May 2013, GSA – Gunnison, CO

SE Utah Conglomerate indicates Uncompahgre Uplift was up and being unroofed during Medial Pennsylvanian (Desmoinesian)

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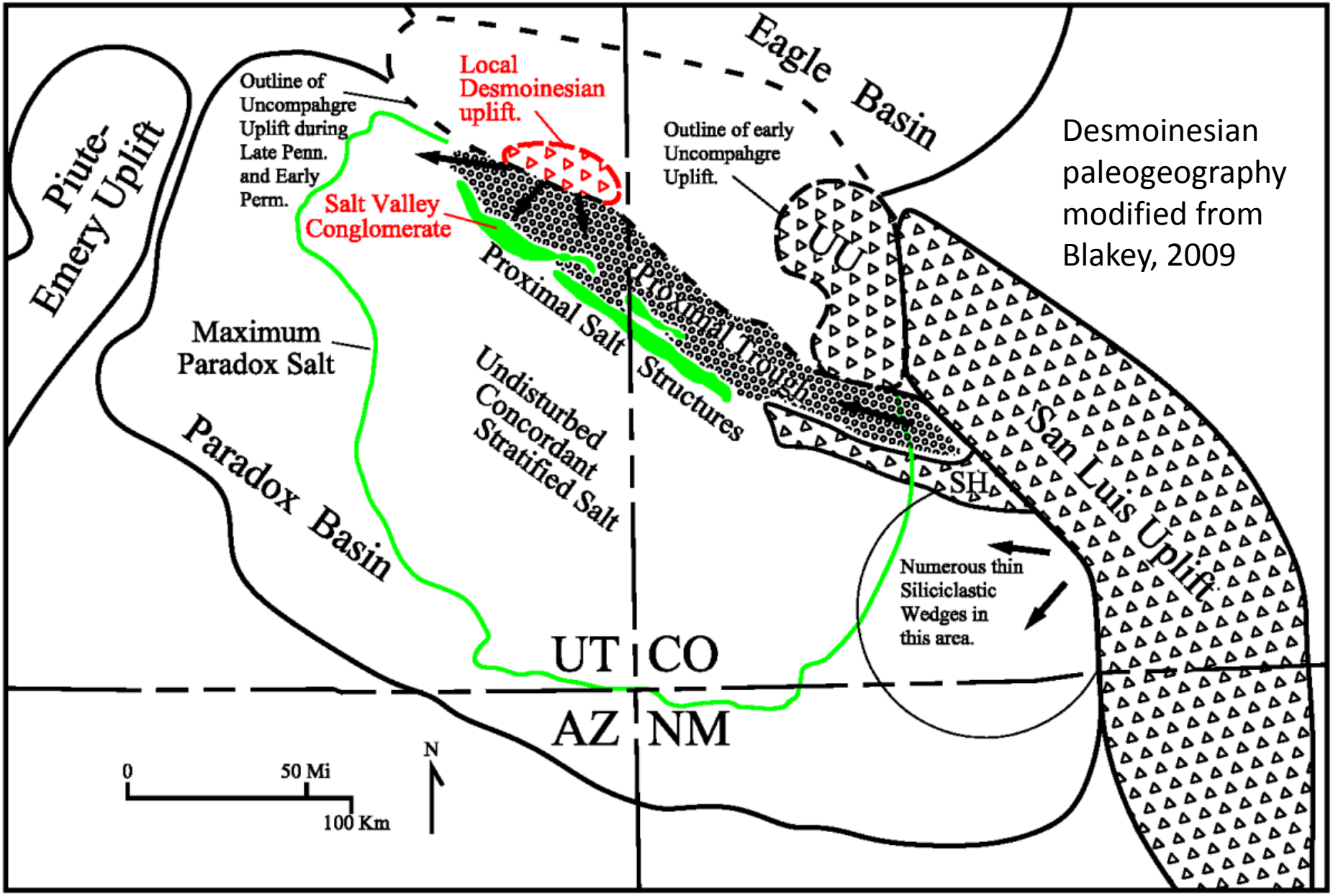


Desmoinesian paleogeography modified from Blakey, 2009

Location of Salt Valley Conglomerate relative to postulated local Desmoinesian uplift within trend of Uncompahgre Uplift

UNITED STATES DEPARTMENT OF THE INTERIOR
Harold L. Ickes, Secretary

GEOLOGICAL SURVEY
W. C. Mendenhall, Director

Bulletin 863

GEOLOGY OF THE SALT VALLEY ANTICLINE AND ADJACENT AREAS GRAND COUNTY, UTAH

BY

C. H. DANE

1935

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1935

Field work done in 1920s

First paper to describe the Pennsylvanian conglomerates in Salt Valley

CARBONIFEROUS SYSTEM

PENNSYLVANIAN (?) SERIES

UNNAMED CONGLOMERATE

A conglomerate containing boulders of limestone and chert as much as 15 inches in diameter embedded in an indurated yellow sandstone matrix is exposed in two isolated areas in Salt Valley—one in sec. 15 and the other in secs. 9 and 10, T. 23 S., R. 20 E. The stratigraphic relations of the conglomerate have not been ascertained, owing to complicated structure and poor exposures. The boulders of the conglomerate contain fossils, all of which are regarded by G. H. Girty as either Mississippian or longer-ranging species that could be Mississippian. The list of forms identified from the first collections is given in another paper[18] but is summarized here for completeness.

Triplophyllum, one or more species.
Fenestella, several species
Schuchertella aff. S. chemungensis
Schuchertella sp.
Productella aff. P. concentrica
Productus ovatus
Productus aff. P. ferngleneensis
Rhipidomella aff. R. pulchella
Schizophoria sedaliensis?
Schizophoria sp.
Camarophoria bisinuata?
Camarotoechia aff. C. metallica
Camarotoechia sp.
Spiriferina solidirostris
Spiriferina sp.
Delthyris novamexicana?
Spirifer centronatus
Spirifer aff. S. centronatus
Spirifer sp.
Pseudosyrinx aff. P. keokuk
Cliothyridina? sp.
Composita humilis?
Composita? sp.

A collection made subsequently by E. T. McKnight contains the following species:

Triplophyllum sp.
Fenestella, several species
Schuchertella? sp.
Chonetes loganensis
Productus aff. P. burlingtonensis
Camarotoechia metallica
Aviculipecten sp.
Naticopsis sp.
Phillipsia sp.
Bairdia? sp.

These identifications were made by G. H. Girty, who says:

This collection, like the collections made at the same locality last year, is rather certainly of Mississippian age, probably Madison.

[18] Baker, A. A., Dobbin, C. E., McKnight, E. T., and Reeside, J. B., Jr., Notes on the stratigraphy of the Moab region, Utah: Am. Assoc. Petroleum Geologists Bull., vol. 11, no. 8, pp. 789–790, 1927.

