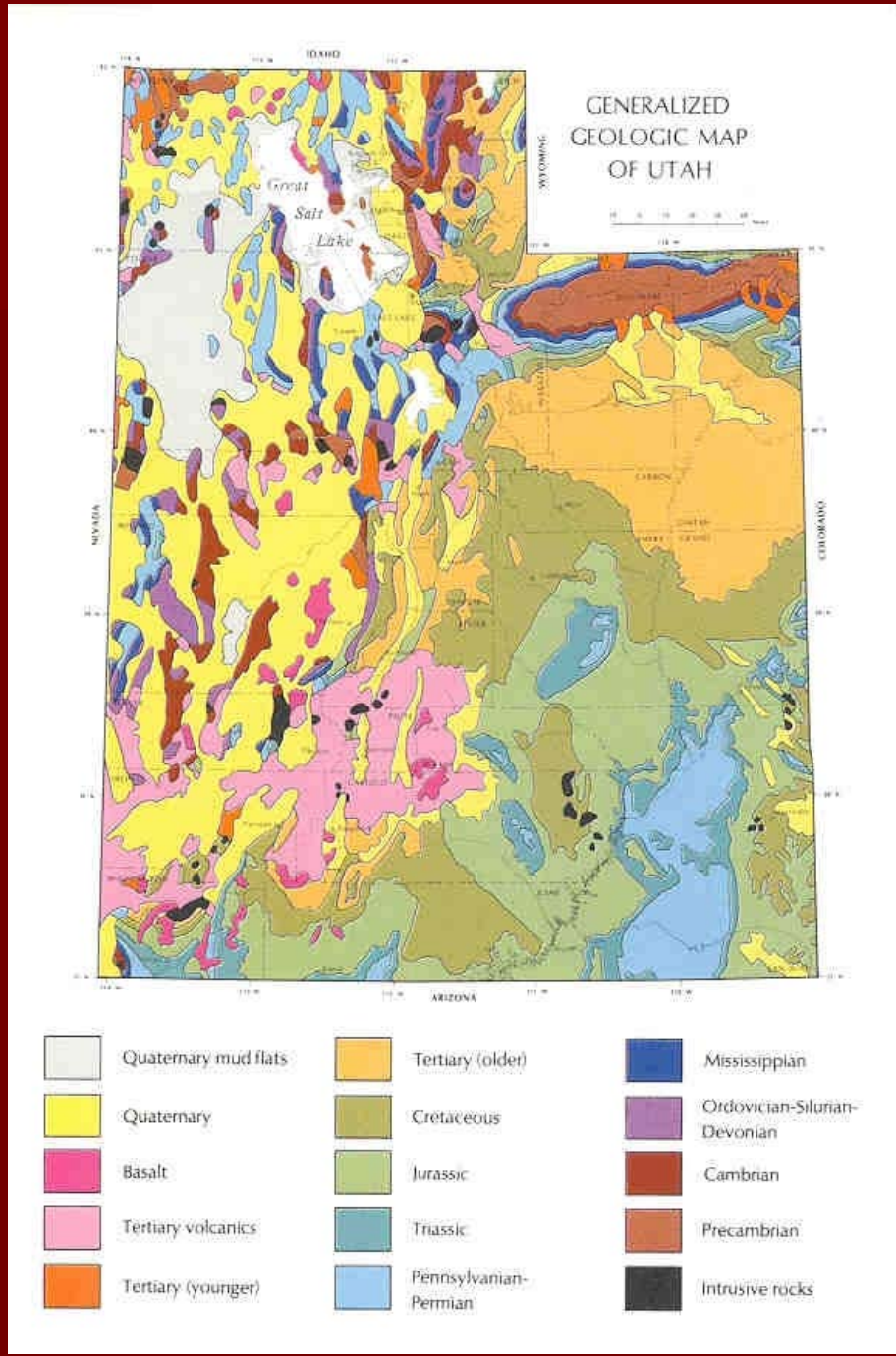
Geology of Utah



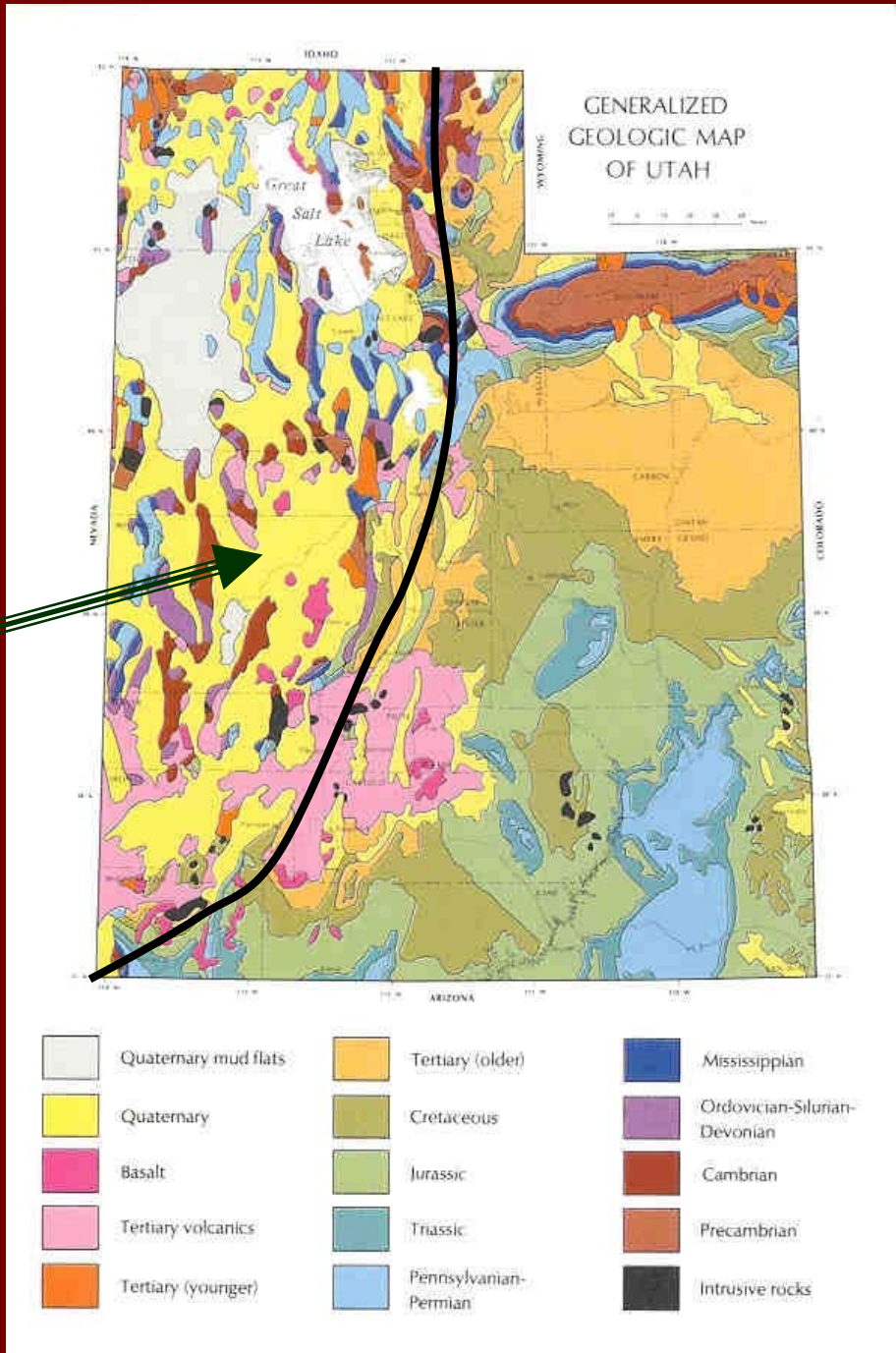
Geology of Utah

- Physiographic Provinces



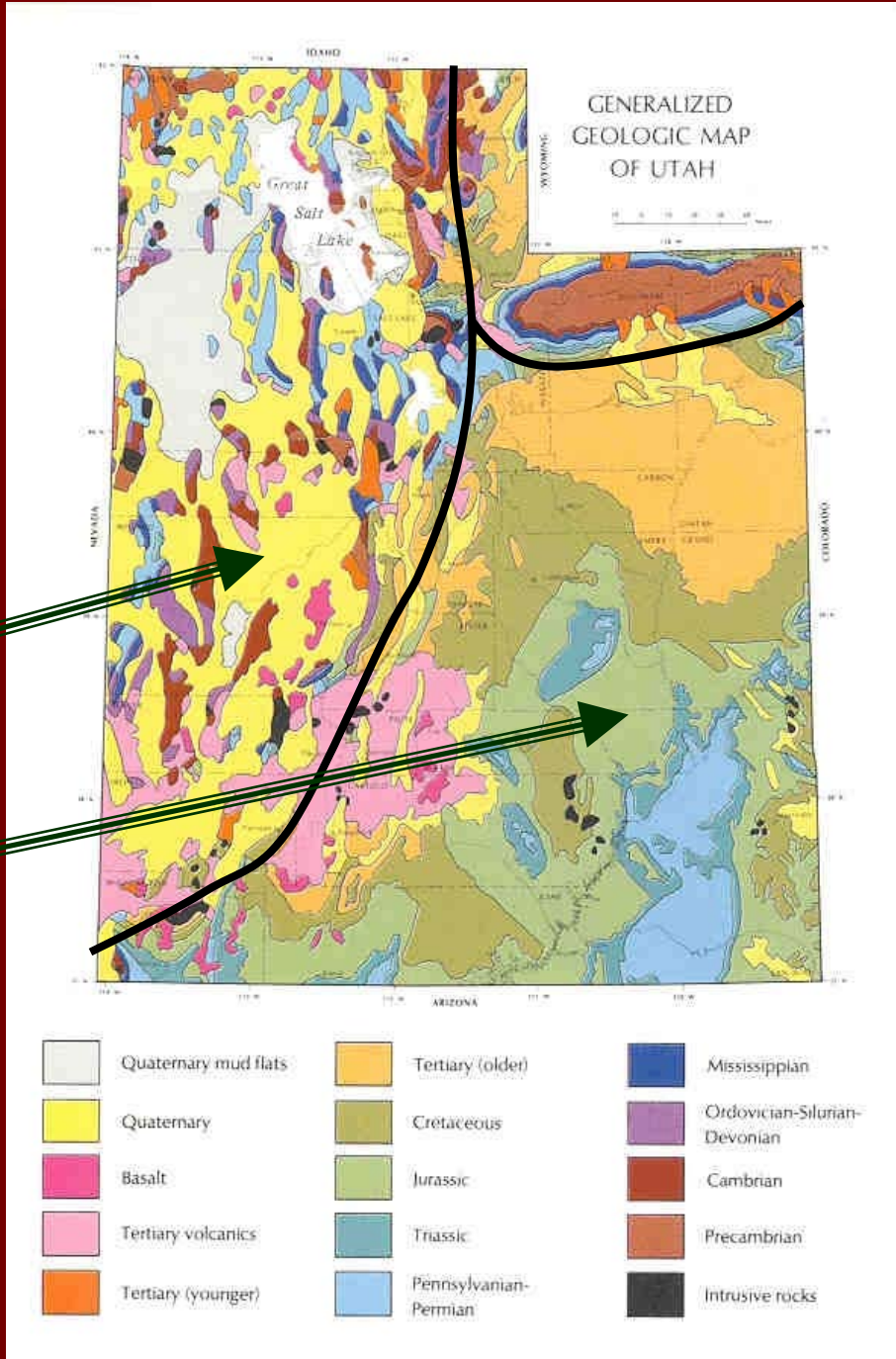
Geology of Utah

- Physiographic Provinces
  - Basin and Range



