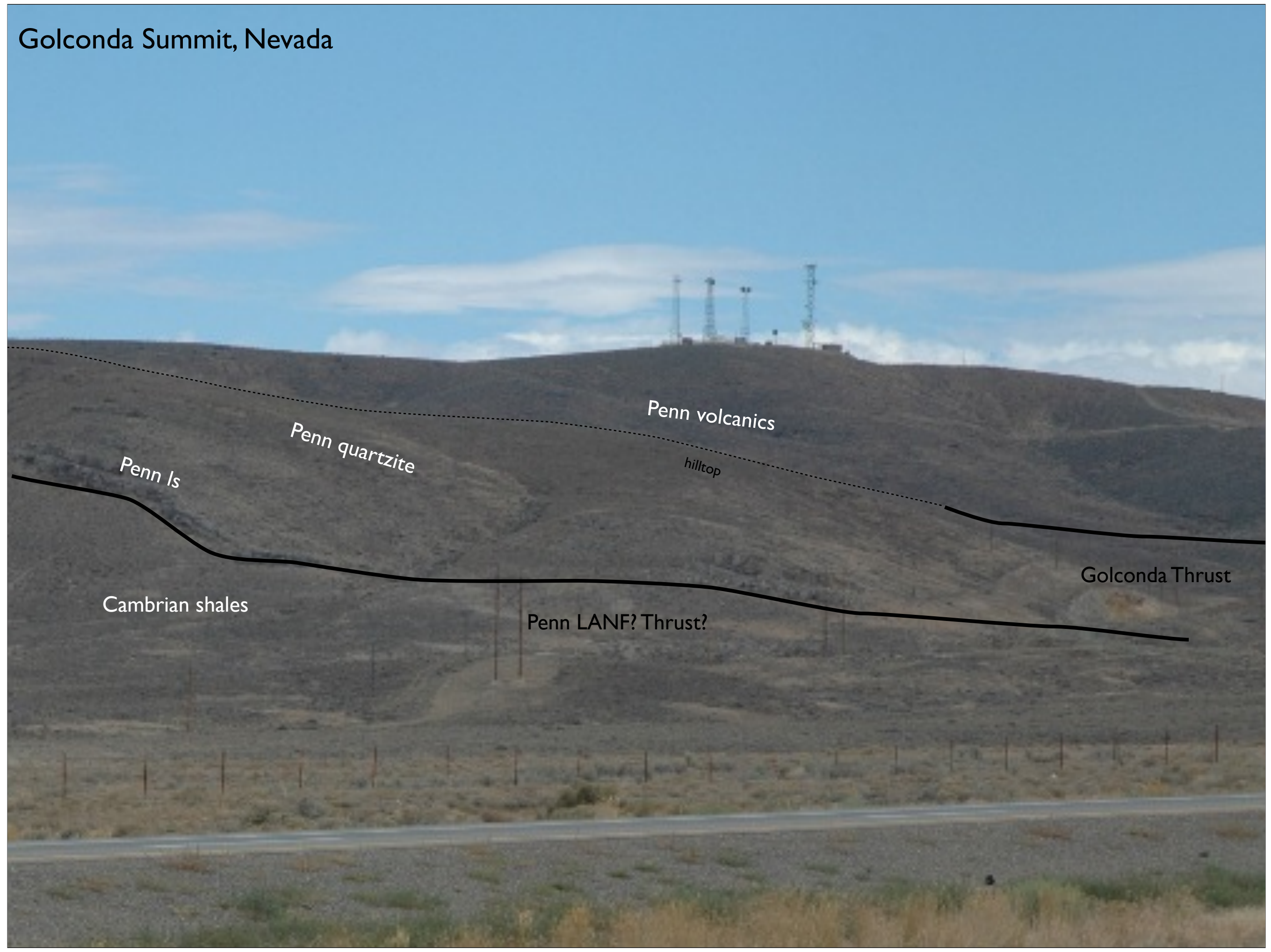


Golconda Summit, I80. Above highway where trucks are, Cambrian Preble Frm (phyllitic shale) under Antler Peak ls, Penn–Perm reef ls––juxtaposed on Iron Point fault (thrust on old maps, LANF in Cashman et al). Edna Mtn (Permian ss) at very top of hill. Small hill at right has Iron Point Thrust again within it. To left of highway, peak with antennae is Golconda Summit, which is Penn shale+chert of upper plate of Golconda allochthon. Ledge 1/3 way up is Antler Peak ls with brown Edna Mtn Frm above. Most of gray slopes behind is greenstone unit (basalts–andesites of Penn age) of upper plate of Golconda.

Golconda Summit, Nevada

PUMPERNICKEL FORMATION (LOWER PERMIAN AND UPPER, MIDDLE, AND LOWER PENNSYLVANIAN) – Interbedded chert, shale, greenstone, and quartzite; minor limestone

PℙPpu Upper part – Interbedded black chert and gray limestone. Chert is thin bedded, in 2- to 4-inch-thick ribbons, and weathers dull brown from fracture surfaces inward. Limestone is gray to dark gray, fine to medium grained, and sandy, and locally contains segmented worm trails. Locally, very thin layers (¼ to ½ inch thick) of medium- to coarse-grained sandstone containing black conodonts occur near the base of the unit. J. W. Huddle (written commun., 1972; USGS 24937–PC and USGS 24940–PC) reports that most of the conodonts are *Gondolella bisselli* Clark and Behnken, which suggests an Early Permian Wolfcamp age. The unit is best exposed on top of the long narrow ridge along the border between sec. 24, T. 35 N., R. 40 E., and sec. 19, T. 35 N., R. 41 E. There the beds are folded into small, tight, northwest-plunging folds overturned to the northeast. Unit probably is youngest of Pumpernickel rocks and top is always present-day erosion surface

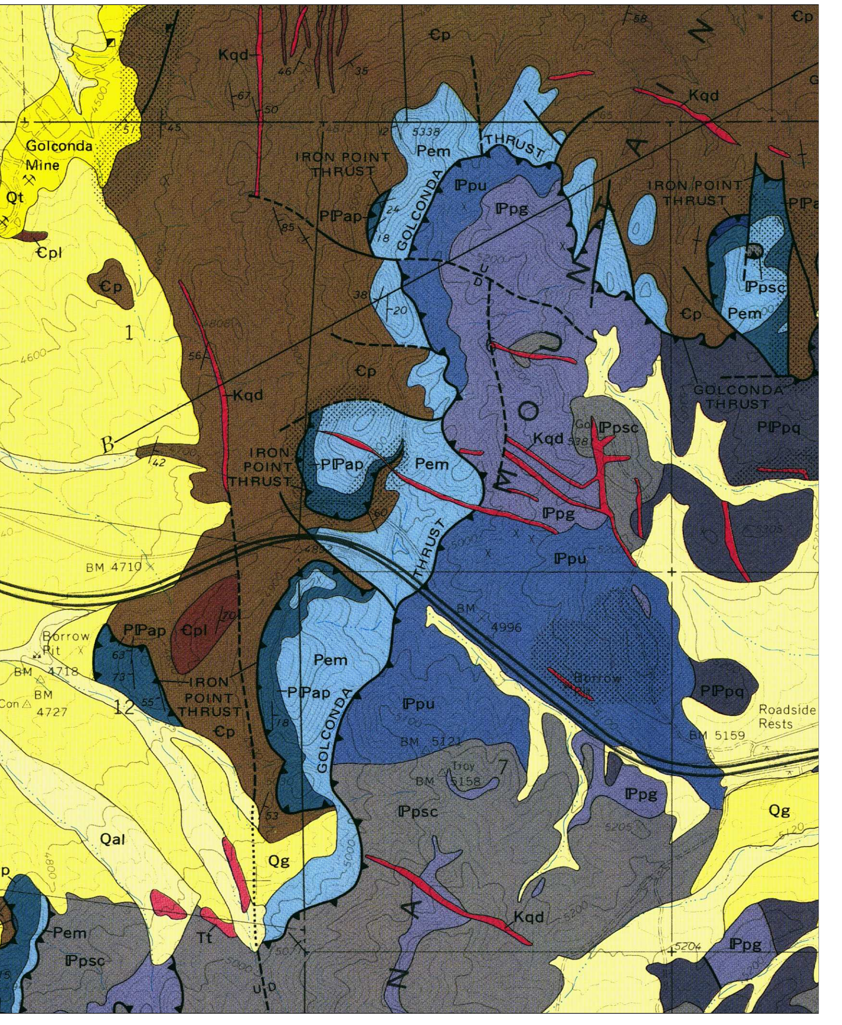
PℙPpq Quartzite and limestone – Light-brown fine-grained calcareous quartzite and minor discontinuous lenses of gray sandy limestone. Overlies interbedded chert and shale (ℙpsc). Contact commonly gradational

ℙpsc Interbedded shale and chert – Pale-olive, siliceous shale and gray, greenish-gray, and black, thin-bedded chert

ℙpq Quartzite – Dark-olive-weathering, fine- to coarse-grained, dirty quartzite; commonly contains dark chert grains, sparse feldspar, and shreds of micaceous minerals. Occurs in lower part of formation but not everywhere present. Included in ℙpu unit in Iron Point quadrangle to east where it is too thin to be mapped separately

ℙpg Greenstone – Includes pillow lavas, vesicular flows, and pyroclastics ranging in composition from olivine basalt to andesite, all altered to clay minerals, hornblende, chlorite, iron oxides, and calcite. Most abundant in lower part of formation in thin-bedded chert and shale sequence (ℙpsc). Contact with chert and shale is favorable ground for copper mineralization. A prominent "reef" of green quartz keratophyre porphyry is included in this unit in NW¼ sec. 18, T. 35 N., R. 41 E

ℙpu Chert and shale undivided – Chiefly gray, greenish-gray, and black thin-bedded chert and pale-olive siliceous shale containing minor amounts of greenstone and dark dirty fine- to coarse-grained quartzite, pebble conglomerate, and gray limestone



Golconda Summit, I80. Above highway where trucks are, Cambrian Preble Frm (phyllitic shale) under Antler Peak ls, Penn-Perm reef ls--juxtaposed on Iron Point fault (thrust on old maps, LANF in Cashman et al). Edna Mtn (Permian ss) at very top of hill. Small hill at right has Iron Point Thrust again within it. To left of highway, peak with antennae is Golconda Summit, which is Penn shale+chert of upper plate of Golconda allochthon. Ledge 1/3 way up is Antler Peak ls with brown Edna Mtn Frm above. Most of gray slopes behind is greenstone unit (basalts-andesites of Penn age) of upper plate of Golconda.