Boulders are up to 30 inches across

"complicated structure" – ***strata are locally vertical and recumbent***

Limestone boulders have Mississippian fossils

Girty –
Age of fossils --
"probably Madison"
= Leadville Fm

The occurrence in the boulders of the conglomerate of fossils of Mississippian age proves only the post-Mississippian age of the rock, but the abundance of fossil-bearing boulders, the absence of boulders definitely identifiable as belonging to later rocks, and the fact that no comparable conglomerate has been discovered elsewhere in any formation cropping out in the region point together to an early age for the conglomerate. As Pennsylvanian rocks are abundantly exposed in the region, the conglomerate is presumably of early Pennsylvanian age, a conclusion a priori probable from its physical constitution and somewhat reinforced by the existence of the thin Molas formation in the San Juan Mountain region of Colorado.[19] The Molas contains conglomerate beds, the boulders of which carry Mississippian fossils, and a scanty invertebrate fauna has been found in it that indicates its Pennsylvanian age and has some points of similarity with the more abundant fauna found in the overlying Hermosa formation. The Molas rests upon an erosional unconformity cut on the underlying Leadville limestone, which is of lower Mississippian age and correlated with the Madison limestone. The outcrops in the San Juan Mountains are the nearest present-day outcrops from which the lower Mississippian boulders in the conglomerate in Salt Valley could have been derived, but the probability appears strong that the lower Mississippian limestone underlies a much wider area than its existing exposures would indicate and that the boulders were derived from some source exposed nearby at the time of deposition. As the Molas formation is only 40 to 50 feet thick, and there seems no reason to suppose a great thickness for a basal Pennsylvanian conglomerate, it appears possible that Mississippian limestone may exist at no great depth beneath the surface exposure of the conglomerate. However, the structural relations in the vicinity of the exposures are so complex that this must be regarded only as a possibility. This possibility, however, might appropriately be investigated by core drilling by any company interested in exploiting the possible oil resources of the region, the drilling to be regarded only as an attempt to obtain information on the lower part of the stratigraphic succession—information which might be of practical value in subsequent deep drilling elsewhere and would surely be of scientific interest.

"no comparable conglomerate has been discovered elsewhere in region" - **still true today**

"Molas Fm contains conglomerate beds" –

but,

Molas conglomerates are 130 miles SE in SW Colorado

"the boulders were derived from some source exposed nearby" –

closest logical source is 15 miles NE at the Uncompahgre Uplift

LATE PALEOZOIC AND EARLY MESOZOIC STRUCTURAL HISTORY OF THE UNCOMPAHGRE FRONT[1]

By
DONALD P. ELSTON and EUGENE M. SHOEMAKER
U. S. Geological Survey, Denver, Colorado
U. S. Geological Survey, Menlo Park, California

1960

This 1960 paper assigns conglomerates
in Salt Valley to the Permian Cutler Fm;
second paper in 1960 by authors says the same

We were unable to find any later reference since 1960s
which re-describes the conglomerates
or suggests an age other than Permian.
Let us know if there was a new study!

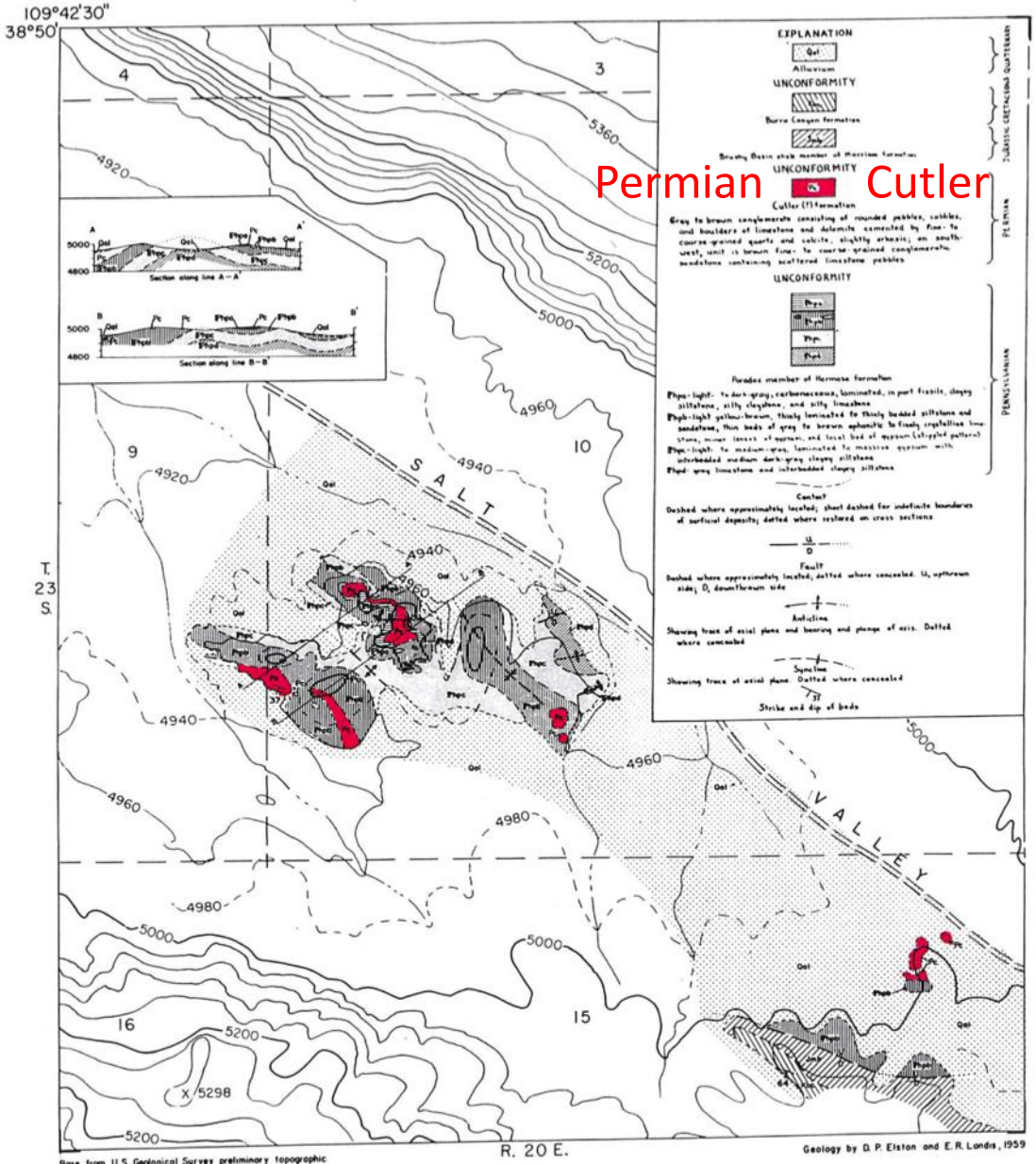
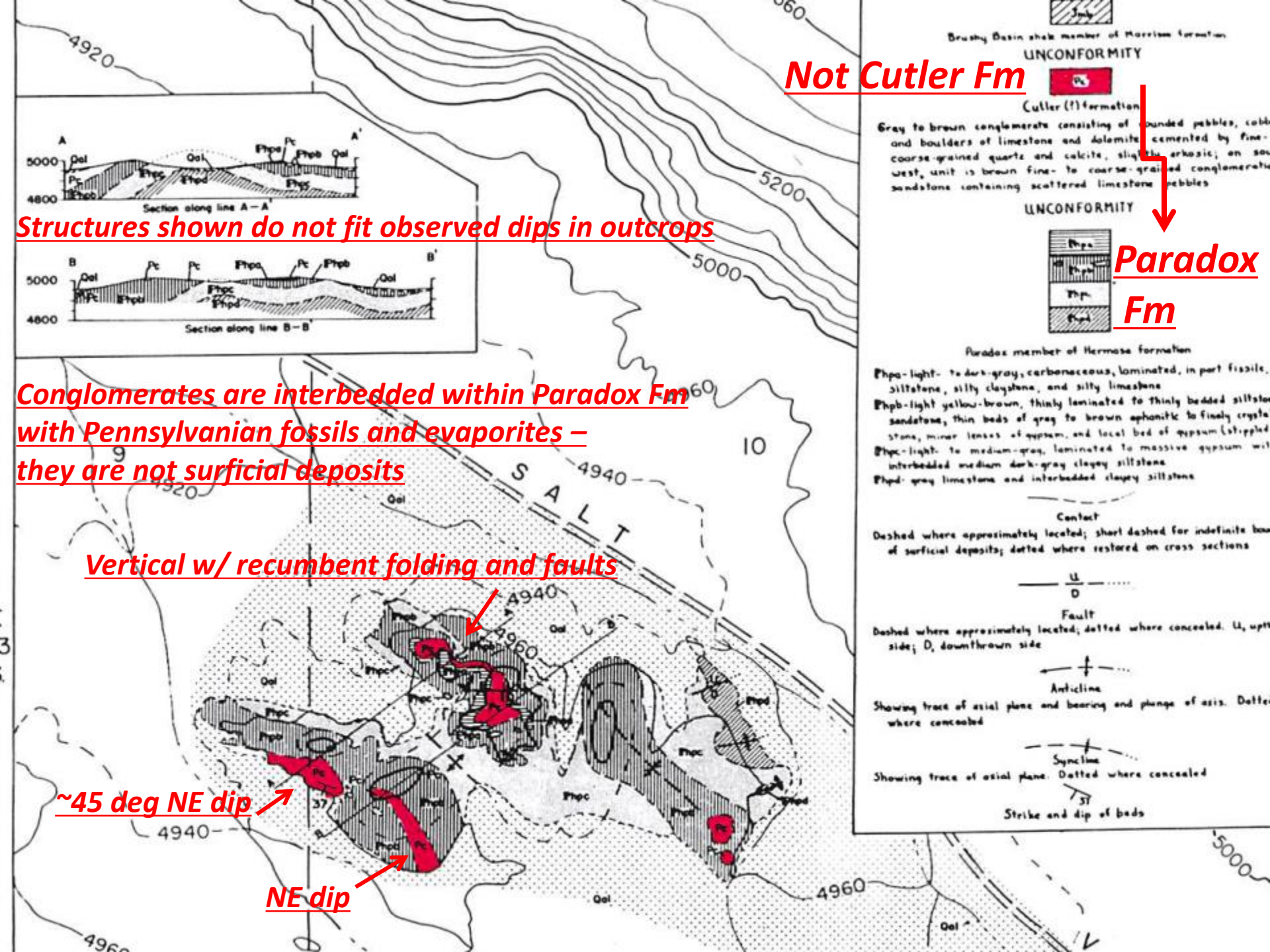