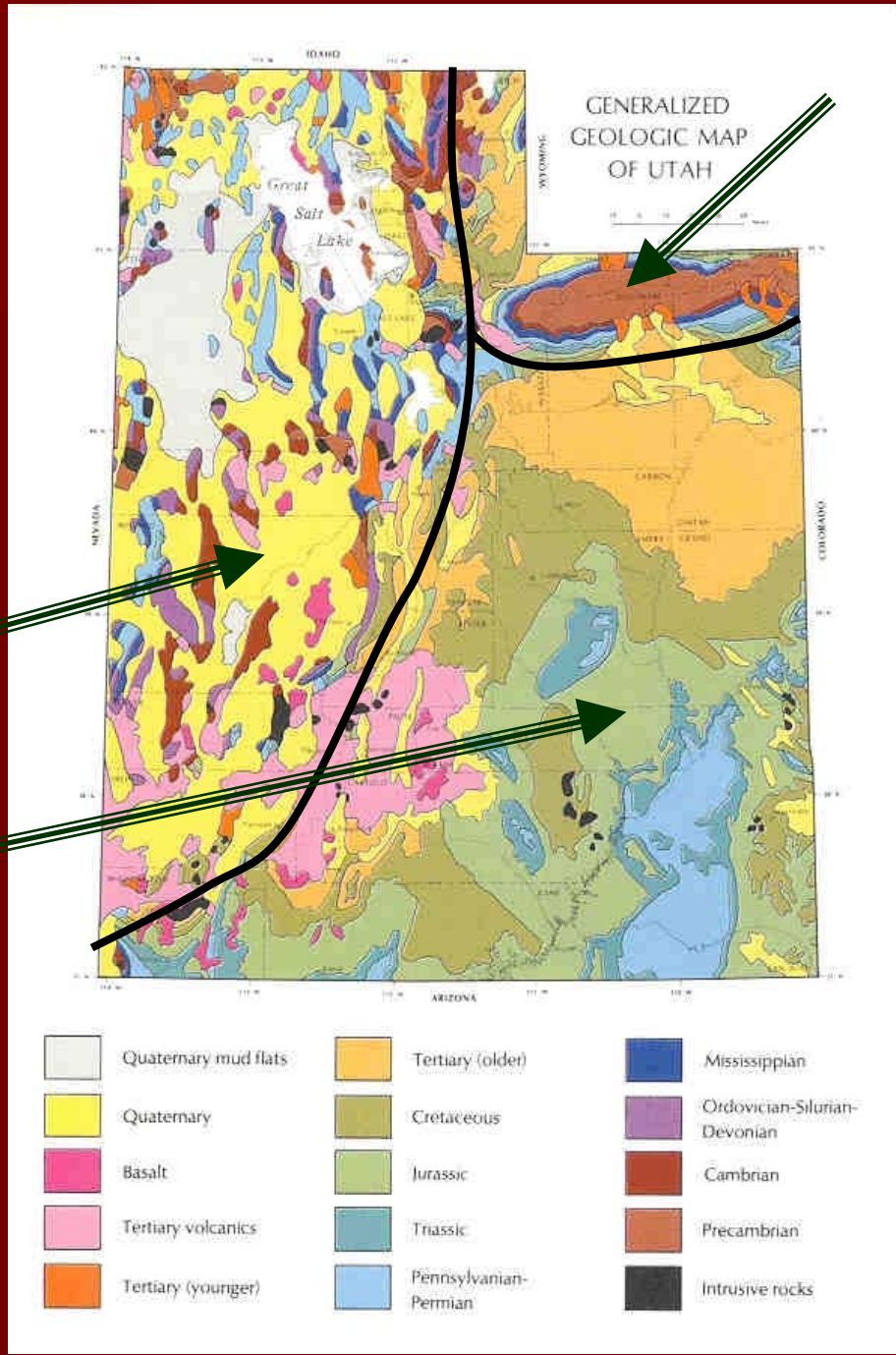
Geology of Utah

- Physiographic Provinces
  - Basin and Range
  - Colorado Plateau



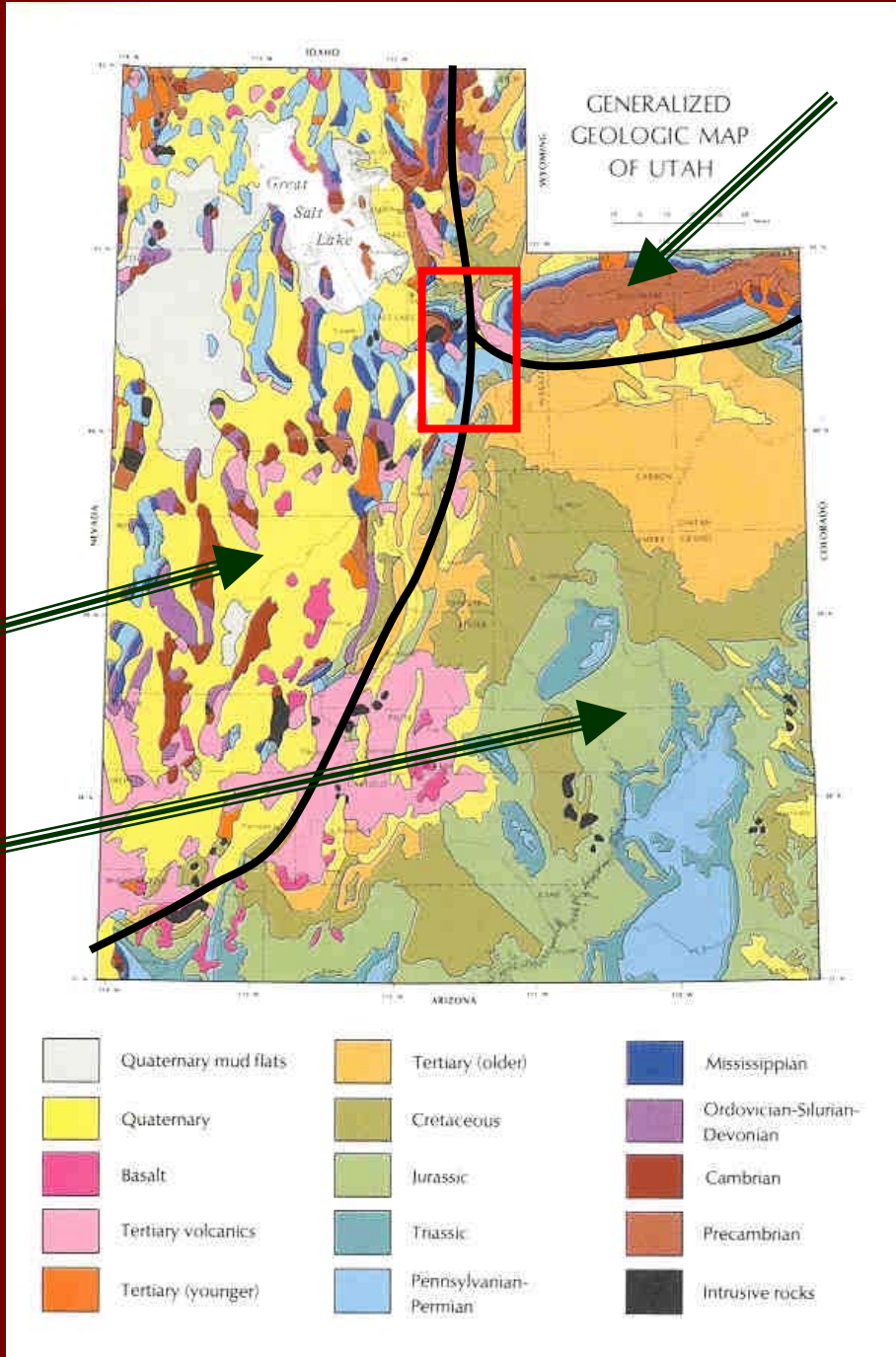
Geology of Utah

- Physiographic Provinces
  - Basin and Range
  - Colorado Plateau
  - Middle Rocky Mountains