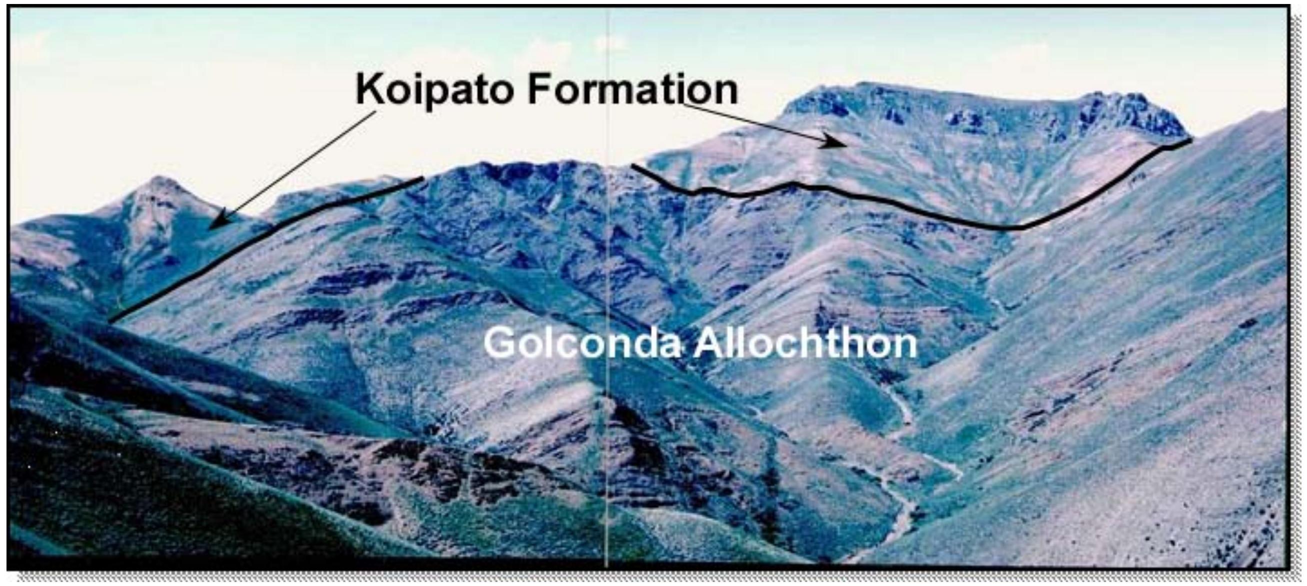
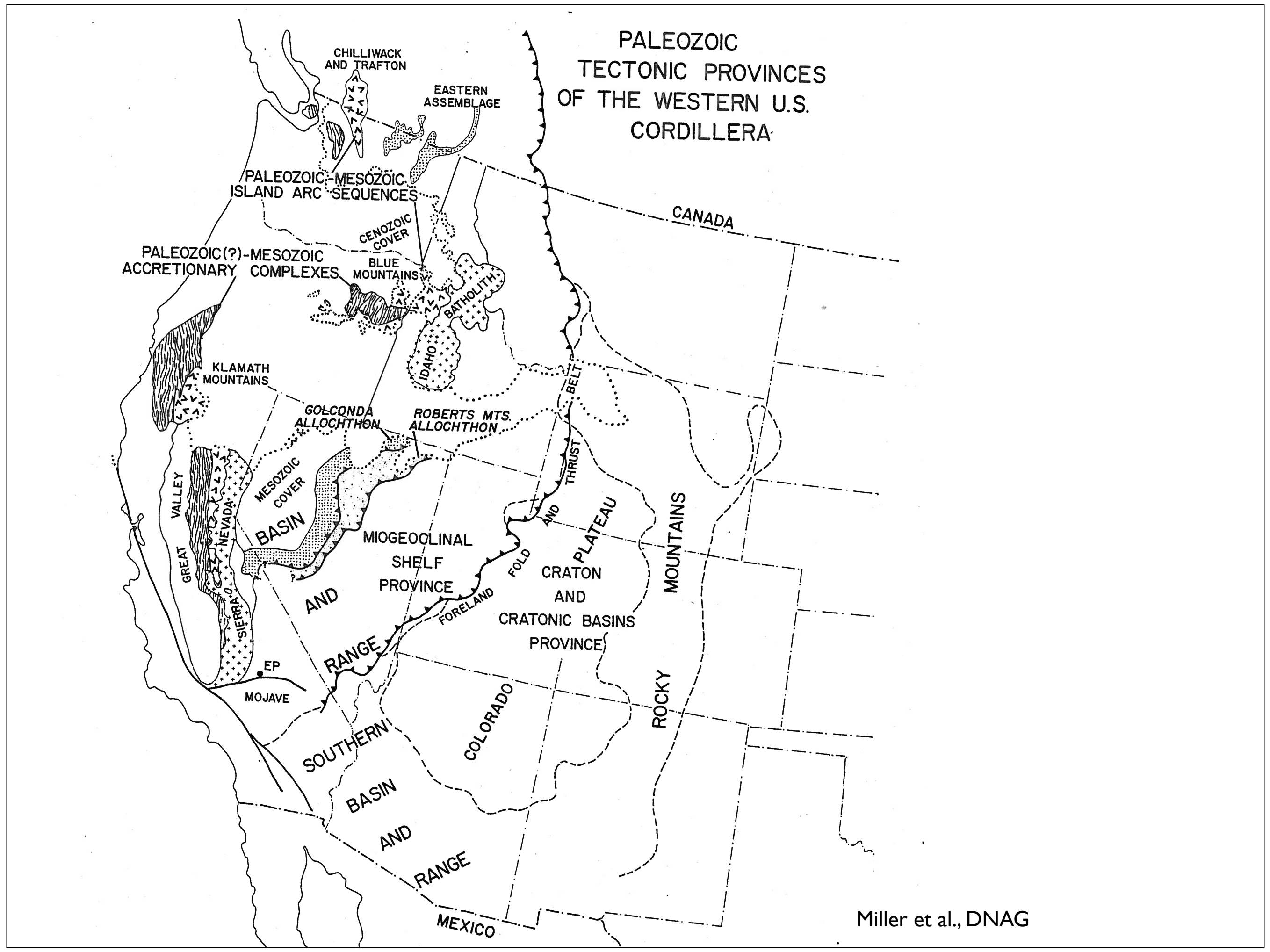


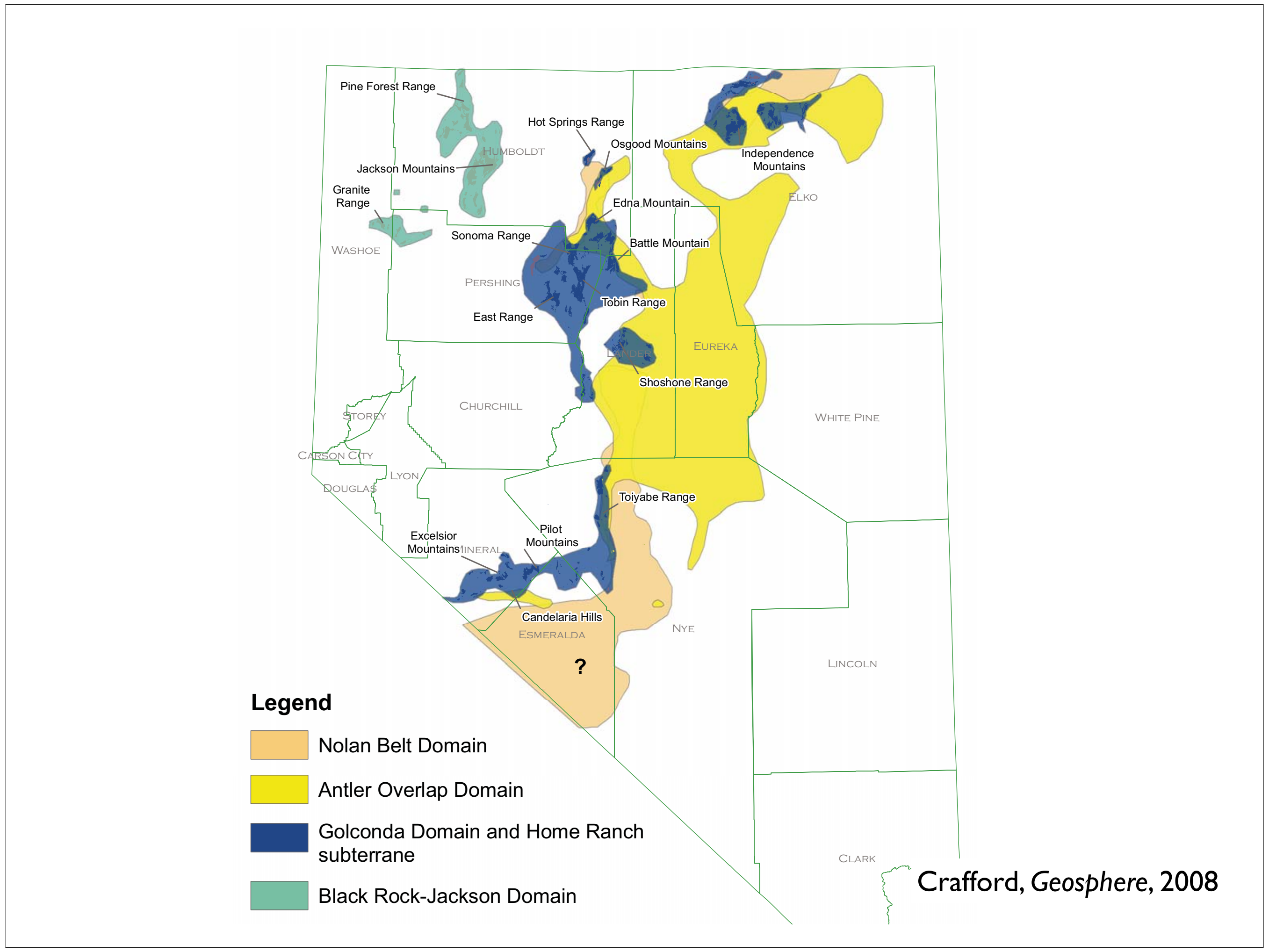
Figure 1.4. View of Hoffman Canyon and China Mountain in the Tobin Range, which is the type locality of the Sonoma Orogeny. Ferguson et al. (1952) noticed that the undeformed Koipato Formation rests on top of the highly deformed Golconda Allochthon with a marked angular unconformity. View to the north. Modified from Walter Snyder (per. comm.).