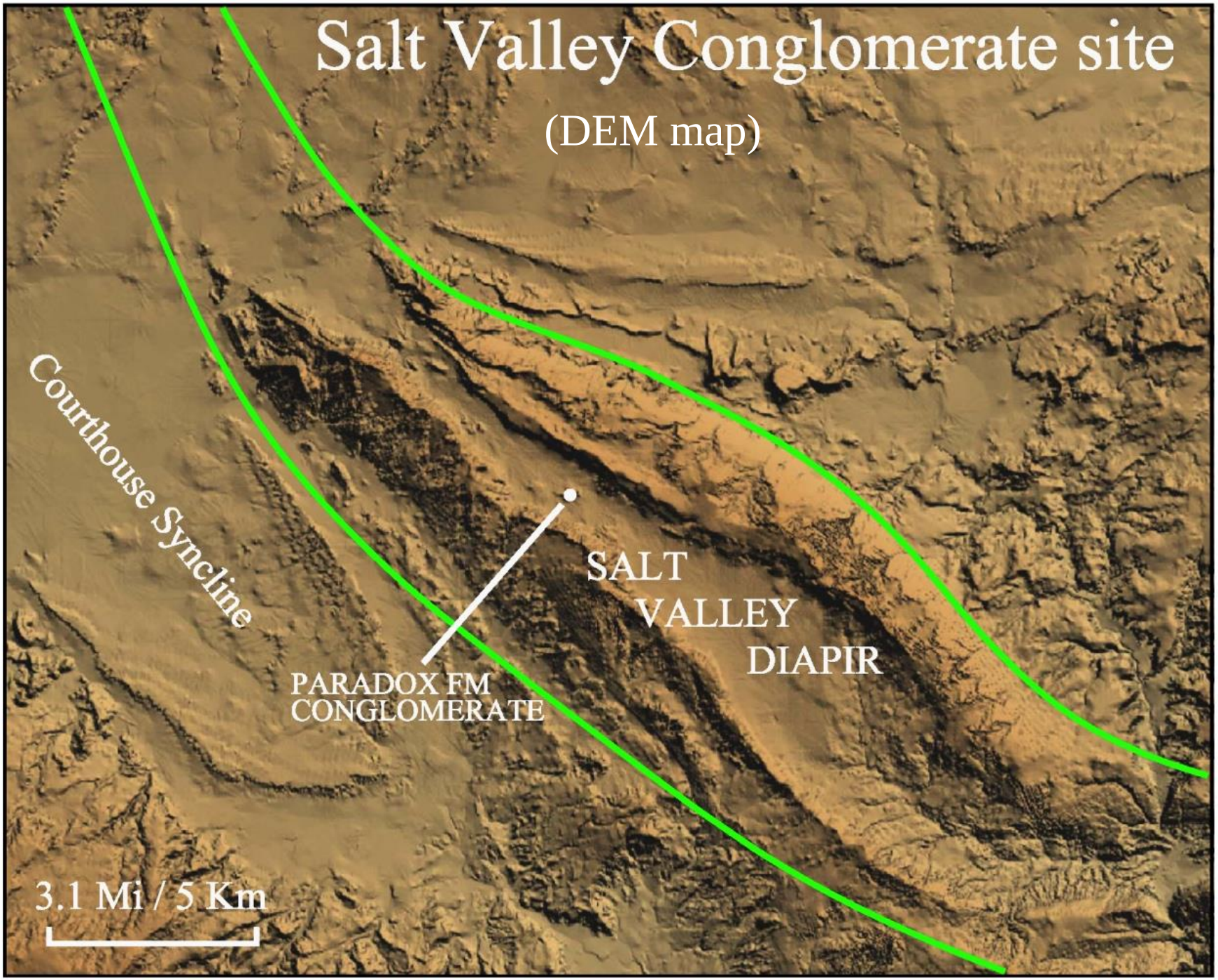
Figure 3—Geologic map of part of Salt Valley, Grand County, Utah