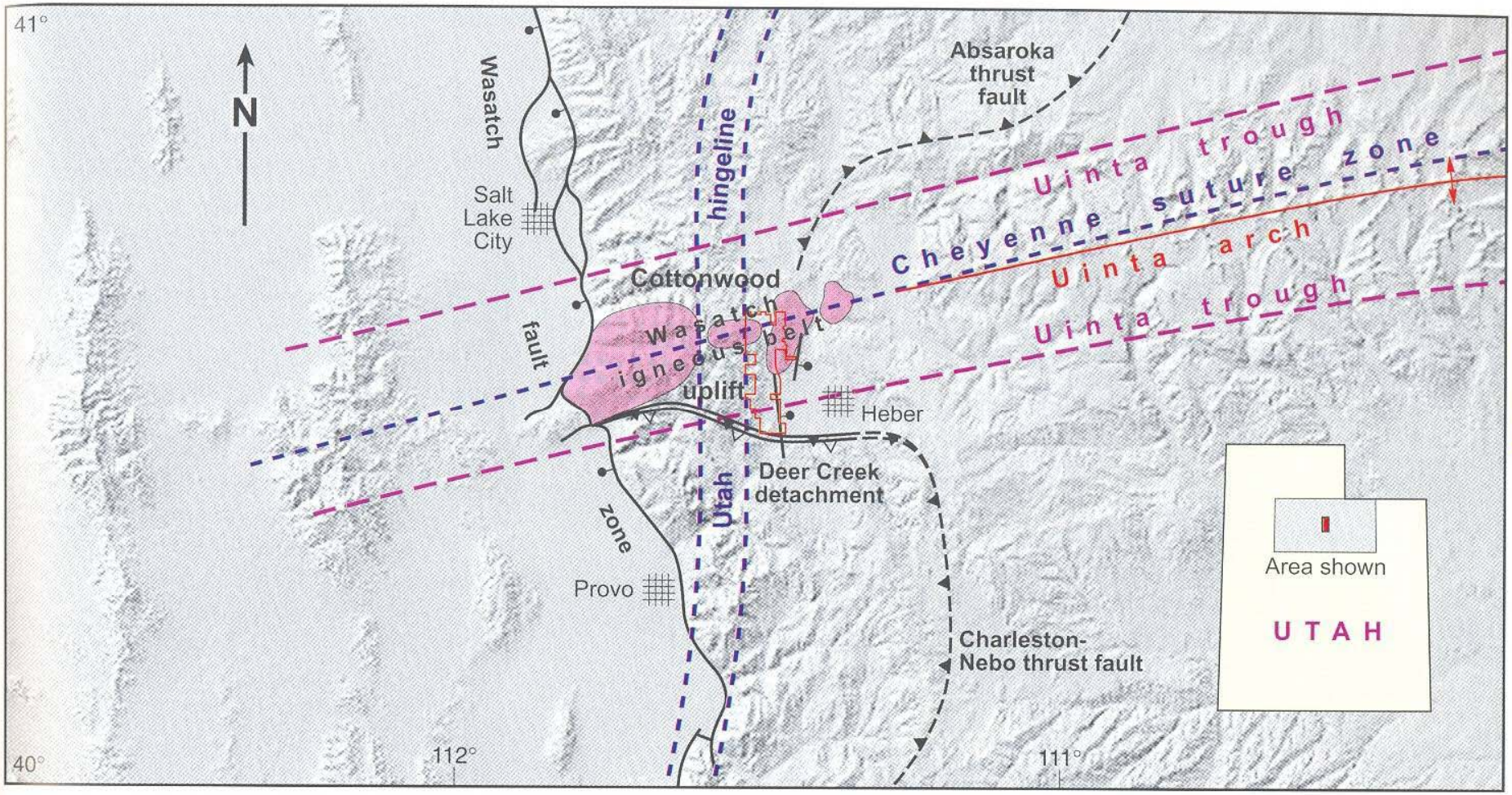


Geology of Utah

- Physiographic Provinces
  - Basin and Range
  - Colorado Plateau
  - Rocky Mountains