Vetz, MS thesis, Boise State, 2011

Koipato late Triassic (possibly late Permian); high initial Sr and very negative eNd suggest this was on NAM crust when intruded/erupted.



Kind of funny map as a lot of things are Mz (batholiths, for instance, and fold-and-thrust extent)



Crafford notes lower plate pretty undeformed, but upper plate hammered—in places relatively undeformed Tr on top. Also discuss Nolan belt, which is defined by Crafford as having continental affinity but higher grade metamorphism and west-verging thrusting in pre-mid-Penn

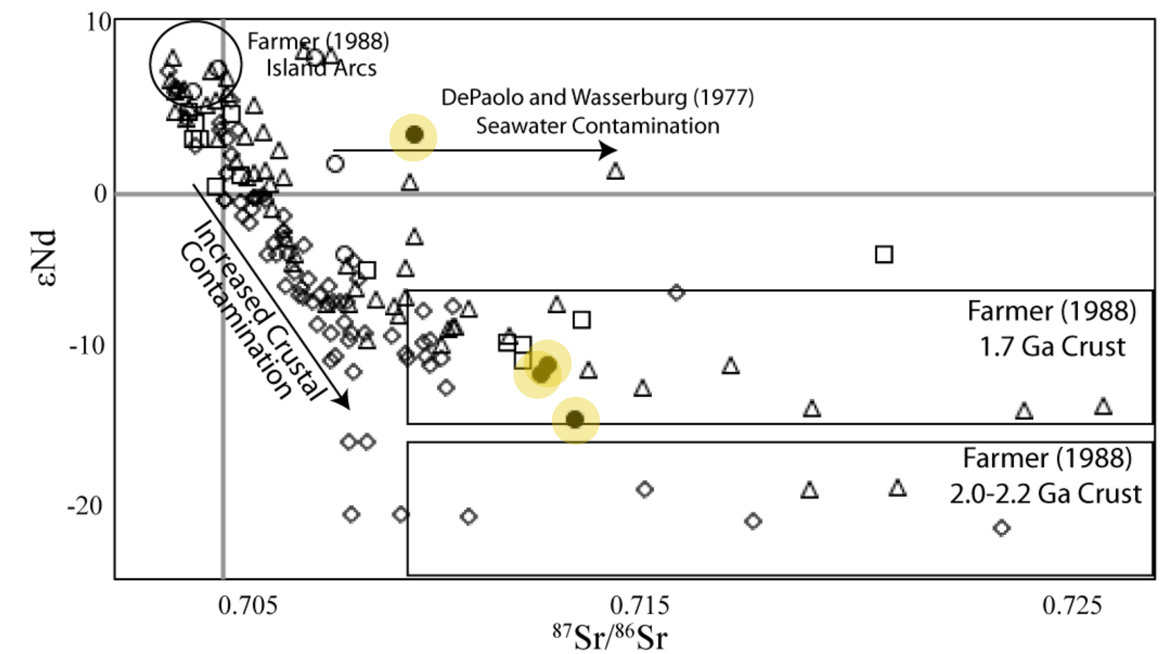
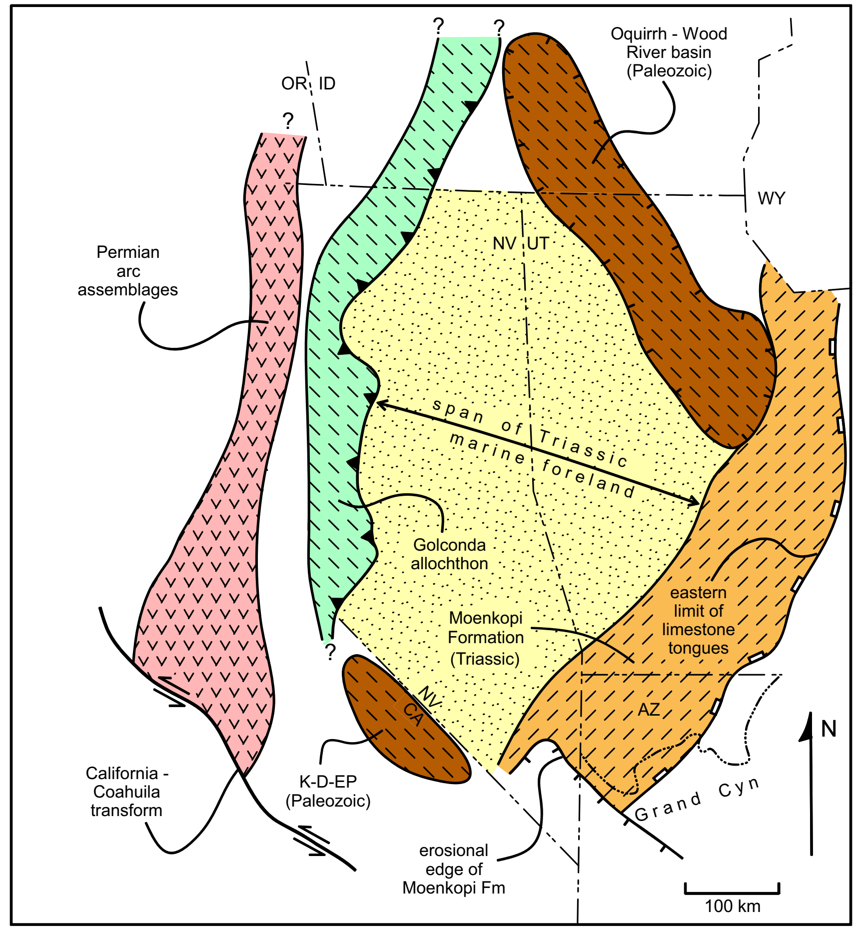


Figure. 3.4. εNd vs. $^{87}Sr/^{86}Sr$ plot showing the values of four samples (solid circles) from the Koipato Formation reported in this study and other Mesozoic and Tertiary samples from DePaolo (1981), Farmer and DePaolo (1983; 1984), Samson et al. (1989), and DePaolo and Daley (2000). Open circles = Triassic, open squares = Jurassic, open triangles = Cretaceous, and open diamonds = Tertiary. Arrow showing increased crustal contamination is taken from Farmer (1988).

Vetz, MS thesis, Boise State, 2011

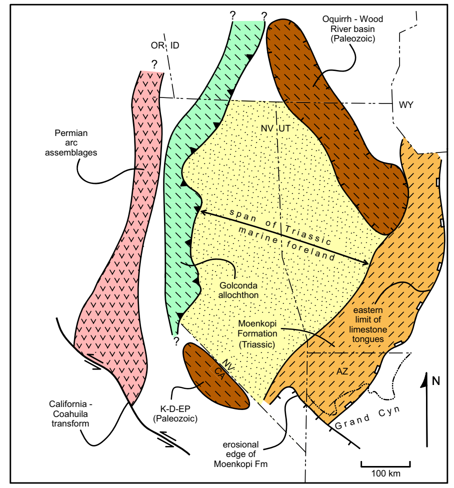
So was Golconda emplaced on continental margin? Solid dots are from overlapping volcanics which seem exceptionally continental in origin. [Ideally should compare with Klamath/Sierra arc rocks]

Possible geometry of Triassic foreland



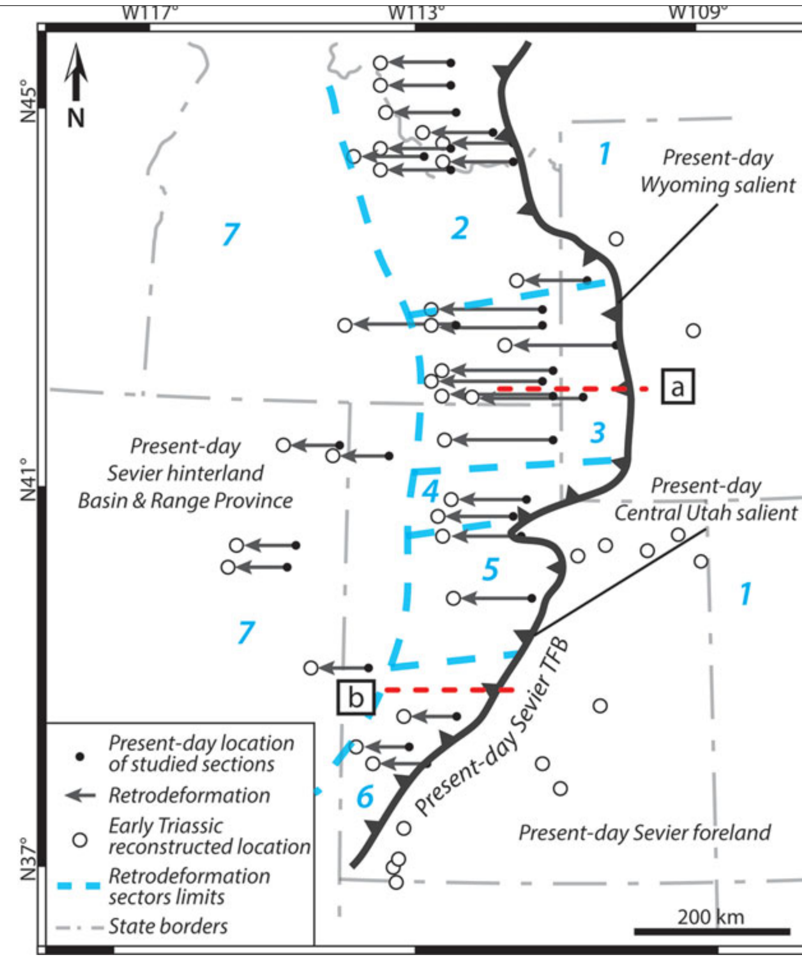
Dickinson, *Geosphere*, 2013

Figure 9. Mississippian to Early Triassic (325–245 Ma) tectonomagmatic relations across the intermountain region. Selected late Paleozoic depocenters: Oquirrh–Wood River basin (Geslin, 1998; Hintze and Kowallis, 2009); Keeler–Darwin–El Paso (K–D–EP) basin cluster (Stevens et al., 1997, 2005; Stevens and Stone, 2007). See Figure 1 for the states shown (boundaries distorted) and Figure 2 for the time span depicted.