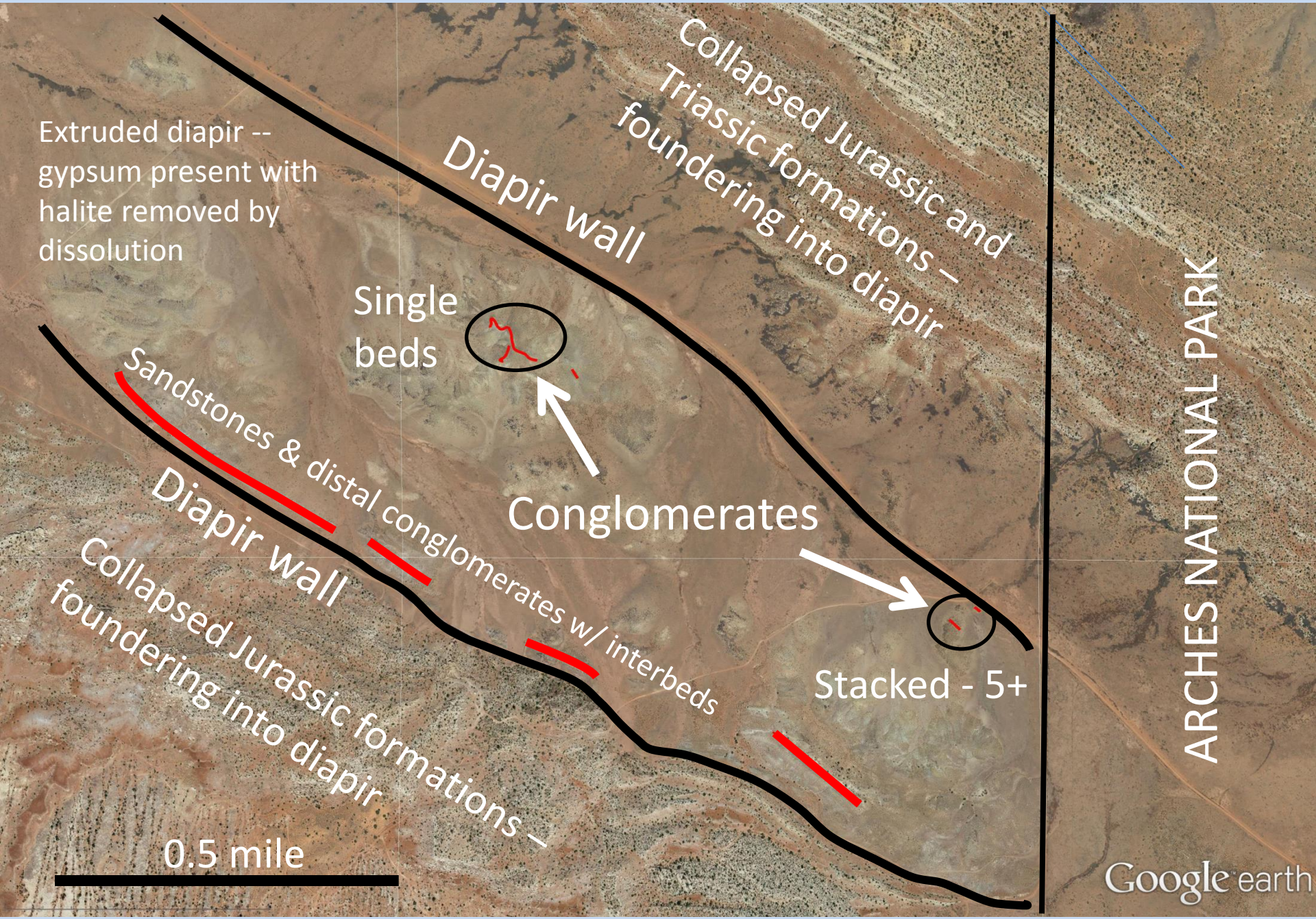
1960 map

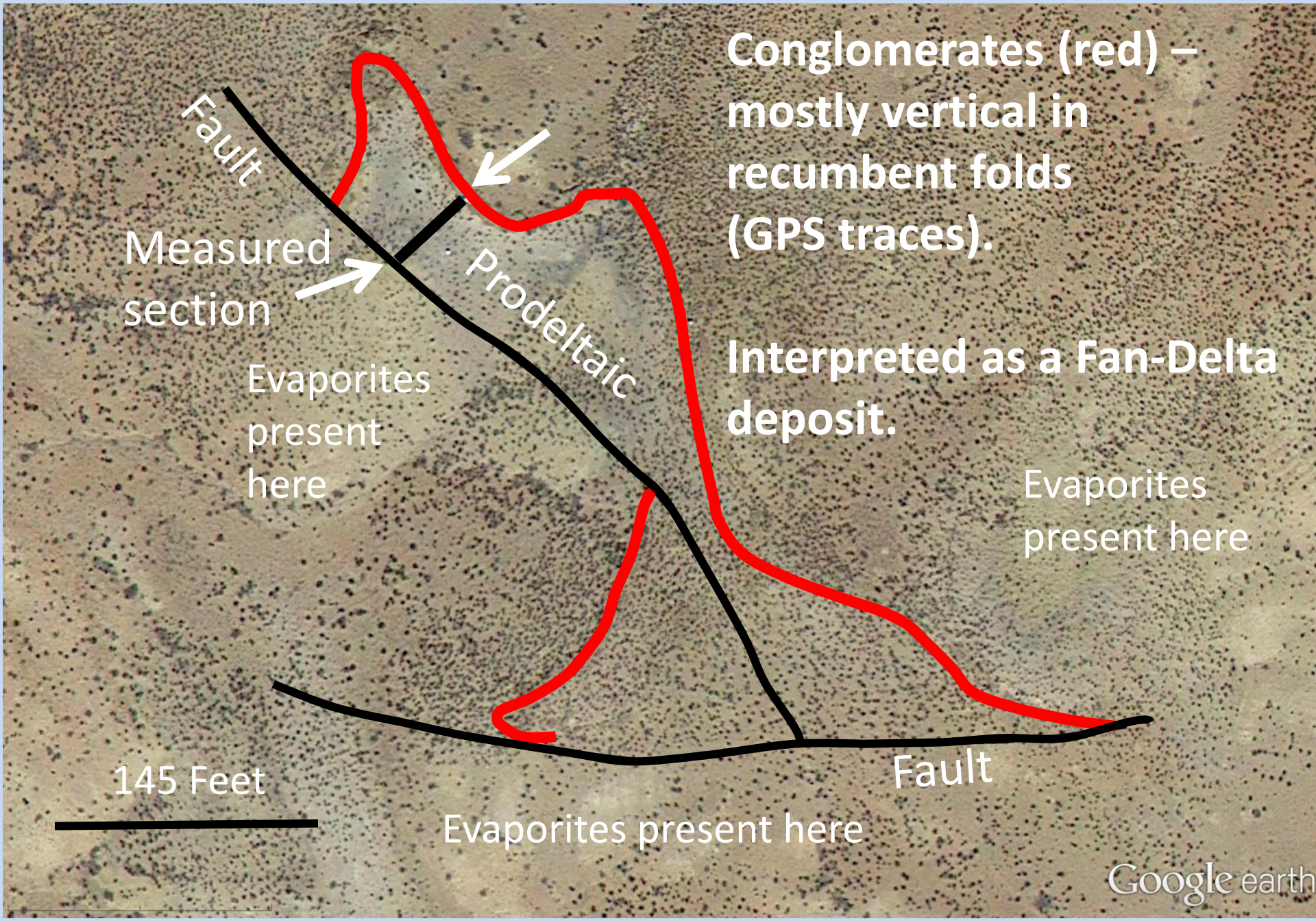
Red = Cong.