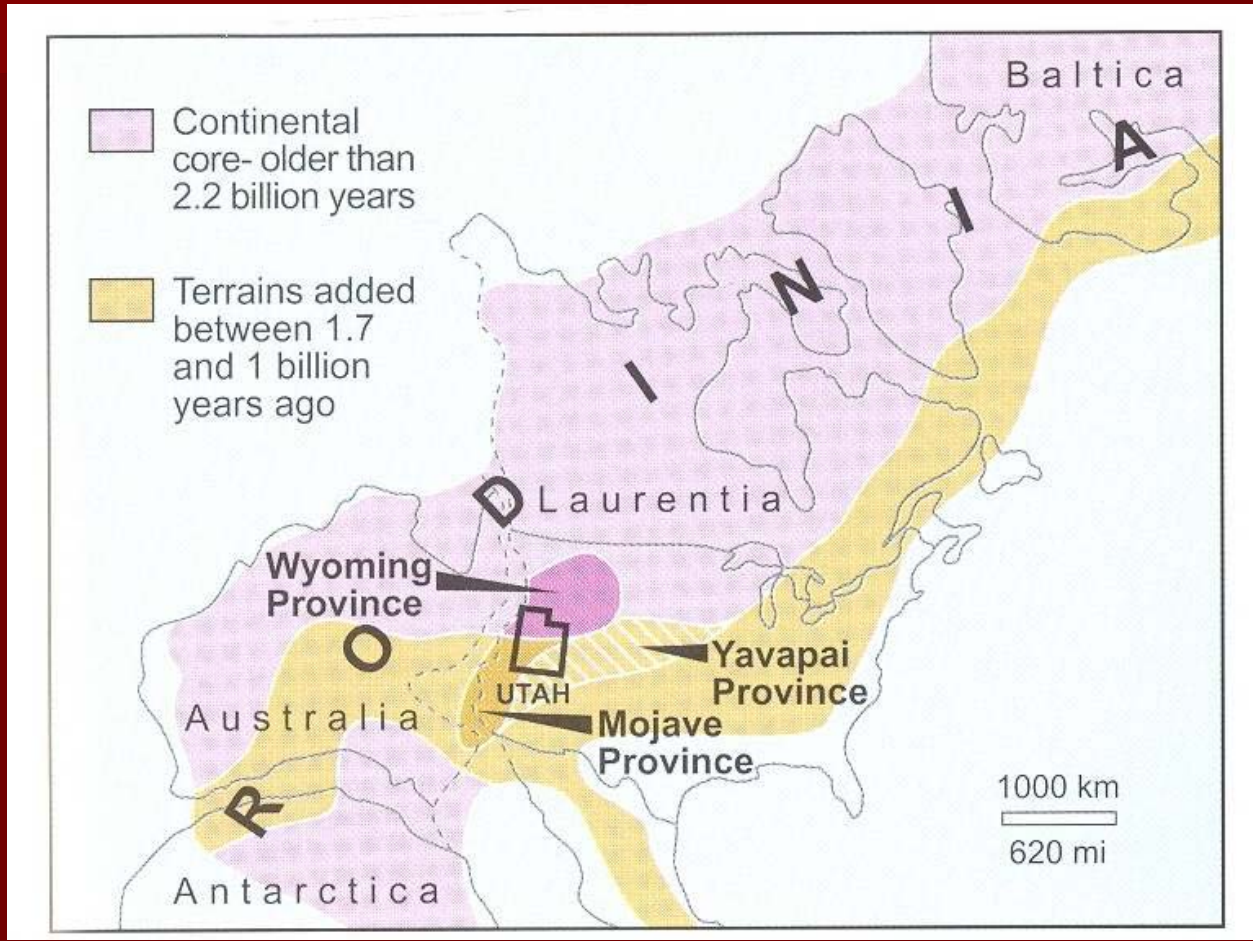


Structural Features: Cheyenne Suture, Uinta Trough

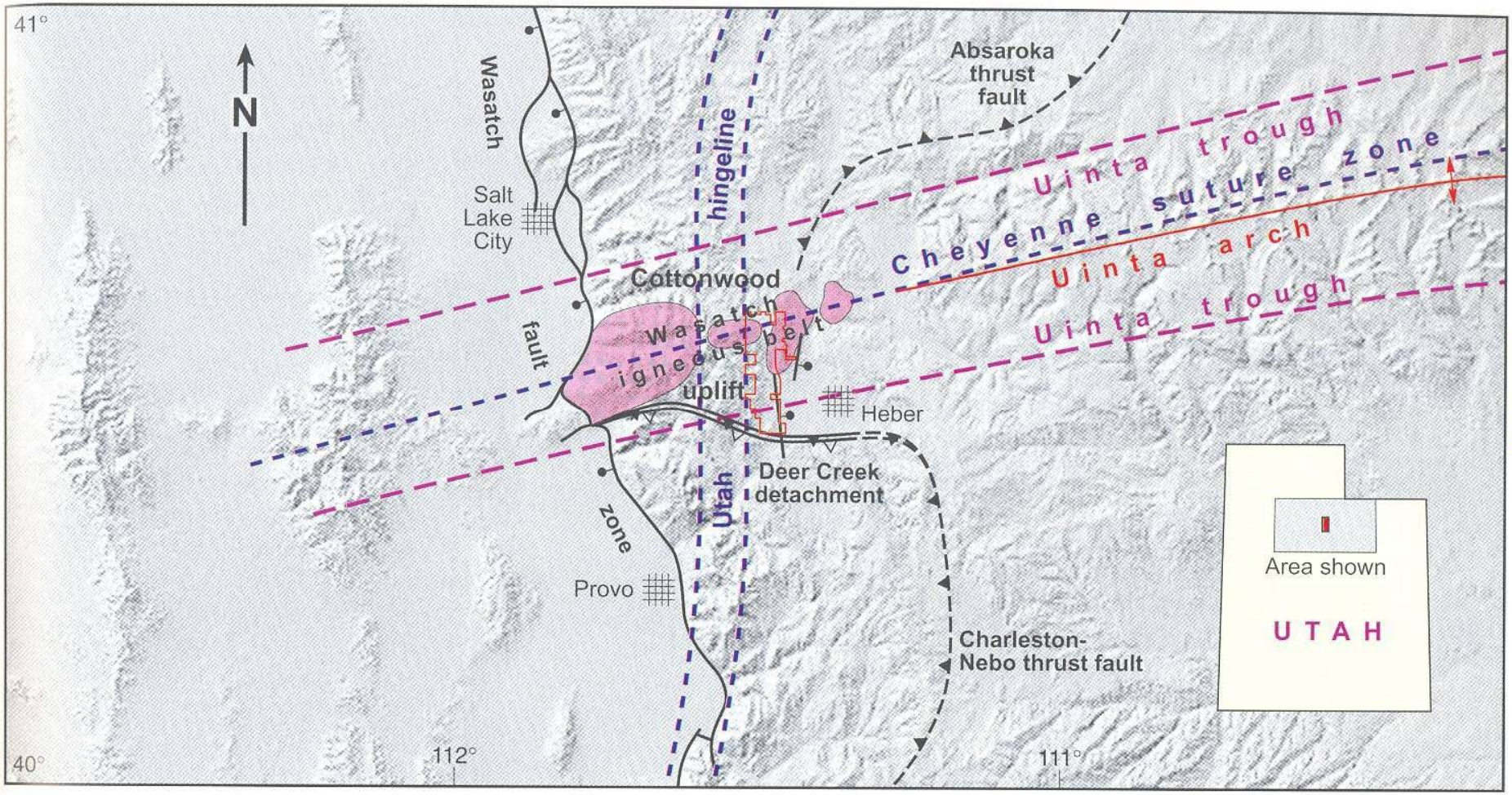


Continental Collision and Rift

- 1.7 bya
  - Cheyenne suture belt
  - Weakly welded crust
- 1.0 bya
  - Rodinia supercontinent
- 850 mya
  - Rift @ Cheyenne suture belt
  - Uinta trough
- 725 mya
  - N-S rift -------
  - Thinned crust to central Utah

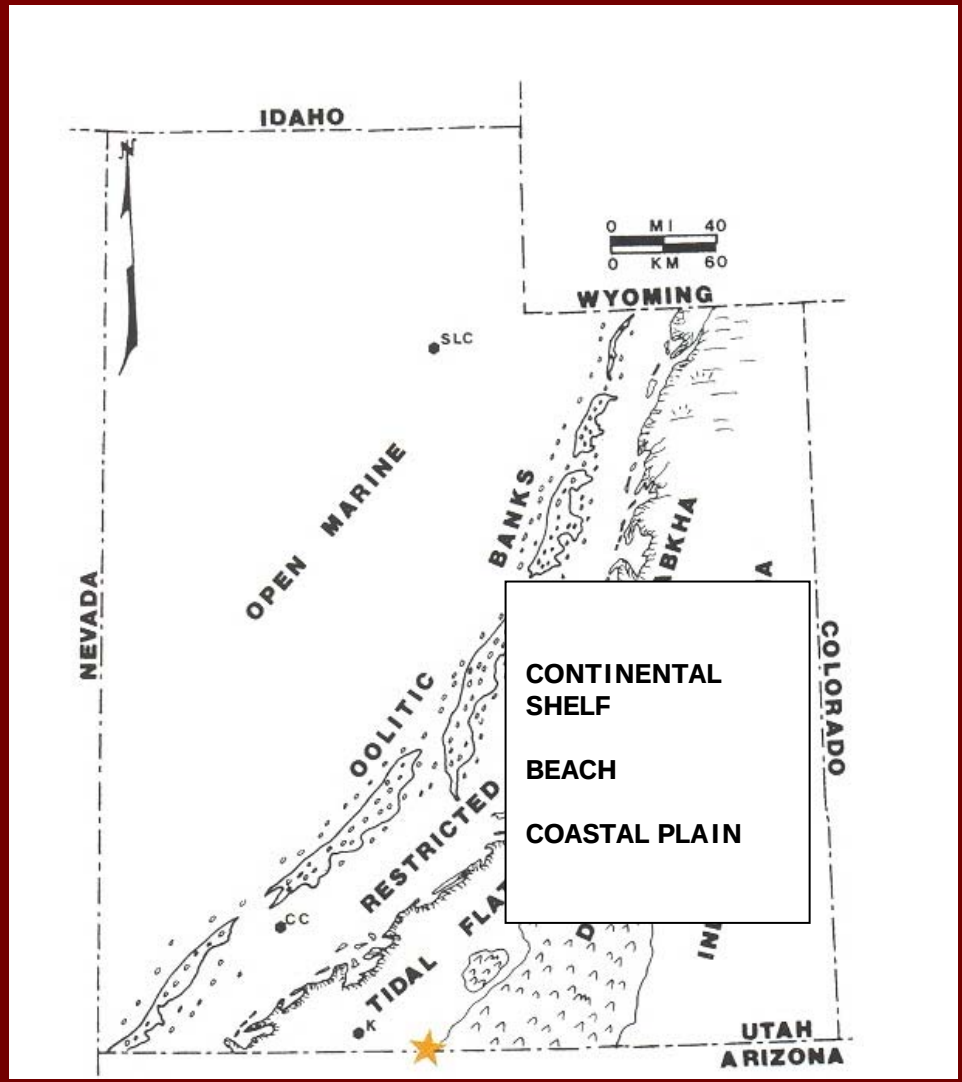


Structural Features: Utah Hinge Line

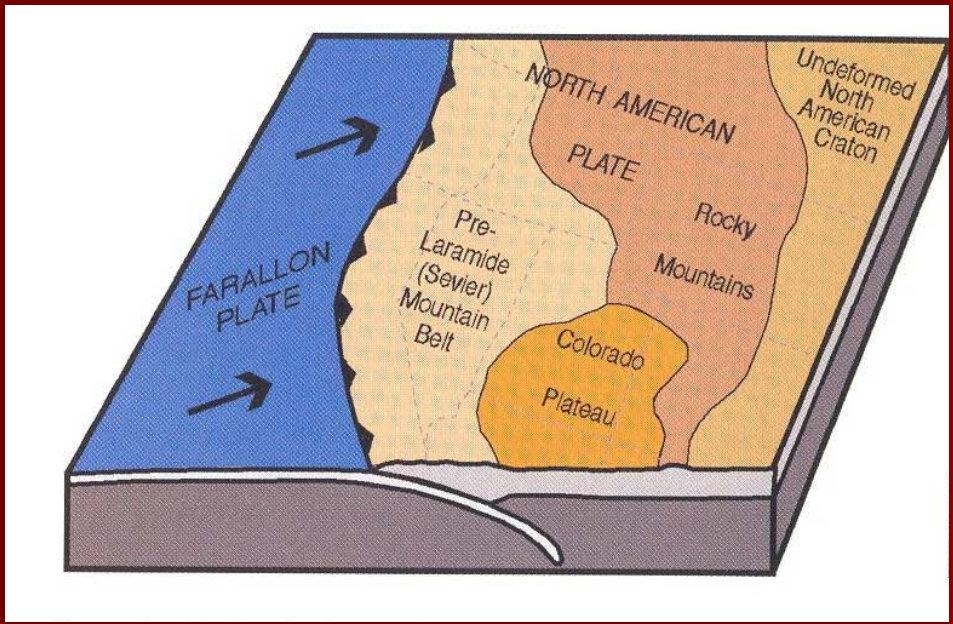


Paleozoic to Early Mesozic (Mid-Triassic)

- Utah tectonically quiet, tropical
  - West of hinge line
    - Subsiding basin (Nevada, W Utah)
    - Thick marine deposits
  - East of hinge line
    - Continental shelf
    - Thin beach, coastal plain, shallow marine deposits