Dickinson, *Geosphere*, 2013

Possible geometry of Triassic foreland



Caravaca et al., *Geol. Mag.*, 2018

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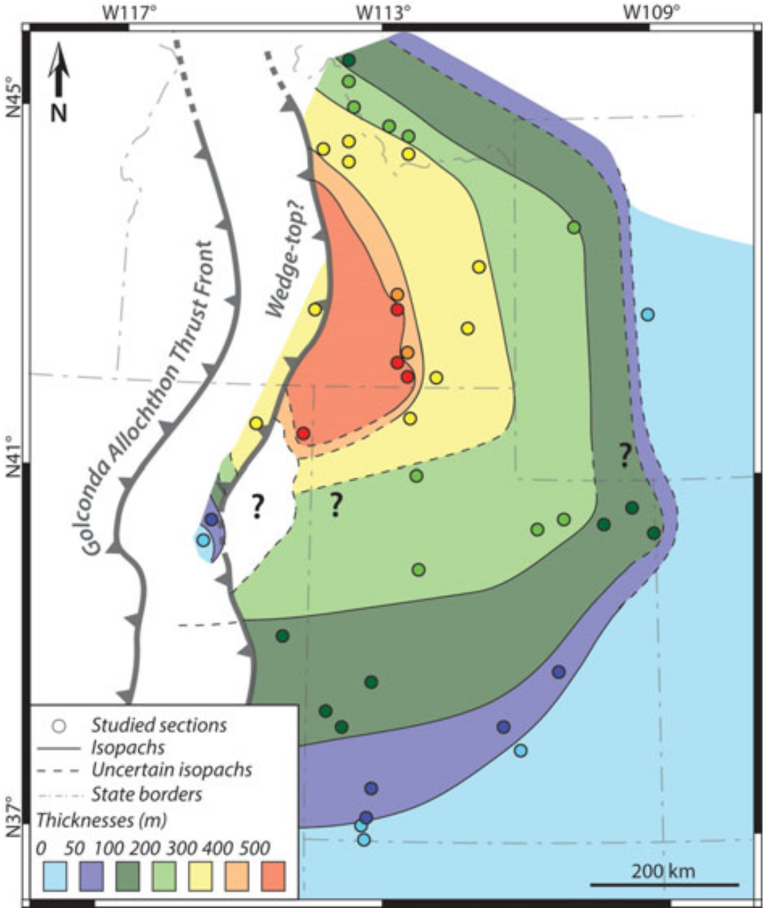
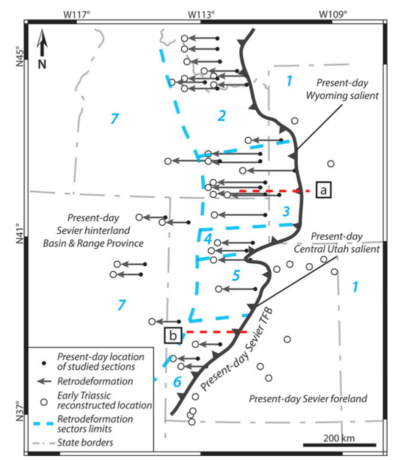
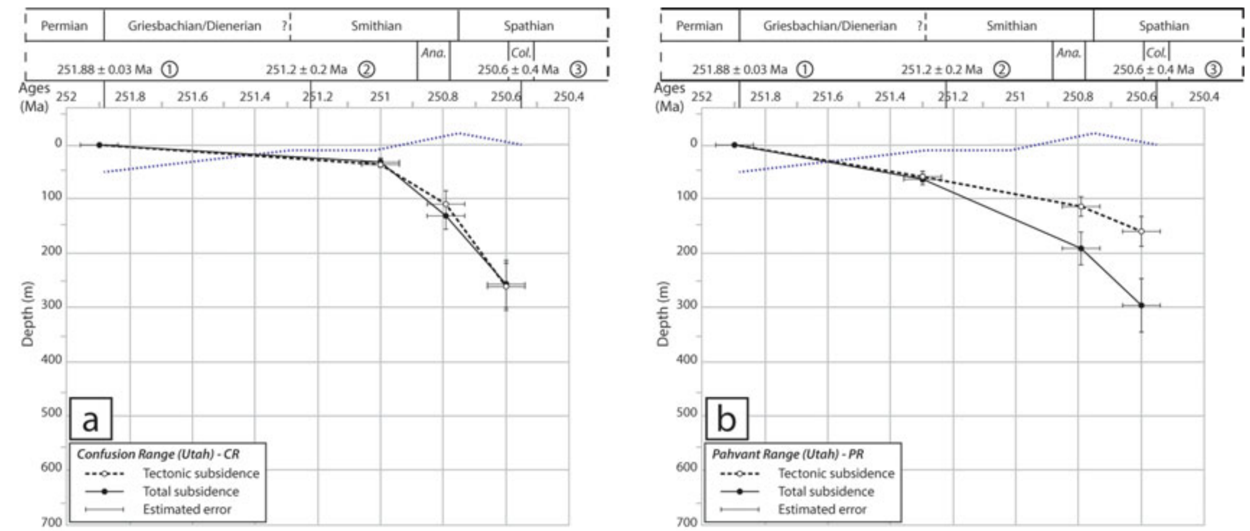
Isopachs Sonoma foredeep (lower Triassic) retrodeformed

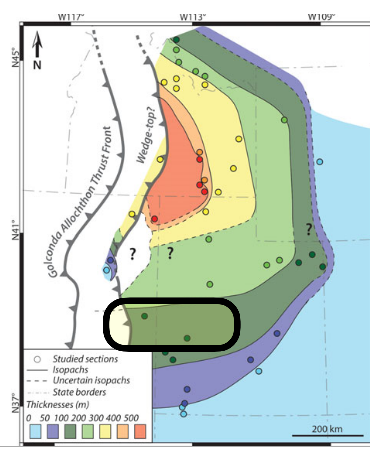




Caravaca et al., *Geol. Mag.*, 2018

Couple strange things here. One is that subsidence is highest north of where GA is known. Another is that this is quite far out from the GA front.
However, if this is foredeep (which some literature says doesn’t exist), this is both time and space control.
Figure 8. (Color online) Isopach map of the sedimentary thicknesses recorded for the PTU–Smithian interval, showing marked differences in sedimentary thicknesses between northern and southern Sonoma Foreland Basin. The studied sections are shown at their paleolocation (Fig. 7). The reconstructed Golconda Allochthon Thrust Front during the PTU–Smithian studied interval is also indicated (modified from Dickinson, 2013; see also Fig. 12). The position of the wedge-top is based on variations in the sedimentary thicknesses and on geophysical data (Fig. 10).

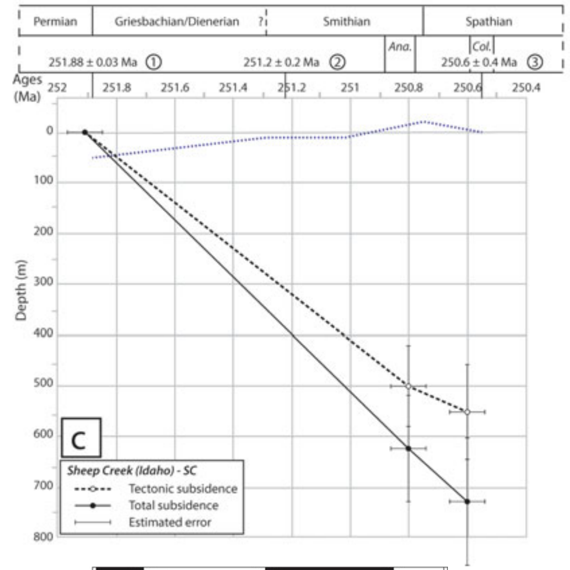


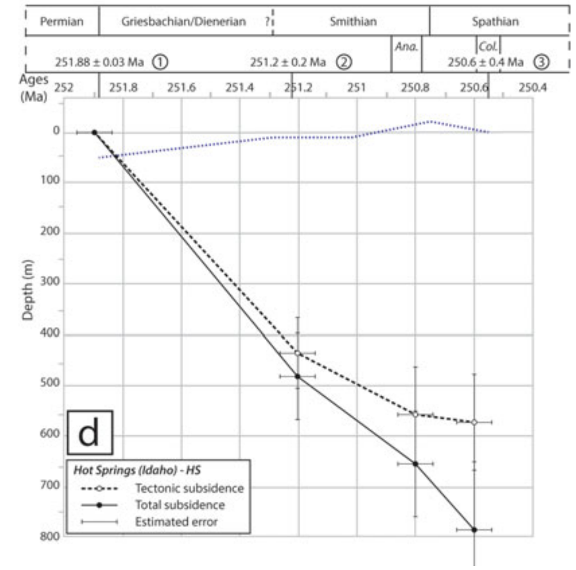


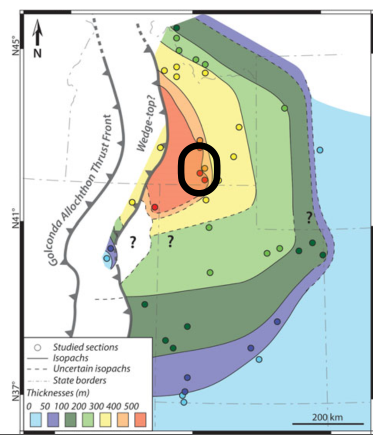
Isopachs Sonoma foredeep (lower Triassic)

Caravaca et al., *Geol. Mag.*, 2018

Tectonic subsidence curves in the south…not too much. HAs that convex-up shape like foredeep with a moving load.