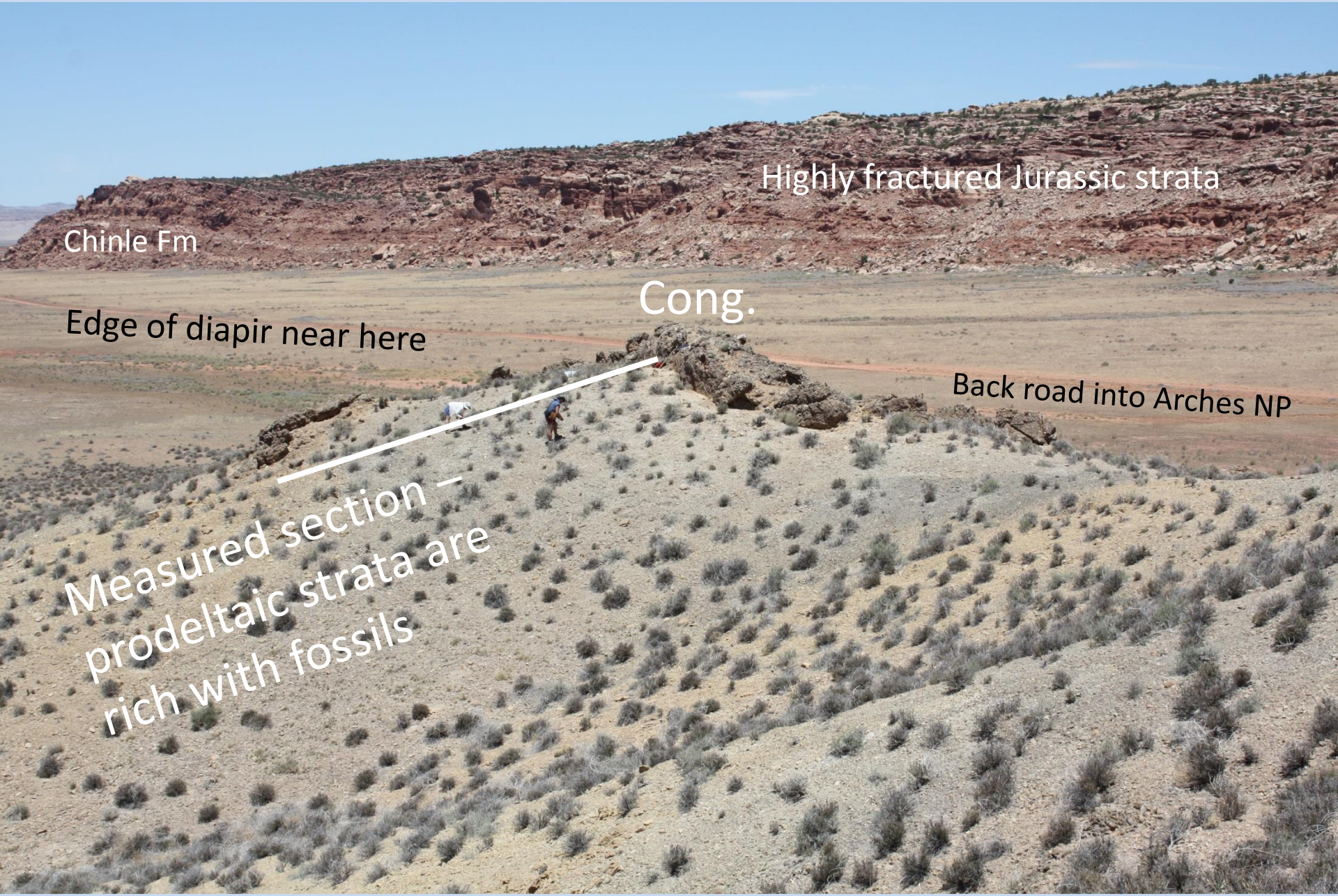
Assigned to Cutler


Not Cutler Fm
Paradox Fm
Structures shown do not fit observed dips in outcrops
Conglomerates are interbedded within Paradox Fm with Pennsylvanian fossils and evaporites – they are not surficial deposits
Vertical w/ recumbent folding and faults
~45 deg NE dip
NE dip
SALT
UNCONFORMITY
Cutler (?) formation
Paradox member of Hermosa formation
Contact
Fault
Anticline
Syncline
Strike and dip of beds
Section along line A – A'
Section along line B – B'
4920
4940
4960
5000
5200


Salt Valley Conglomerate site
(DEM map)
Courthouse Syncline
SALT
VALLEY
DIAPIR
PARADOX FM
CONGLOMERATE
3.1 Mi / 5 Km


Extruded diapir -- gypsum present with halite removed by dissolution
Diapir wall
Collapsed Jurassic and Triassic formations – foundering into diapir
Single beds
Conglomerates
Sandstones & distal conglomerates w/ interbeds
Diapir wall
Collapsed Jurassic formations – foundering into diapir
Stacked - 5+
ARCHES NATIONAL PARK
0.5 mile
Google earth