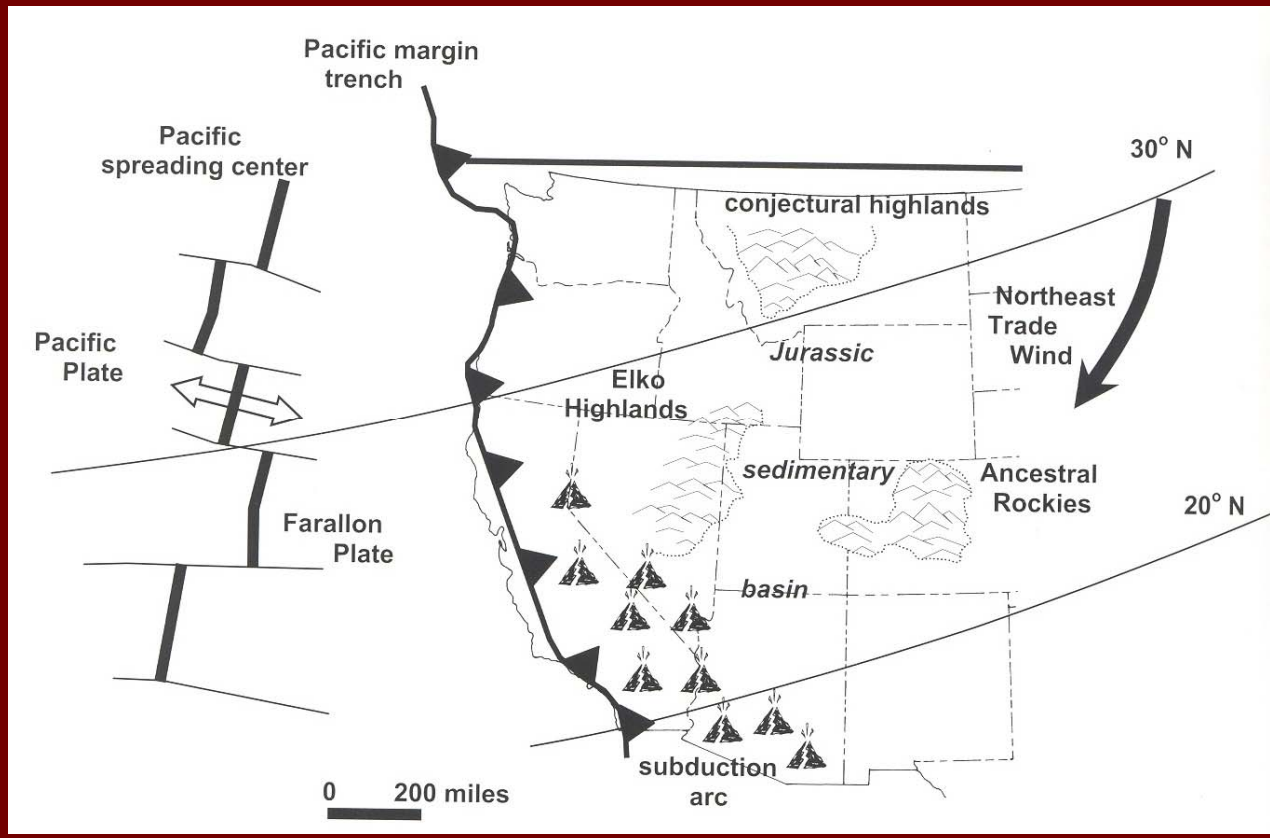
Mesozoic



- North American plate collides with Farrallon plate
- Farallon plate subducts under North American plate

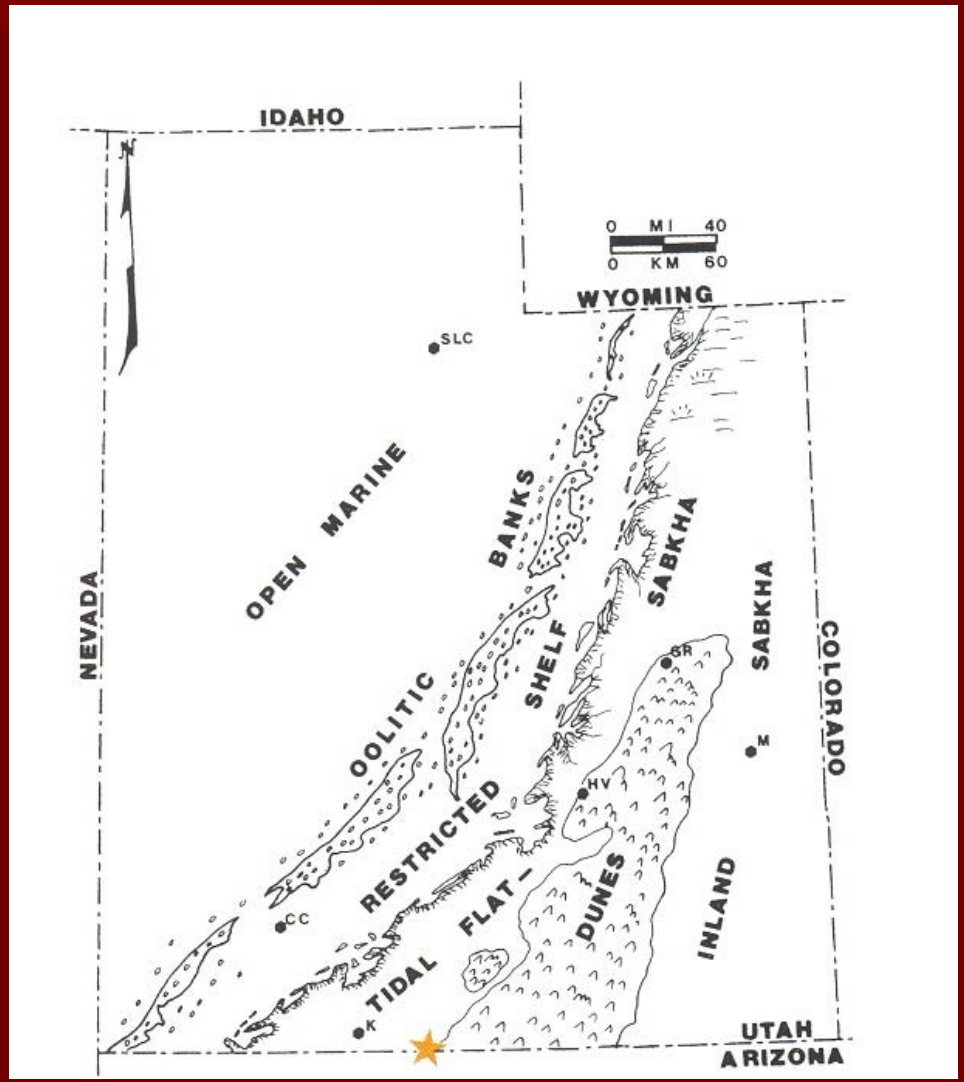
Mesozoic

- Mid-late Triassic
  - Volcanoes in California, Arizona
  - Ashy sediments
- Early Jurassic
  - Move into hot, dry trade winds
  - New mountains to west block coastal precipitation
  - Desert

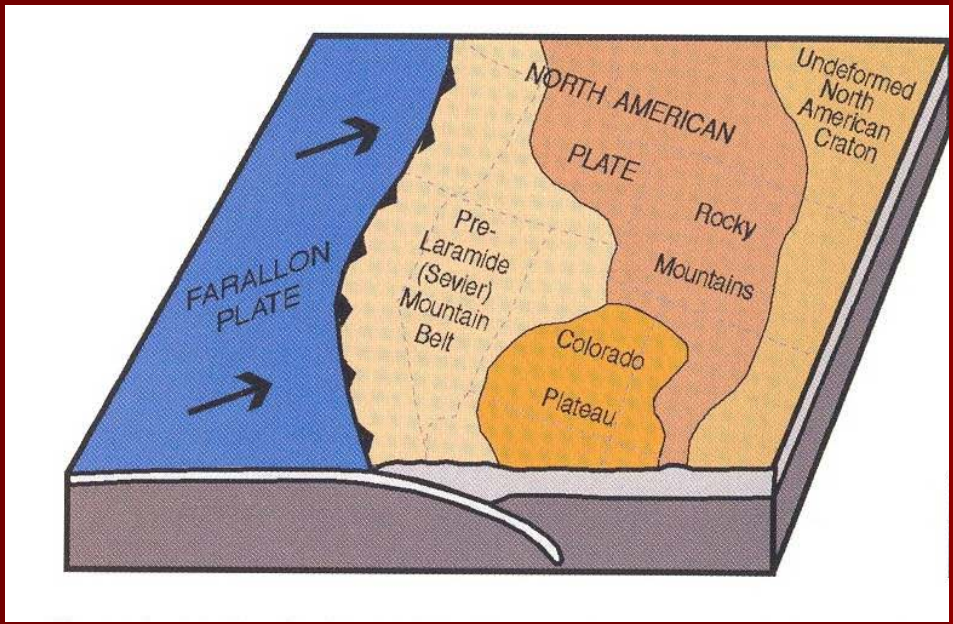


Mesozic
(Late Triassic-Early Jurassic)

- West of Utah hinge line
  - Interior sea
    - Marine deposits
- East of Utah hinge line
  - Transition
    - Sea margin
    - Inland desert