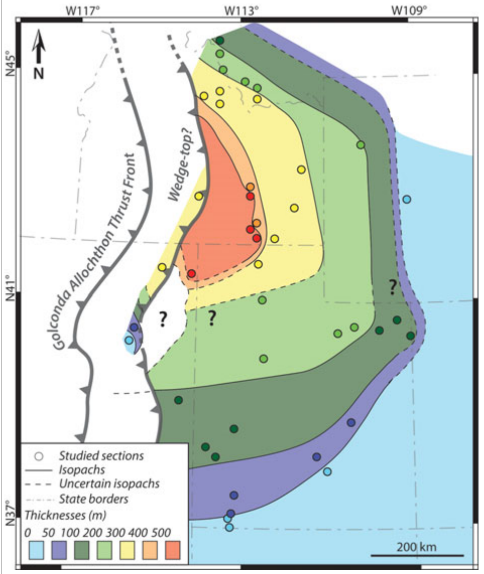




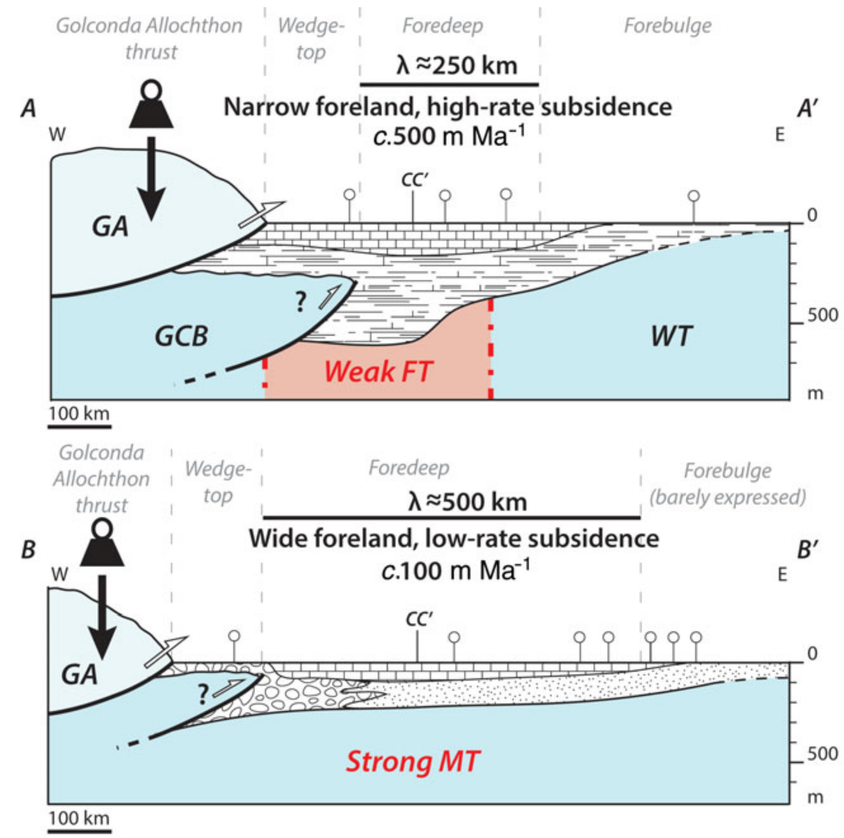
Isopachs Sonoma foredeep (lower Triassic)

Caravaca et al., *Geol. Mag.*, 2018

Tectonic subsidence curves in the north—lots more (unclear how this progressed, though)

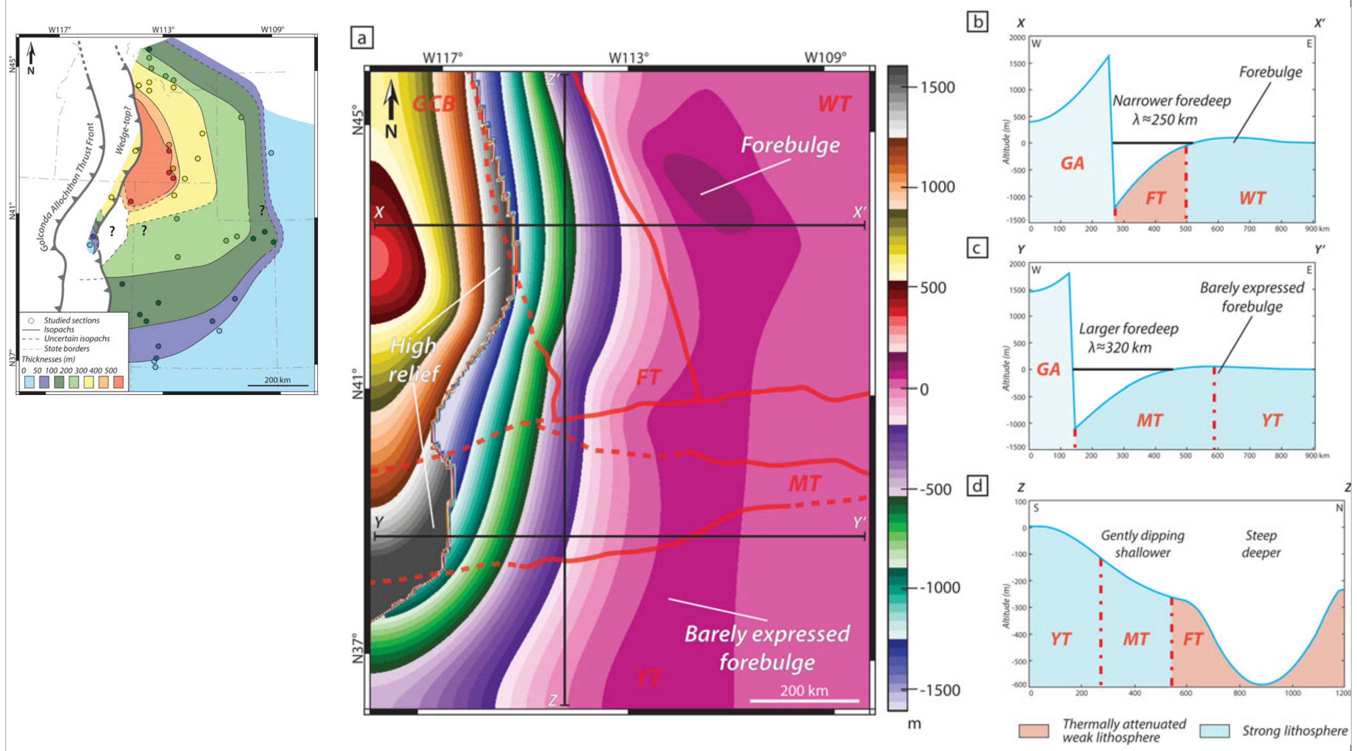


Isopachs Sonoma foredeep (lower Triassic)



Caravaca et al., *Geol. Mag.*, 2018

A-A' is through the deeper foredeep, B-B' to the south. On a simple note, seems the forebulge should be a lot farther west in A-A' than B-B'. GA is Golconda Allochthon, GCB Grouse Creek Block, WT Wyoming craton, MT Mojave terrain.

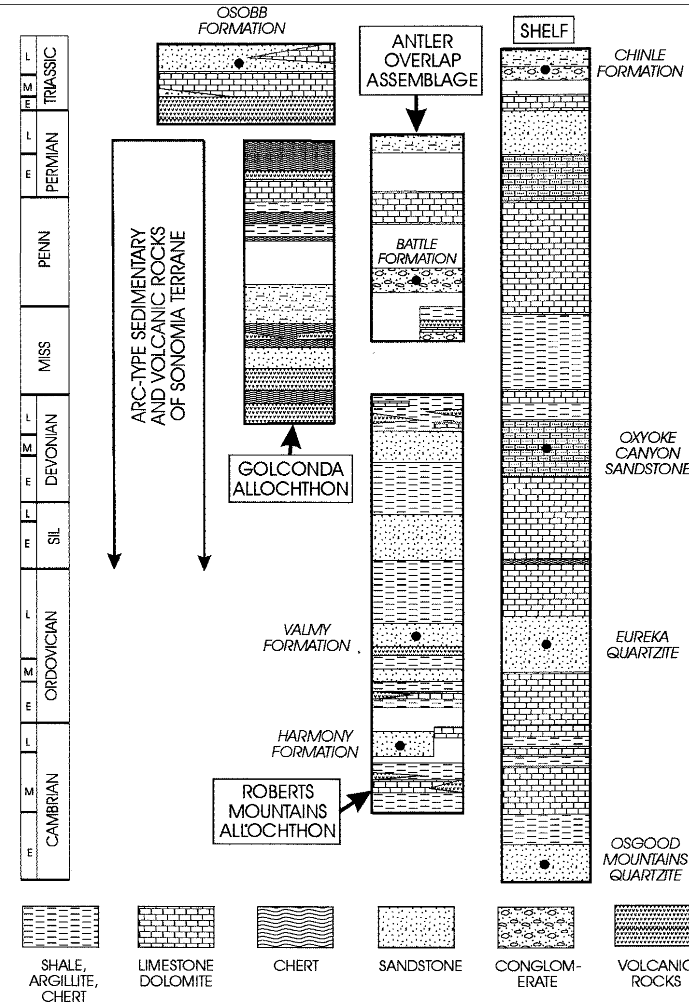


Isopachs Sonoma foredeep (lower Triassic)