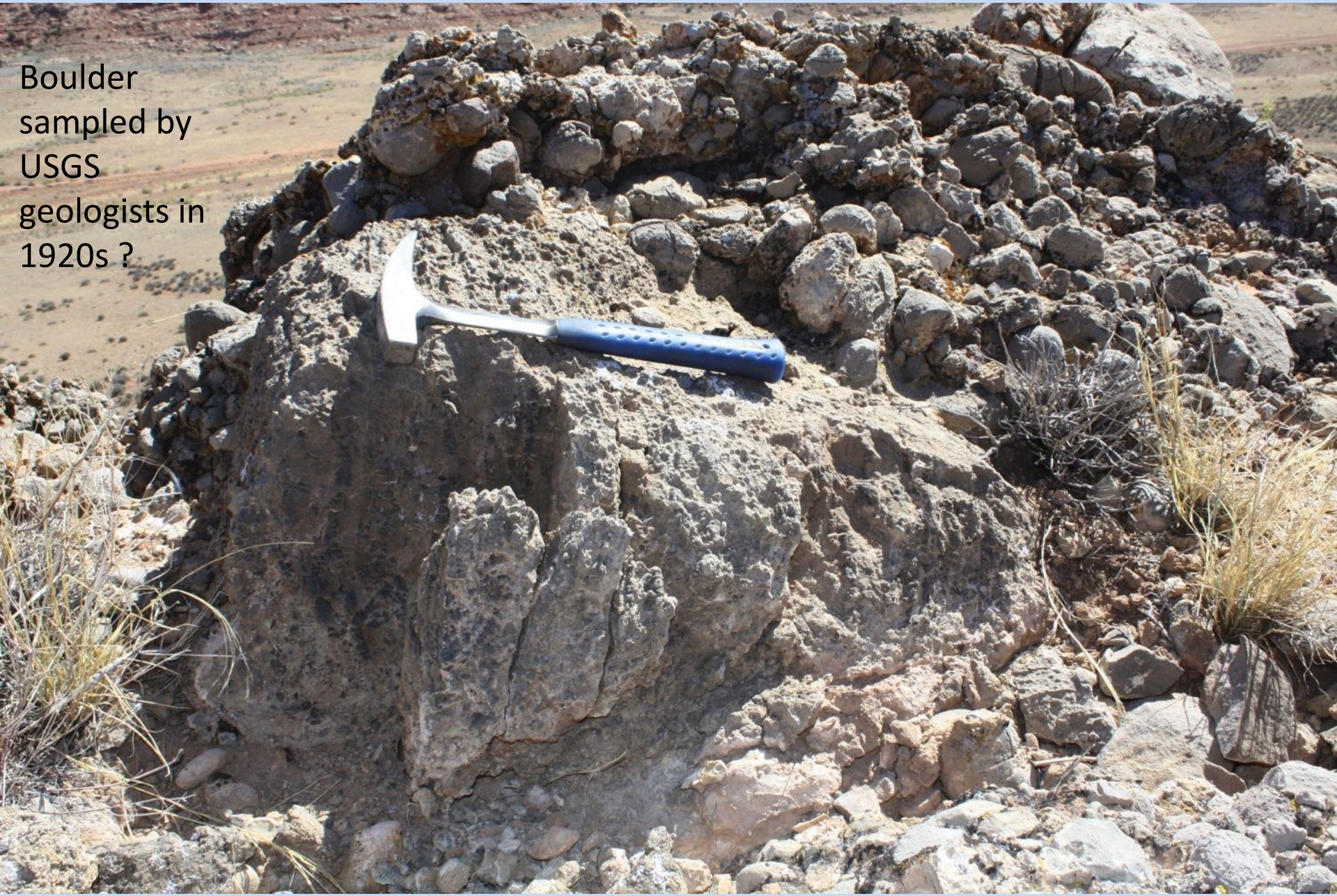

Conglomerates (red) – mostly vertical in recumbent folds (GPS traces).
Interpreted as a Fan-Delta deposit.
Fault
Measured section
Prodeltaic
Evaporites present here
Evaporites present here
Fault
145 Feet
Evaporites present here
Google earth



Vertical folded conglomerate within Salt Valley Diapir – looking north


CONGLOMERATE:
Predominantly limestone clasts.
Igneous and metamorphic clasts and arkose absent, but there are a few mica flakes.

Chert cobble tightly cemented within limestone conglomerate



Very large boulder with Mississippian invertebrate macrofossils

Limestone boulder with abundant microfossil debris

Crinoid debris within large limestone boulder

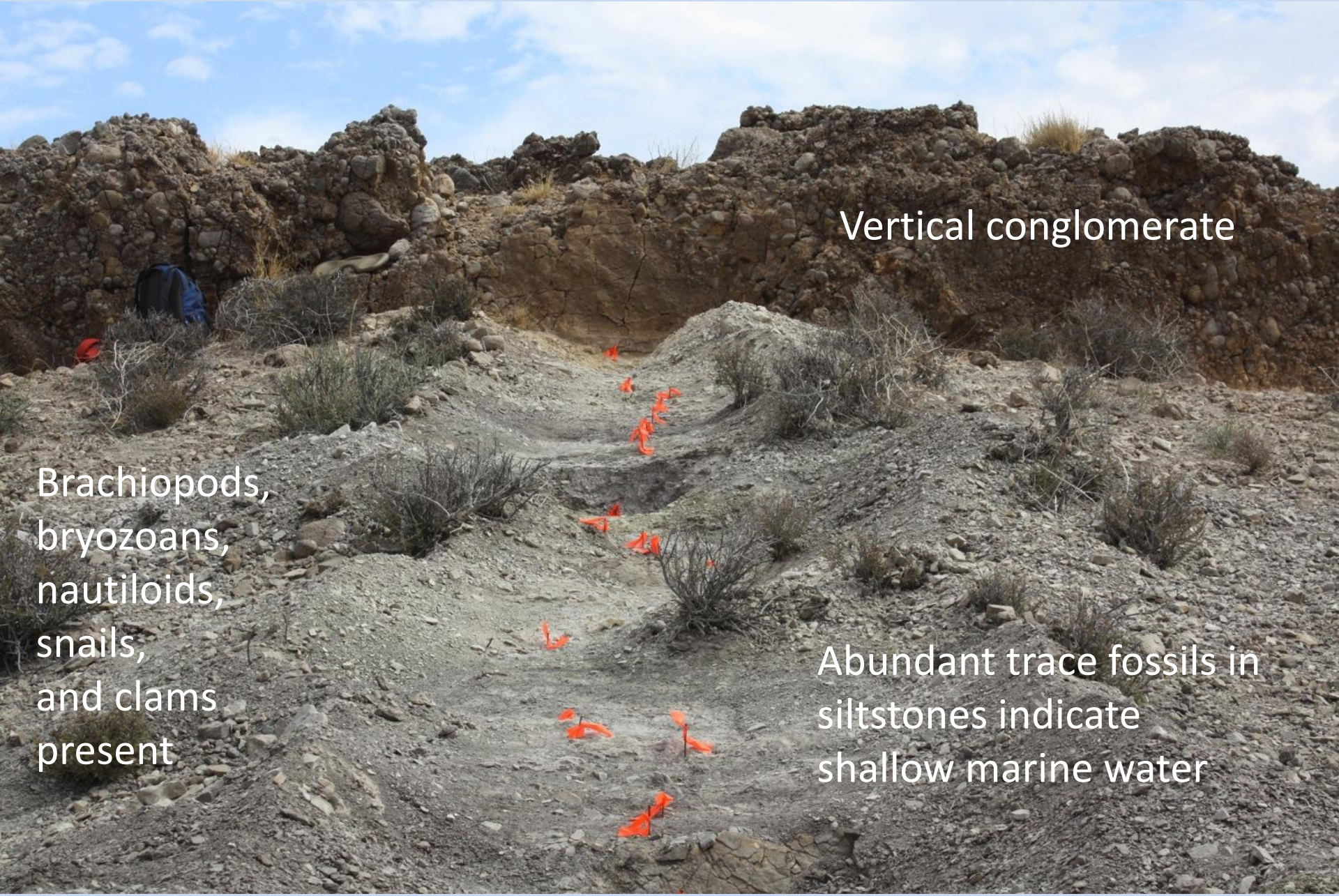
Flute casts at base of vertical conglomerate