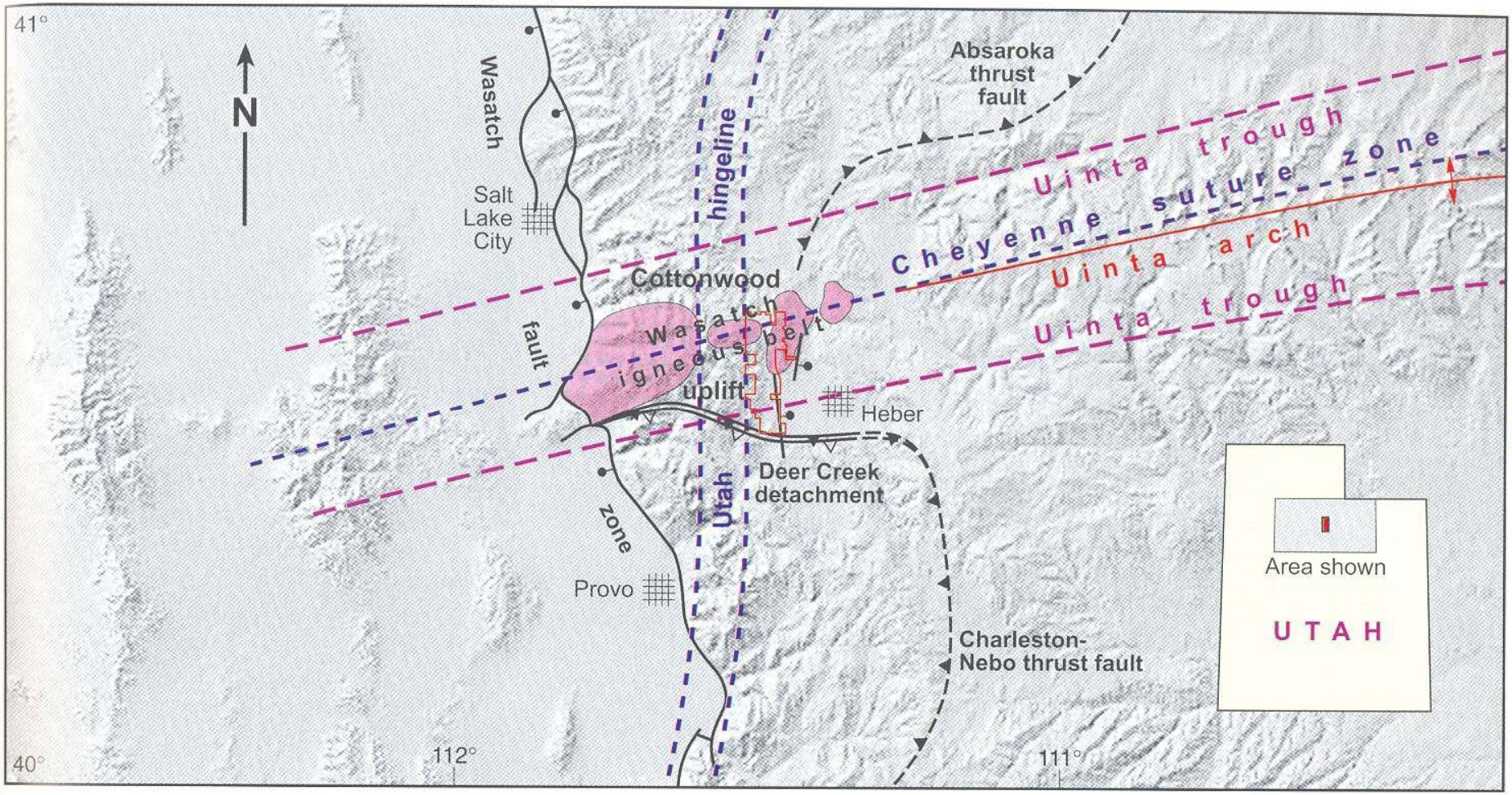


Mid-Late Mesozoic



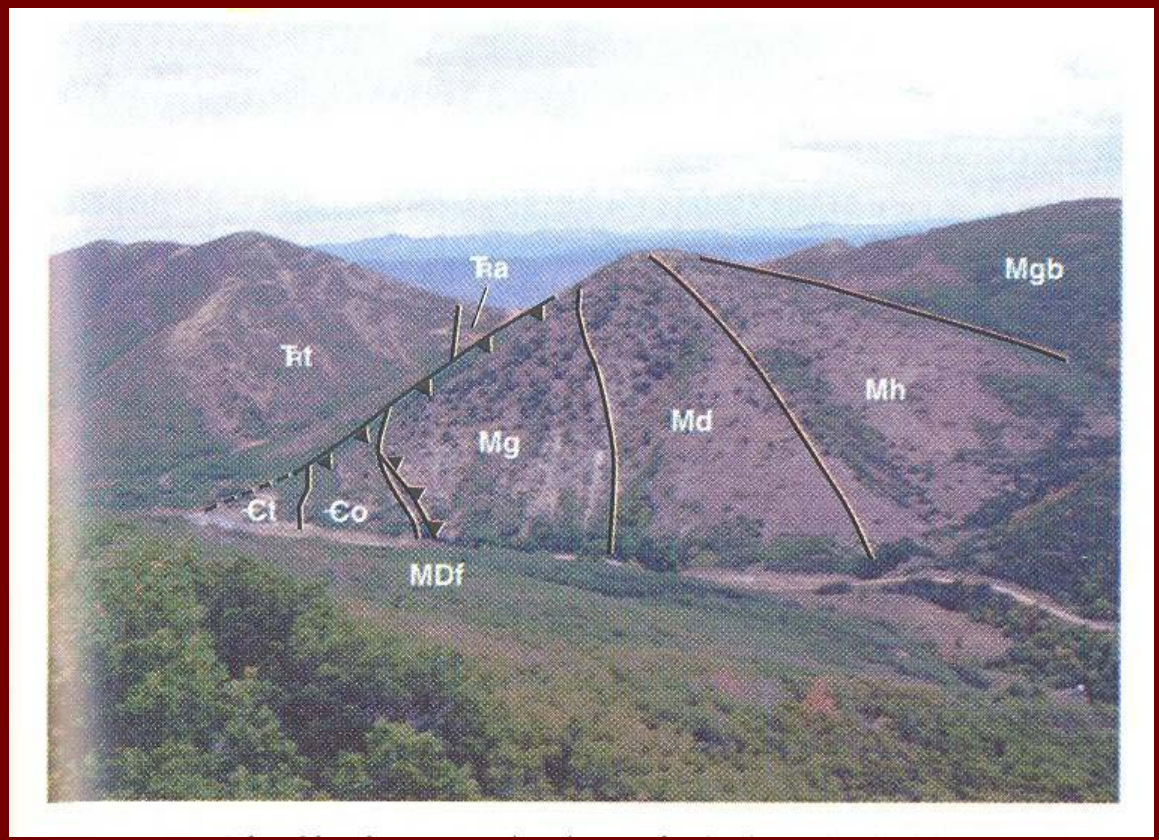
- Subduction of Farallon plate continues
  - Zone of structural deformity migrates east into Utah
  - Rock sheets folded, thrust eastward over younger rock
    - Sevier orogeny
    - Sevier thrust belt

Structural Features: Thrust faults

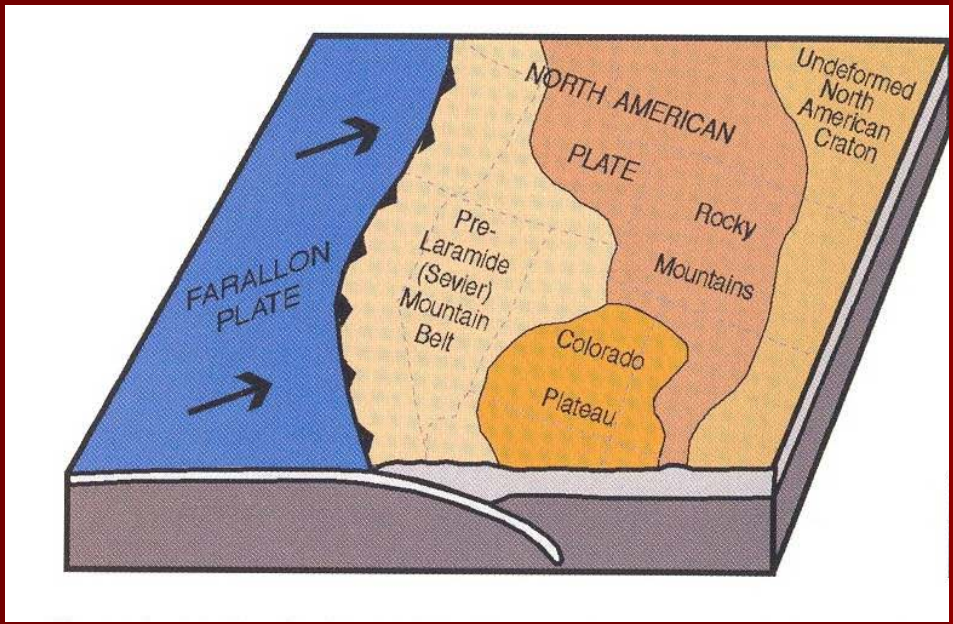


Structural Features: Thrust Faults

- Charleston-Mt. Nebo thrust fault
  - Paleozoic (Mississippian) rocks thrust over Mesozoic (Triassic) rocks

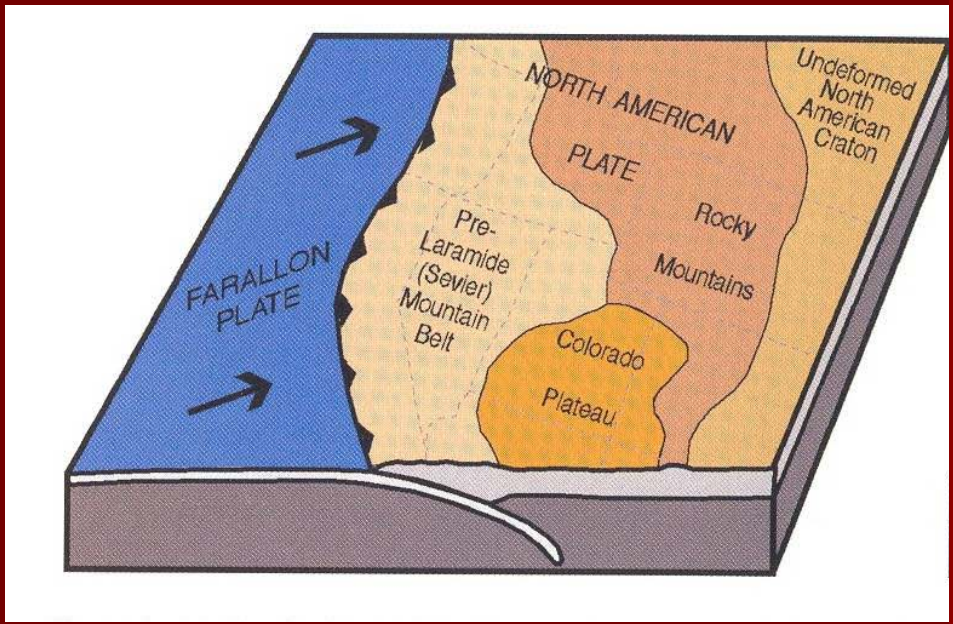


Cenozoic (Early Tertiary)