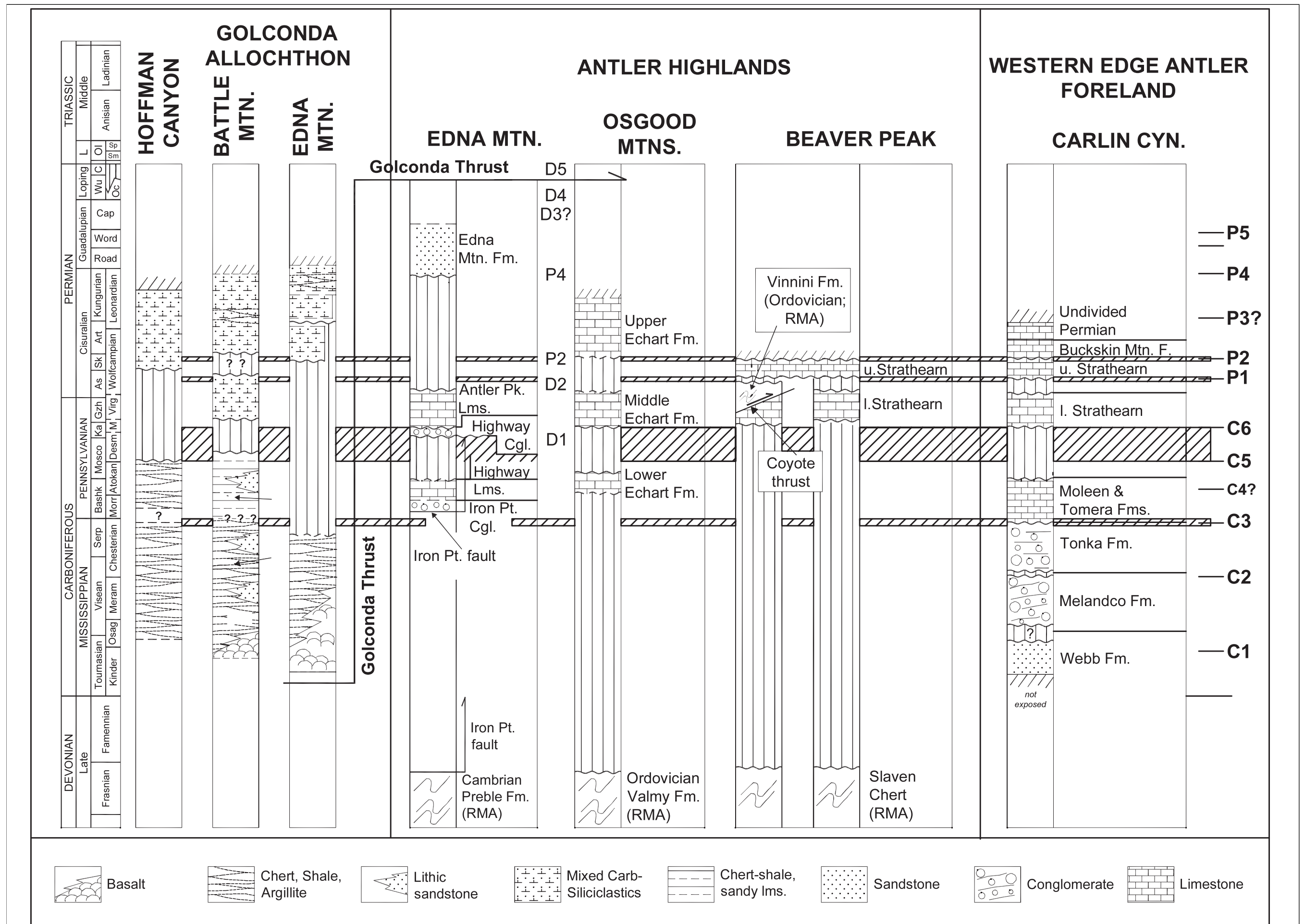
Caravaca et al., *Geol. Mag.*, 2018

…But their numerical analysis suggests that the complex variation of strength could make this work (FT is Farmington Terrane, thought to be Mesoproterozoic and weak (30km Te), other areas older and stiffer (90km Te)). Load edge is brown line and is constant within that boundary

Figure 13. (Colour online) Numerical model of the SFB after the reconstructed palaeogeography and terranes map (cf. Figs 11, 12) with an heterogeneous basement (‘strong’ v. ‘thermally attenuated weak’ lithospheres) and an heterogeneous allochthon (recessed area in central part of the front). (a) Simulated map of the SFB. Thin black lines indicate the position of the 2D profiles; red lines indicate limits of the basement terranes (cf. Fig 10d). (b) 2D W–E profile of the northern part of the SFB model. The narrow foredeep is emplaced upon the ‘thermally attenuated weak’ FT and is bordered by a well expressed forebulge. (c) 2D W–E profile of the southern part of the SFB model. The wider foredeep is emplaced upon the ‘strong’ MT, and is bordered by a barely expressed forebulge. (d) 2D S–N profile of the SFB model. The two northern and southern parts of the basin are individualized with a limit near the MT/FT boundary.