Post-depositional fractures in boulders within vertical conglomerate

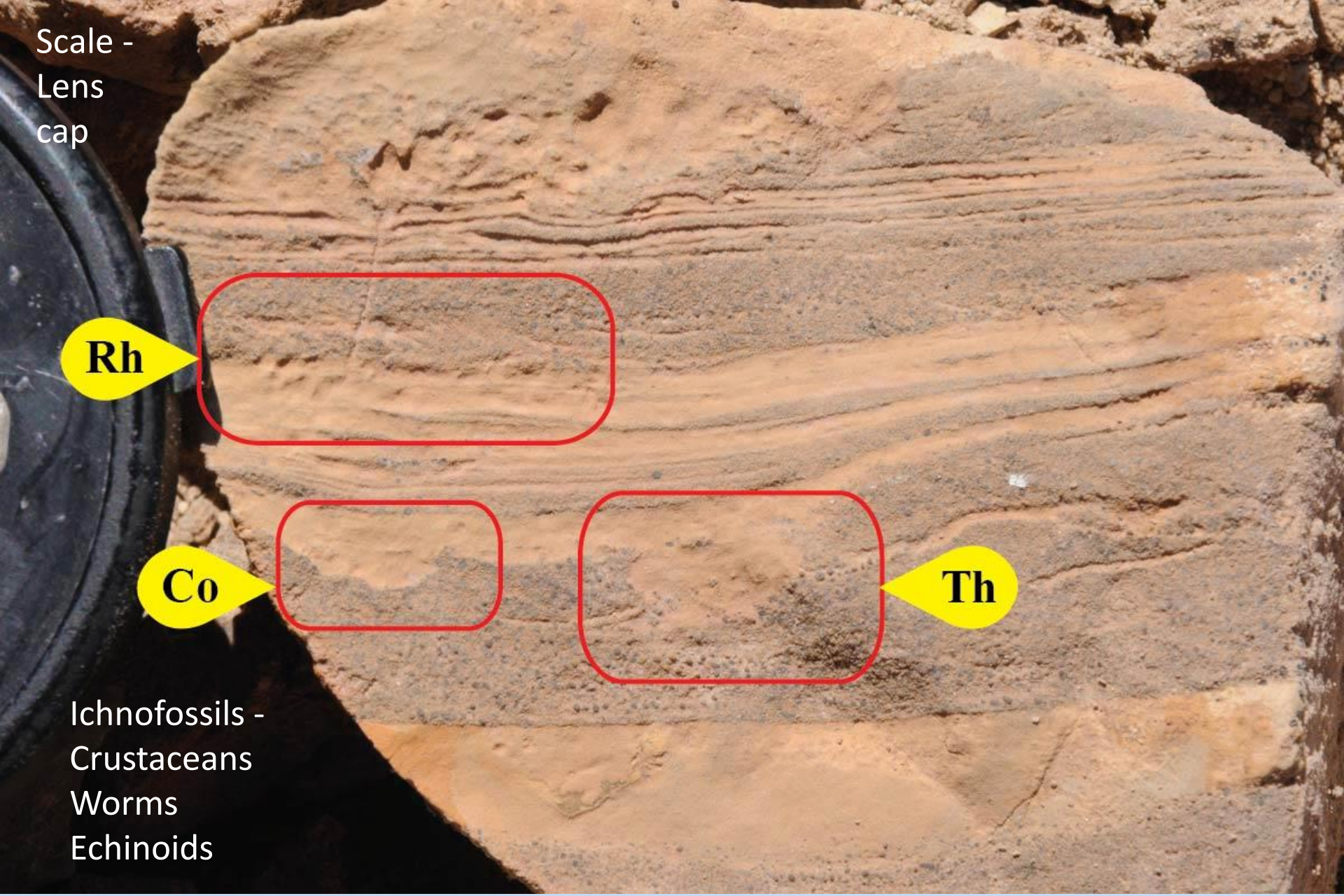
Conglomerate bed at stacked conglomerates – 0.85 mi SE of section

Distal conglomerates (not arkosic) 0.4 mi SW of main conglomerate site

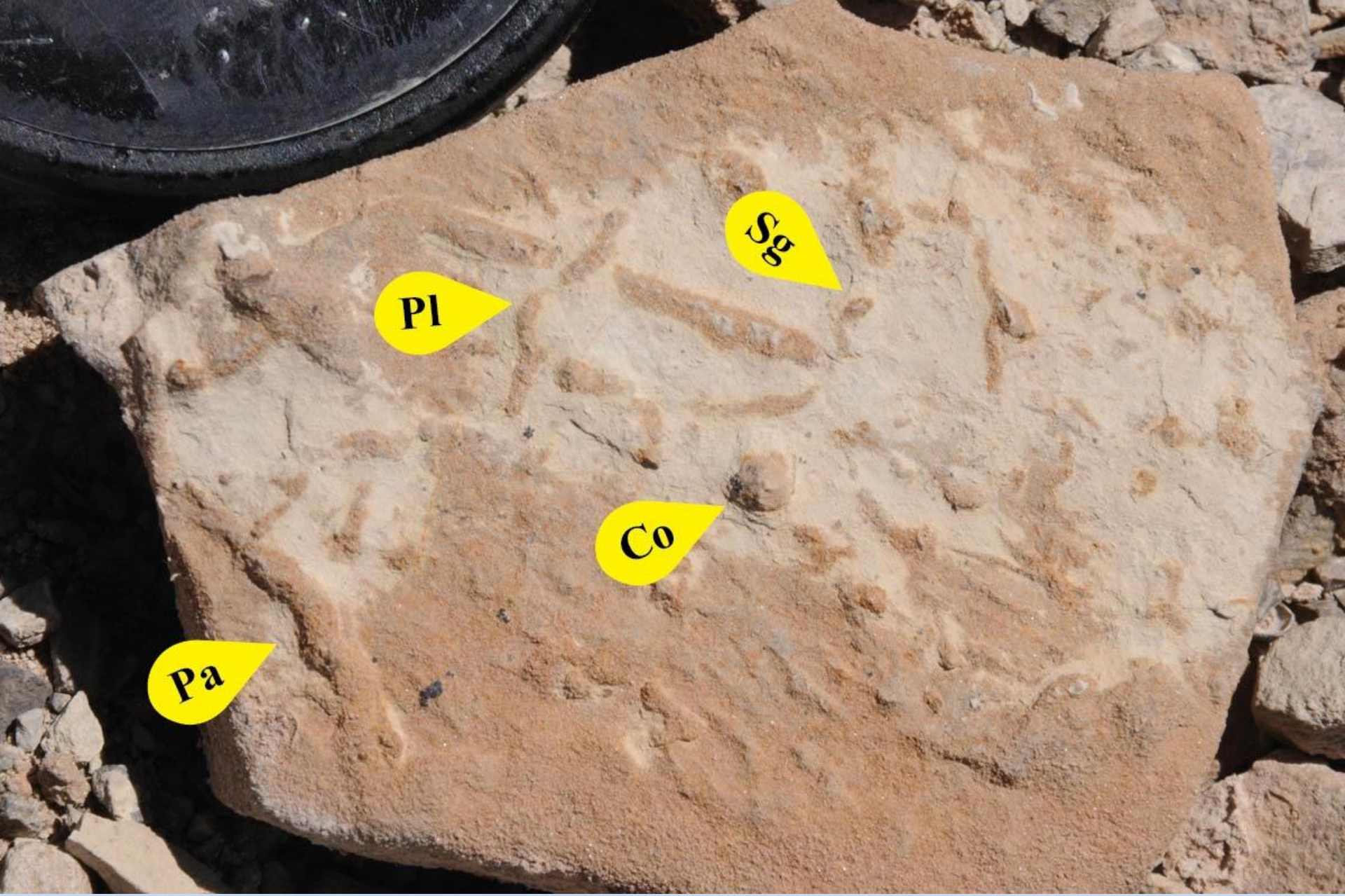
Skolithos in sandstone interbedded with distal conglomerates