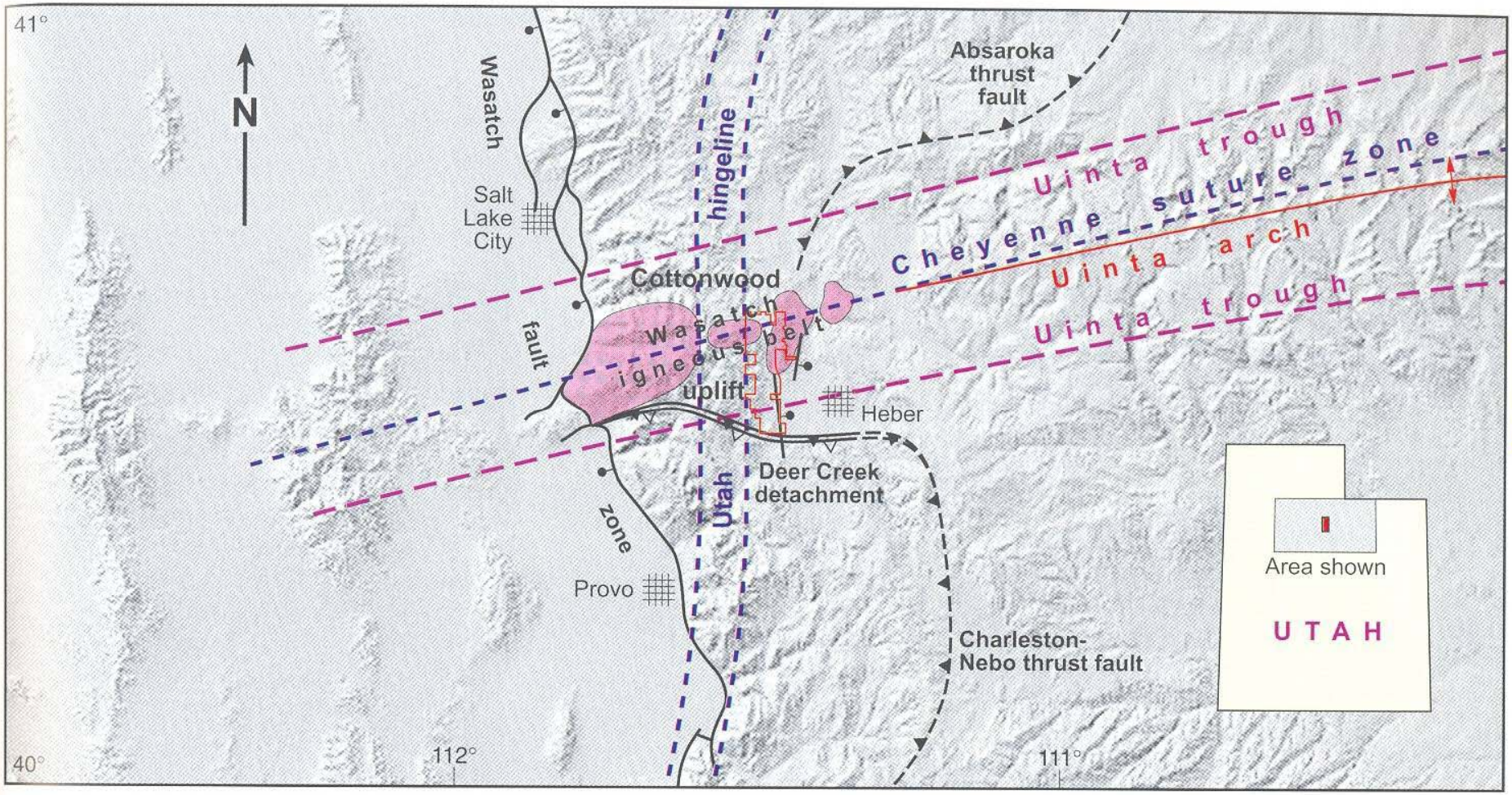
- Farallon plate
  - Subduction continues
  - Subduction angle lessens
- Structural deformity zone migrates eastward
  - West of Utah hingle line
    - Thrusting of rock sheets
  - East of Utah hingle line
    - Basement-cored uplifts
      - Laramide orogeny

Laramide Orogeny



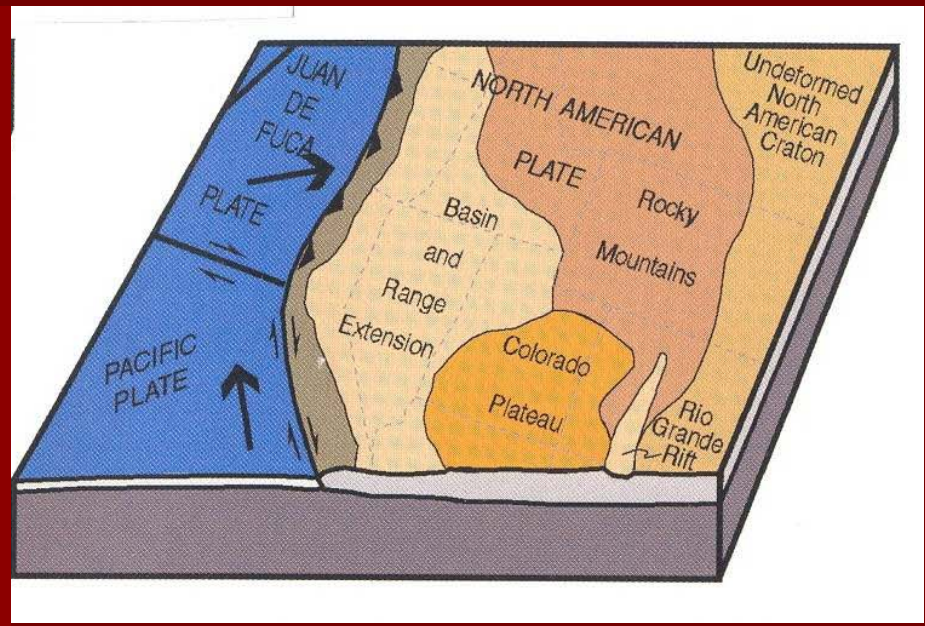
- Most structures oriented North-South
  - Compressional stresses oriented East-West
    - Rocky Mountain structure
      - Basement-cored uplifts bounded by high angle faults
    - Colorado Plateau structure
      - Sedimentary rocks deformed over fractured basement rocks
- Uinta Mountains and Cottonwood Uplift
  - Oriented East-West
  - Pushed up along Cheyenne suture zone

Structural Features: Uinta Arch, Cottonwood Uplift



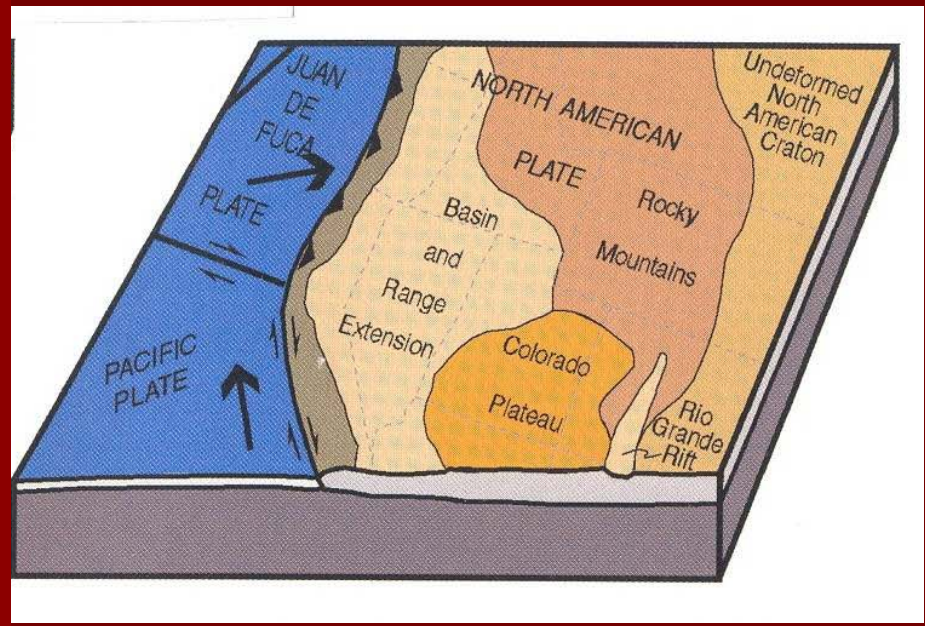
Cenozoic (mid Tertiary)

- Plate tectonics
  - North American plate overrides Fallon plate
- Crust extends, thins
  - Detachment faulting