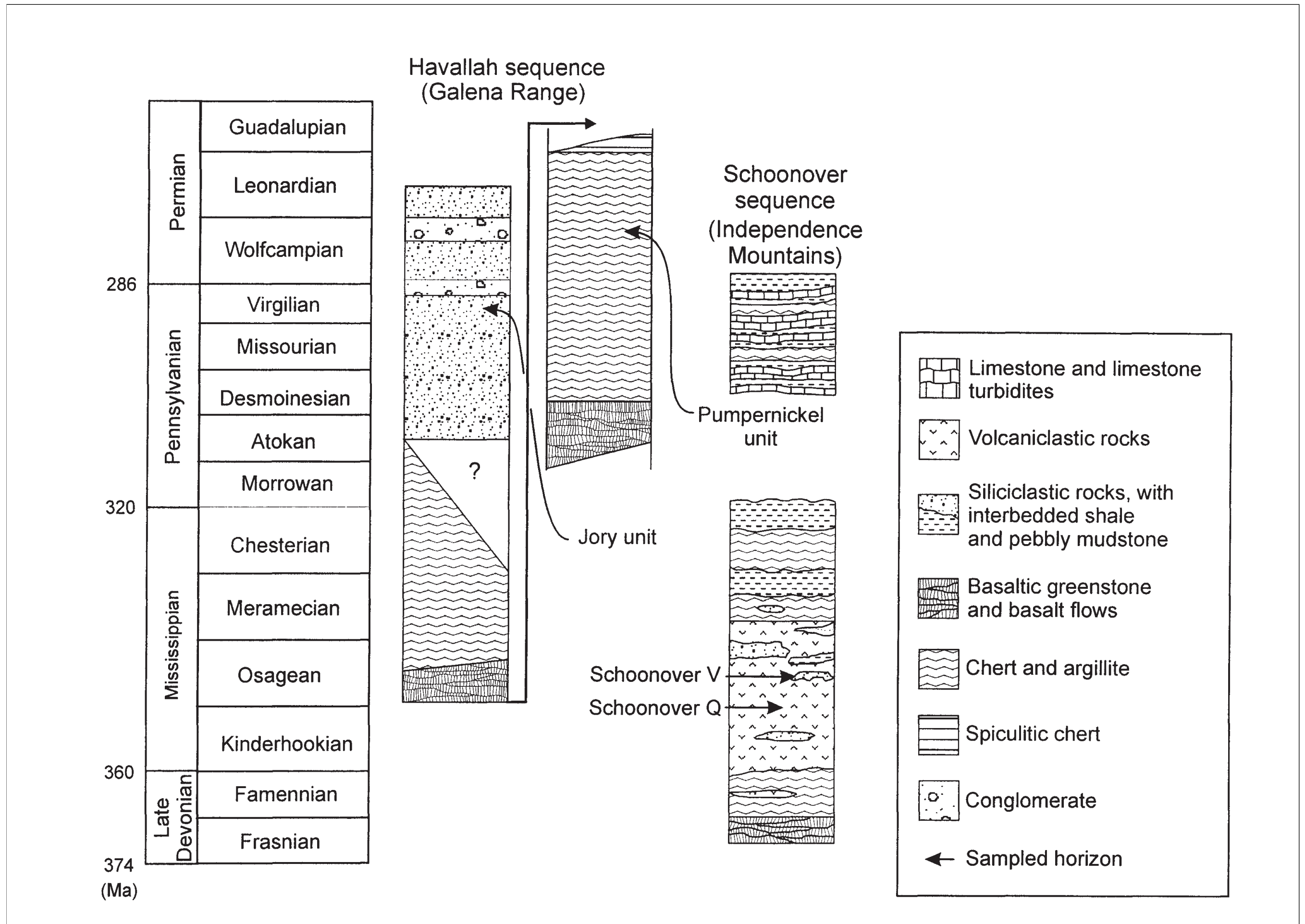


Gehrels and Dickinson, Am J Sci. 1995



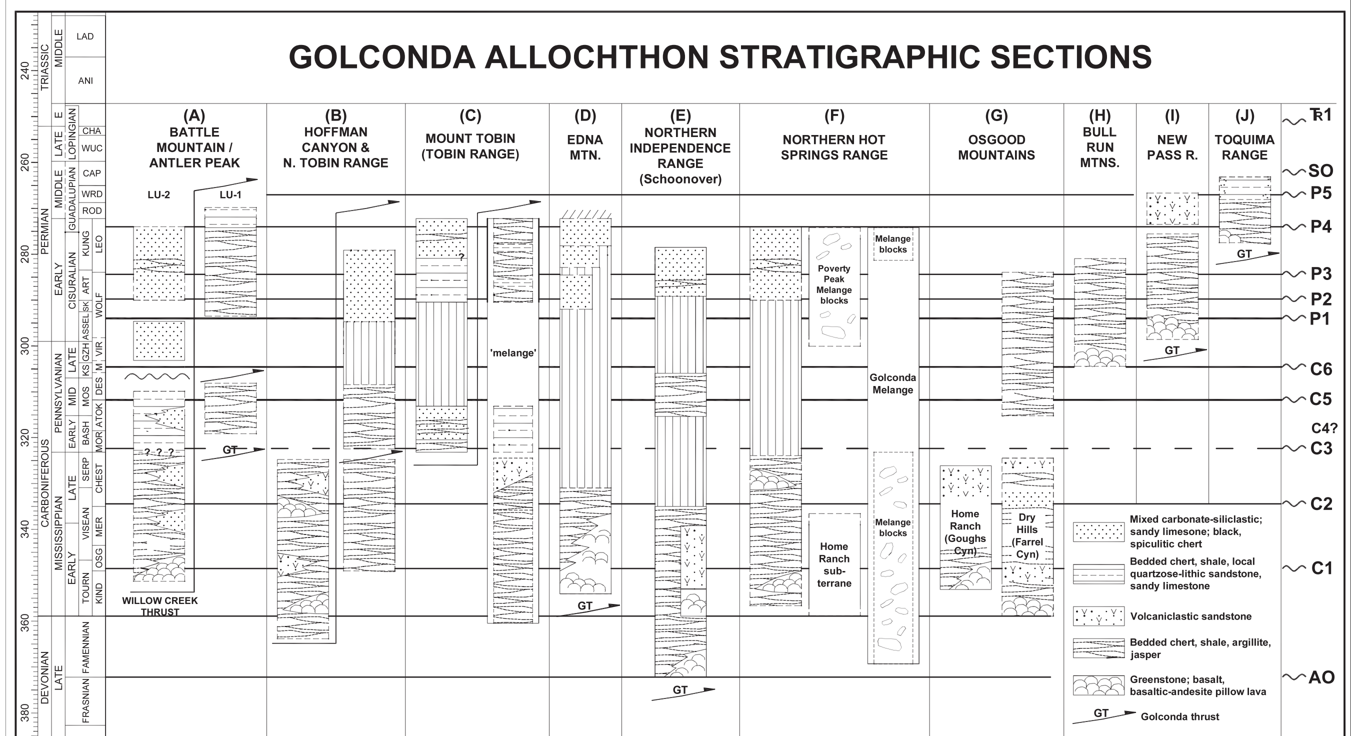
Snyder et al., SEPM vol. 113, 2022

Note C2 at right is main episode of Antler. Note too how frequent igneous rocks are, and of different ages.



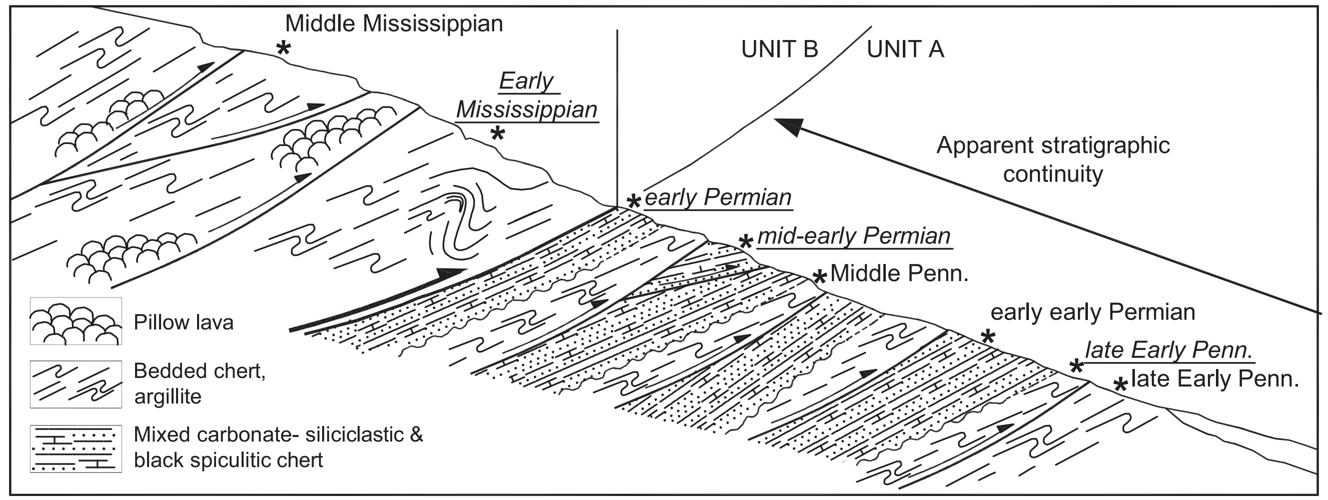
Riley et al., GSA SP 347, 2000

Both of these are Golconda allocthon sections. Independence Mtns in NE Nevada



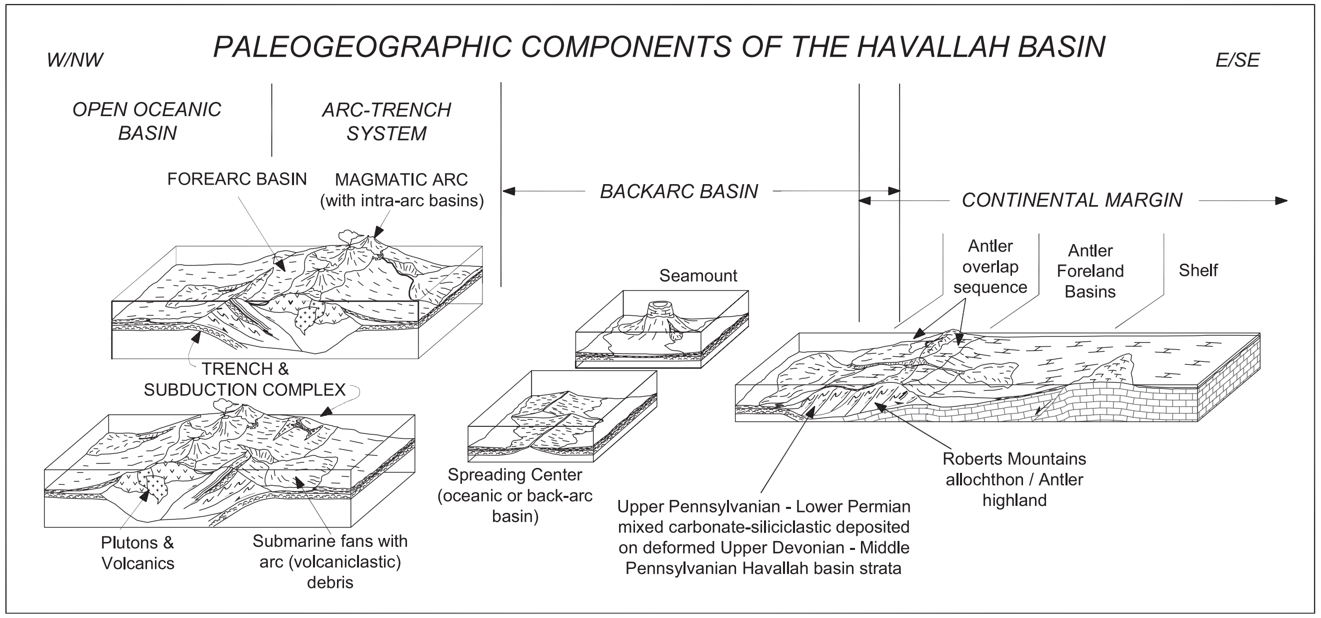
Snyder et al., SEPM vol. 113, 2022

Note C2 at right is main episode of Antler; C5 and C6 bound well dated thrusts in central NV. Note too how frequent igneous rocks are, and of different ages.



Snyder et al., SEPM vol. 113, 2022

Schematic of the complexities found in both Antler and Golconda allochthons.



Snyder et al., SEPM vol. 113, 2022

Note C2 at right is main episode of Antler. Note too how frequent igneous rocks are, and of different ages.

Timing: Devonian

- ARM: Shallow limestones
- Shelf: Carbonate shelf
- RMA: Slaven Chert
- Havallah Basin: initial deposits
- SE CA:
- Sonora alloc.: Los Pazos Frm (turbidites etc)

Timing: Early Mississippian

- ARM: Leadville ls
- Shelf: Initial RMA debris
- RMA: erosion and deformation
- Havallah Basin: basalts, cherts
- SE CA: NE-trending shelf-slope facies belts
- Sonora alloc.: Unconformity

Timing: Middle Mississippian

- ARM: Leadville ls
- Shelf: Foreland basin and unconformity
- RMA: erosion and deformation
- Havallah Basin: basalts, cherts
- SE CA: Shelf deposits (NE trending facies)
- Sonora alloc.: Unconformity; start of orogeny

Timing: Late Mississippian

- ARM: Subsidence Oquirrh basin; minimal elsewhere
- Shelf: Antler overlap clastics
- RMA: erosion (and deformation?)
- Havallah Basin: cherts (mainly, +volcaniclastics)
- SE CA: Shelf deposits
- Sonora alloc.: Unconformity; orogenic deposits

Timing: Early Pennsylvanian

- ARM: Molas Frm, then initial orogenic deposits
- Shelf: Ely ls
- RMA: erosion, limited deposition
- Havallah Basin: cherts, several unconformities
- SE CA: Shelf deposits (Bird Spring Frm)-disruption NE?
- Sonora alloc.: Orogenic deposits

Timing: Middle Pennsylvanian

- ARM: Ancestral Rockies orogeny
- Shelf: Folds and thrusts
- RMA: erosion, limited deposition, deformation
- Havallah Basin: cherts, several unconformities
- SE CA: Keeler Basin (NNW trends; truncation fault?)
- Sonora alloc.: Orogenic deposits

Timing: Late Pennsylvanian

- ARM: Ancestral Rockies orogeny fading
- Shelf: Folds and thrusts
- RMA: erosion, limited deposition, deformation
- Havallah Basin: cherts, several unconformities
- SE CA: Keeler Basin, erosion (truncation fault?)
- Sonora alloc.: Orogenic deposits

Timing: Early Permian

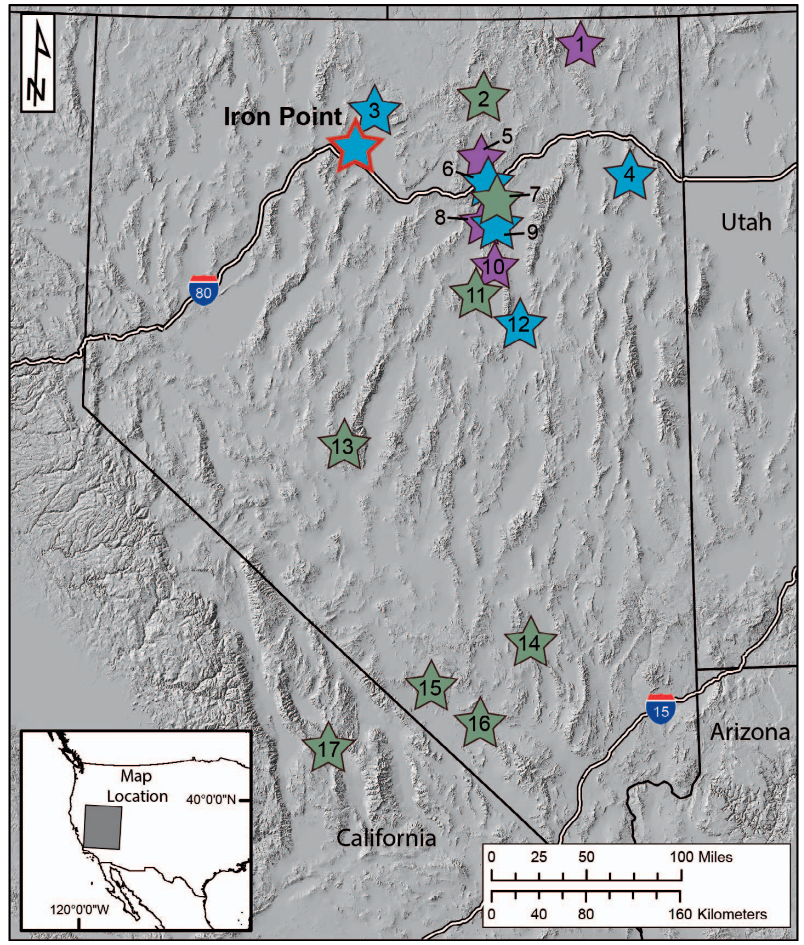
- ARM: Ancestral Rockies orogeny fading
- Shelf: Folds and thrusts
- RMA: limestones, unconformities
- Havallah Basin: cherts, several unconformities, deep ls
- SE CA: Darwin Basin, Last Chance thrust
- Sonora alloc.: Orogenic deposits

Timing: Middle Permian

- ARM: Ancestral Rockies orogeny fading
- Shelf: quieter
- RMA: limited deposition
- Havallah Basin: limited deposition (likely deformation)
- SE CA: Subsidence, initial arc magmatism
- Sonora alloc.: unconformity

Timing: Late Permian

- ARM: Ancestral Rockies sinking in sediment
- Shelf: quieter
- RMA: Deformation (Sonoman orogeny?)
- Havallah Basin: deformation, emplaced as Golconda A.
- SE CA: rebounding elevation, arc magmatism
- Sonora alloc.: unconformity



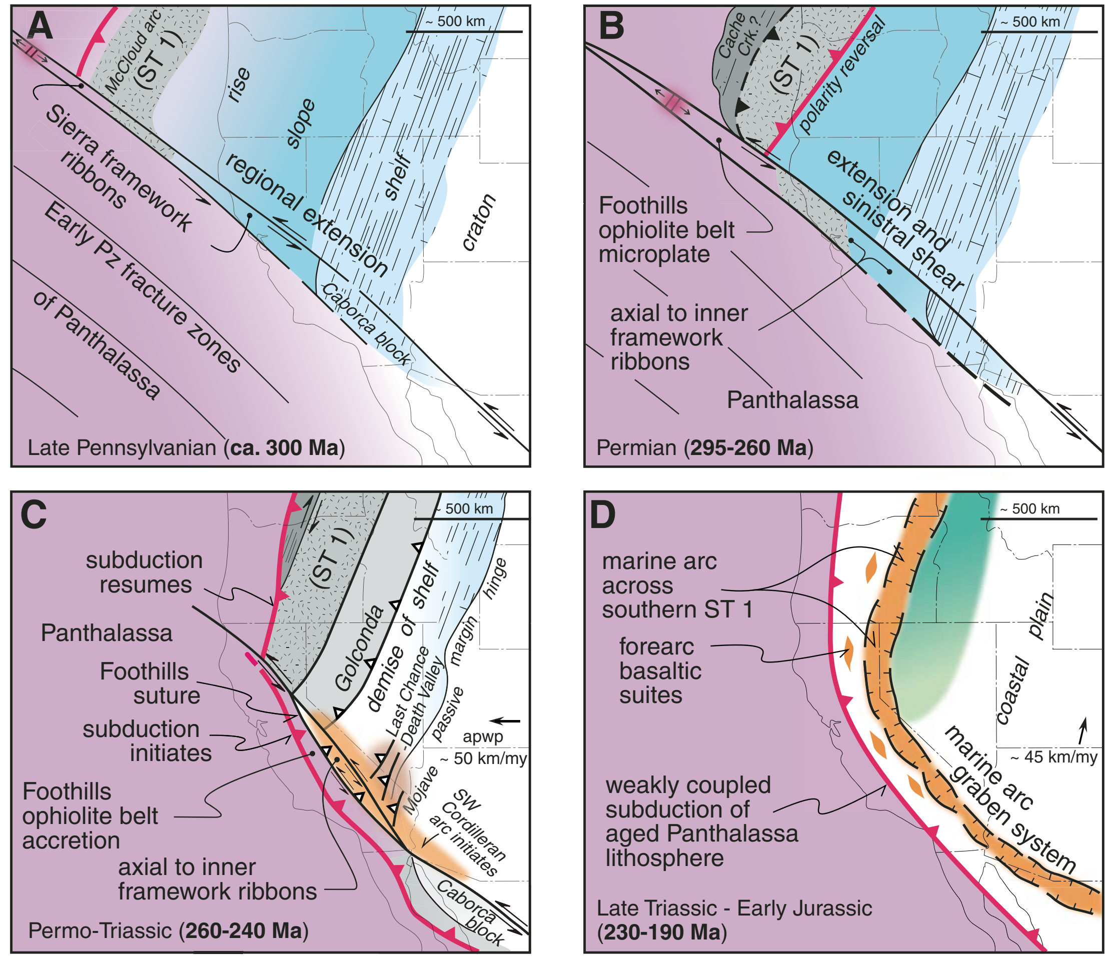
Purple: Mid-Mississippian

Blue: Mid-Pennsylvanian

Green: Early Permian

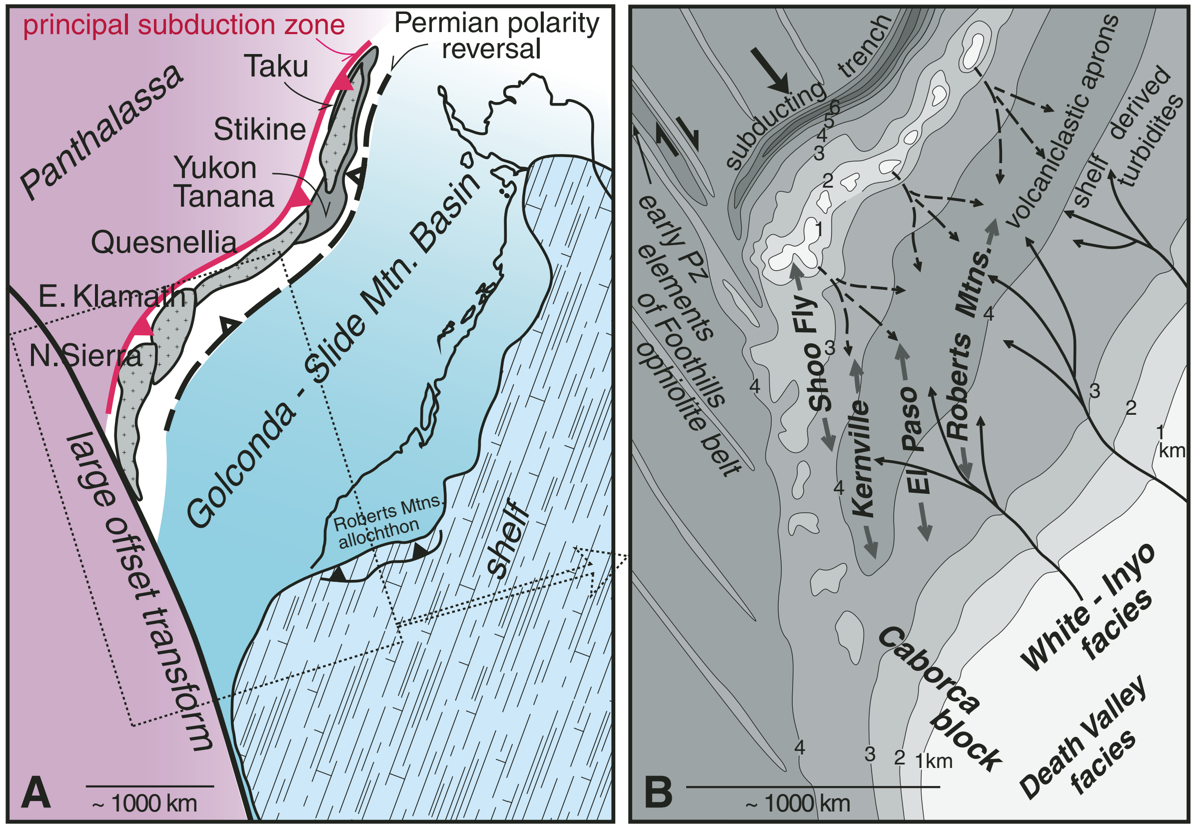
Key and Cashman, SEPM v 113, 2022

Suggesting deformation was north to south [but there was stuff in SE CA]



Saleeby & Dunne, GSA SP 513, 2015

Significance of Sonoman orogen: Seems to reflect the collapse of some marginal oceanic belt between Sierran–Klamath arc to west and Roberts Mtn stuff to east. But there seem to be issues at the early end of the spectrum…



Saleeby And Dunne, GSA SP 513, 2015