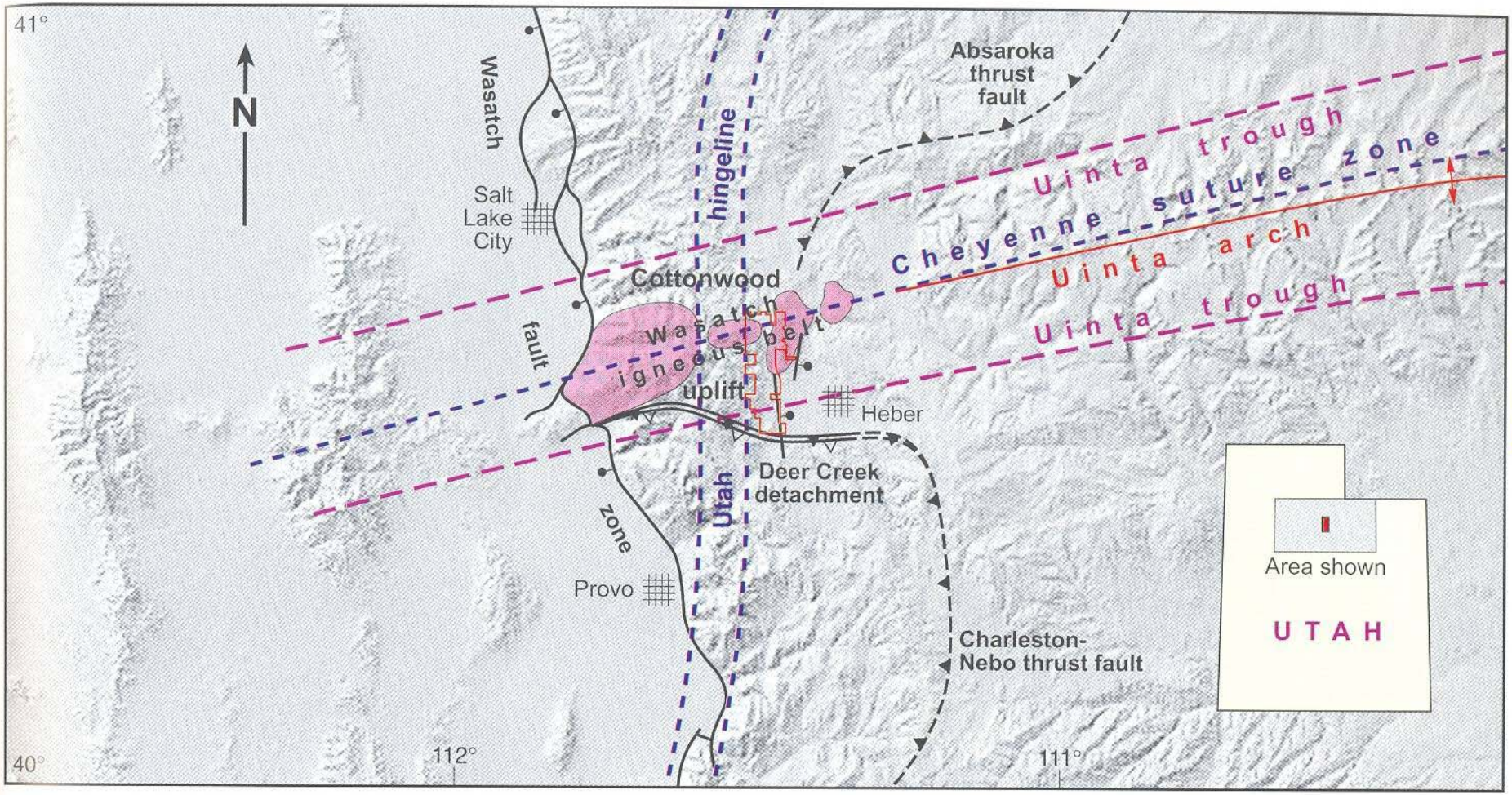


Cenozoic (mid Tertiary)

- Igneous Intrusions
  - Over-thickened crust
    - Formed in Cheyenne suture
      - Seveir, Laramide orogenies
    - Isostatically sagged into upper mantle
  - Detachment reduced crustal load
    - Isostatic rebound and decompression melting of lower crust
  - Siliceous igneous intrusions
    - Granite-like stocks, dikes, volcanoes
      - Wasatch igneous belt

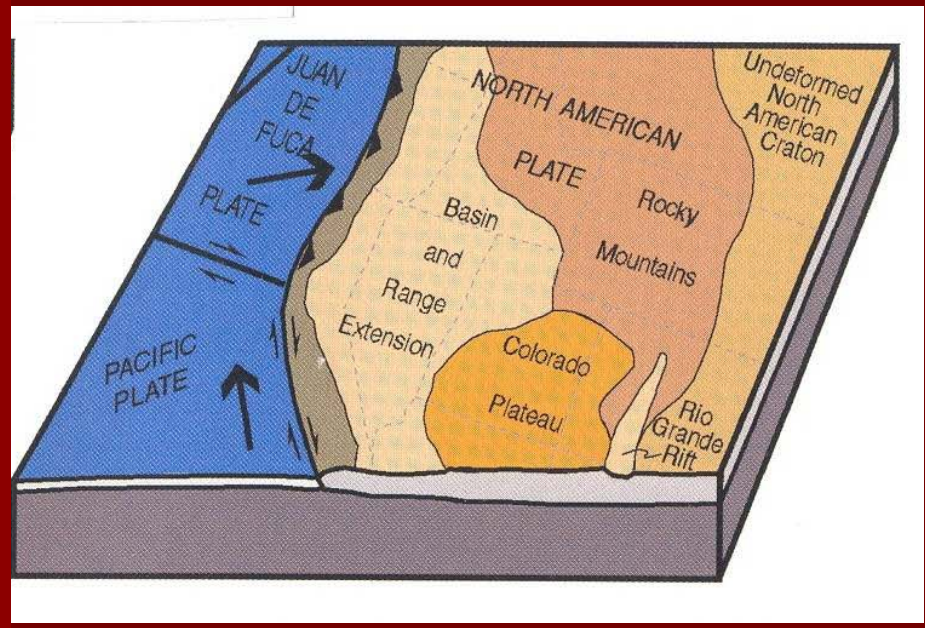


Structural Features: Detachments, Igneous Belt

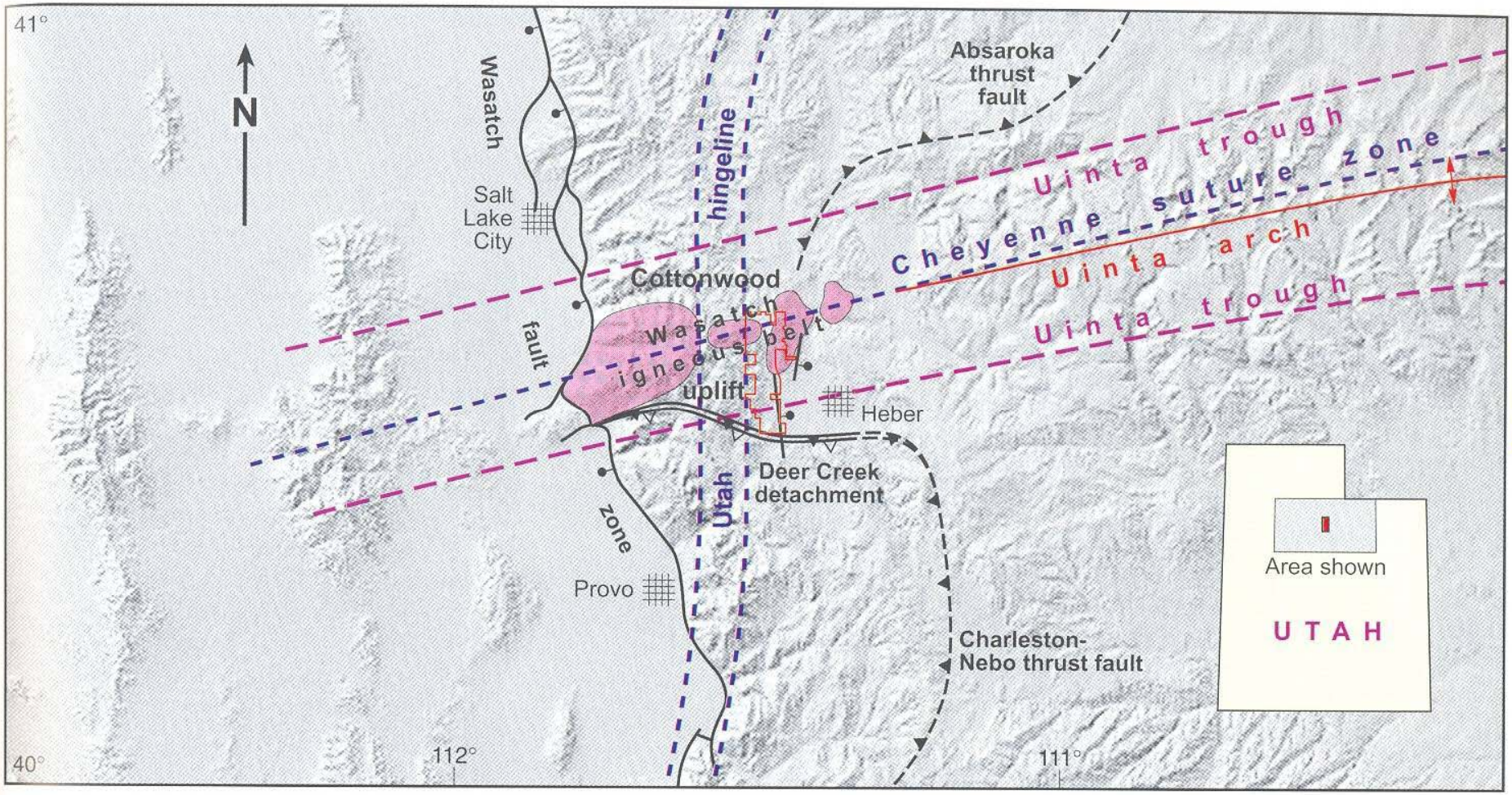


Cenozoic (Late Tertiary to Quaternary)

- North American plate
  - Overrides East Pacific rise
  - Encounters rotating Pacific plate
  - Western part pulled away
  - Extension and detachment faulting accelerated
- West of hinge line
  - Extension, detachment faulting
    - Basin and Range
- East of hingeline
  - Uplift - isostatic rebound
    - Middle Rocky Mountains
    - Colorado Plateau
- Wasatch fault
  - Hinge line, boundary



Structural Features: Wasatch fault, Heber valley



Field Tour (Late Cenzoic)

- Park City
  - Wasatch igneous belt
  - Glaciation
- Heber Valley
  - Basin and Range
  - Half-graben
- Strawberry Valley
  - Basin and Range-Colorado Plateau transition zone
  - Fault-controlled valley
  - Some Colorado Plateau formations