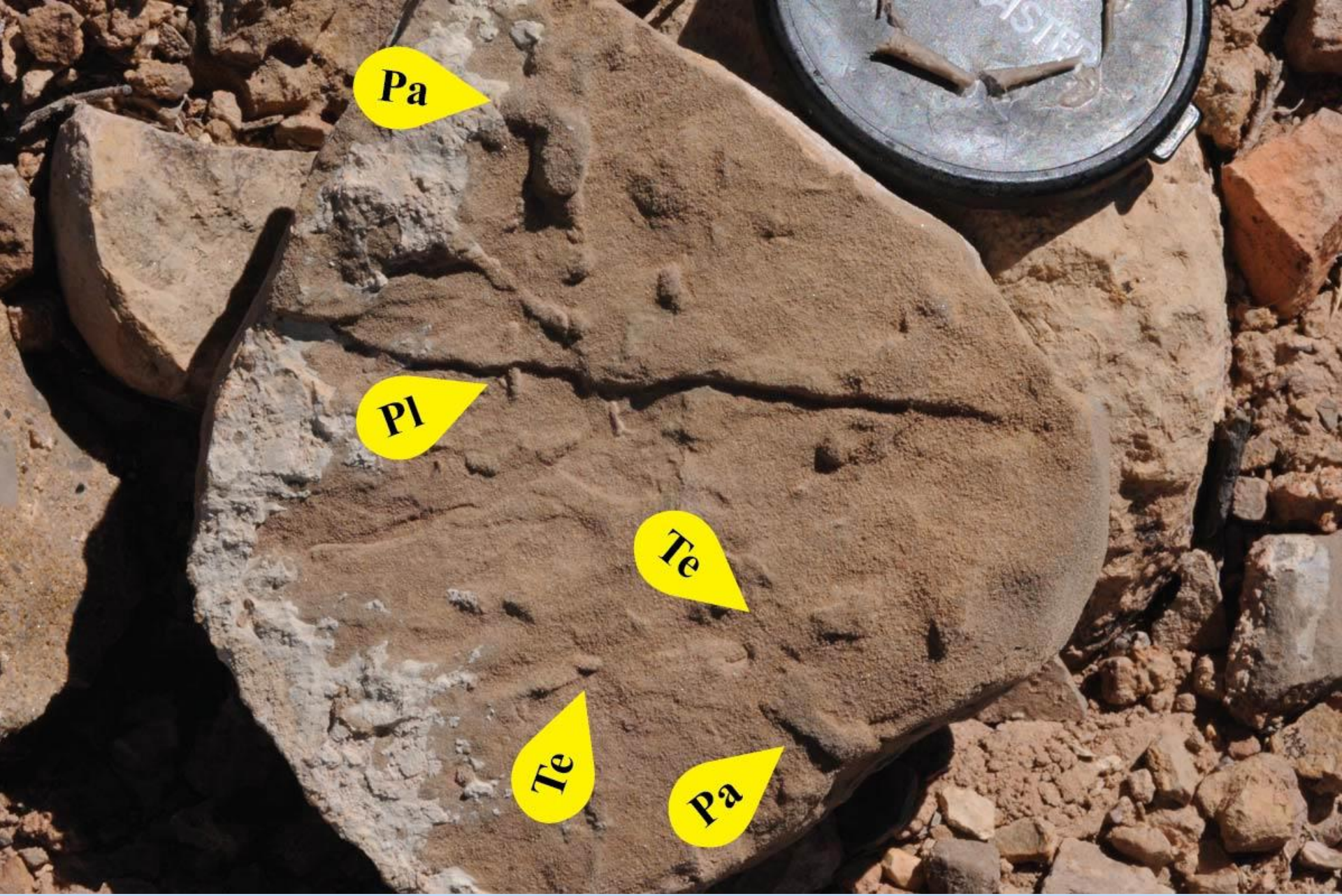
Vertical prodeltaic strata below conglomerate in measured section



Ichnofossils in prodeltaic sandstone & siltstone:
Rh= *Rhizocorallium*; Co= *Conichnus*; Th= *Thalassinoides*



Ichnofossils in prodeltaic siltstone:
Pl= *Planolites*; Sg= *Sagittichnus*; Pa= *Palaeophycus*; Co= *Conichnus*

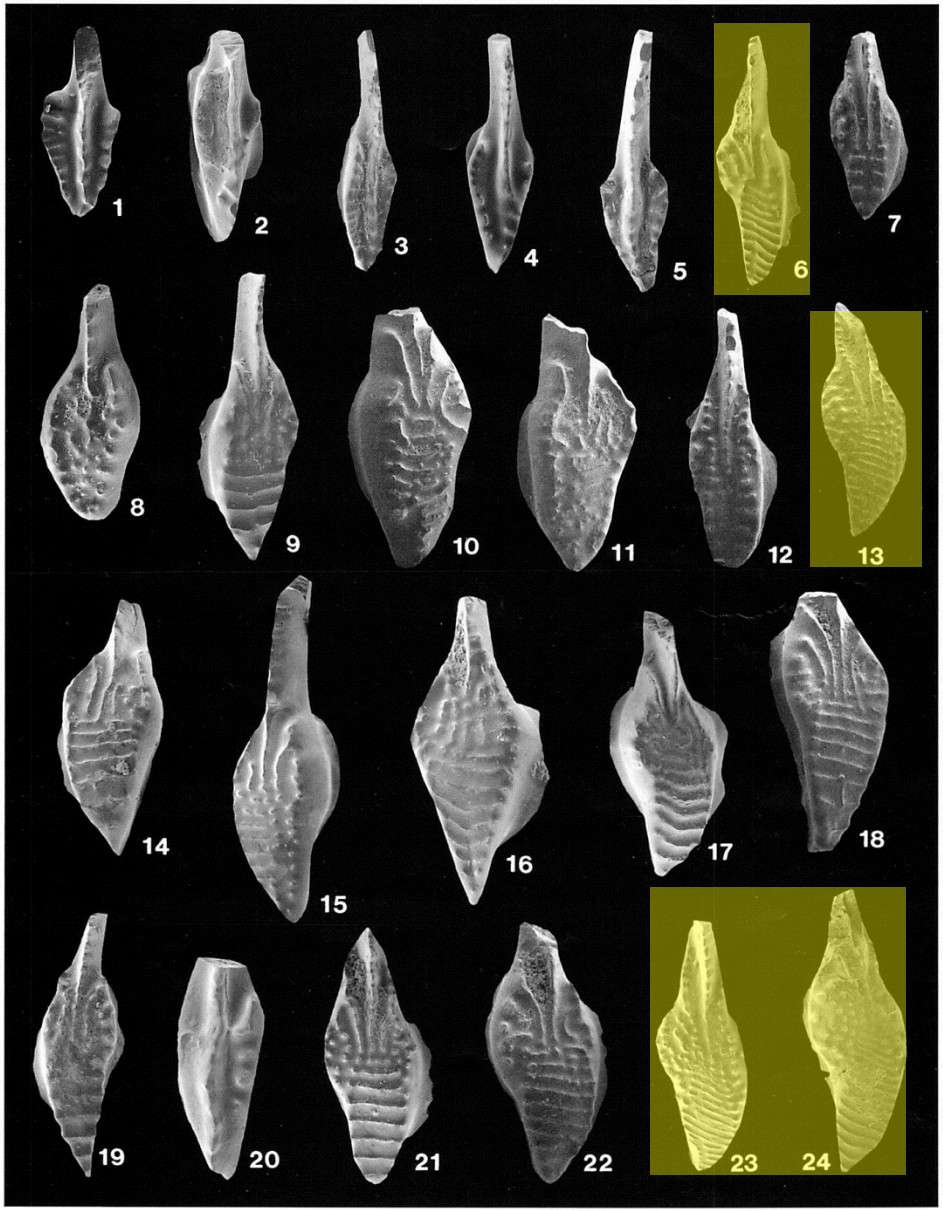


Ichnofossils in prodeltaic siltstone:
Pa= *Palaeophycus*; Pl= *Planolites*; Te= *Treptichnus*

Ichnofossils in prodeltaic siltstone.
Ch= *Chondrites*

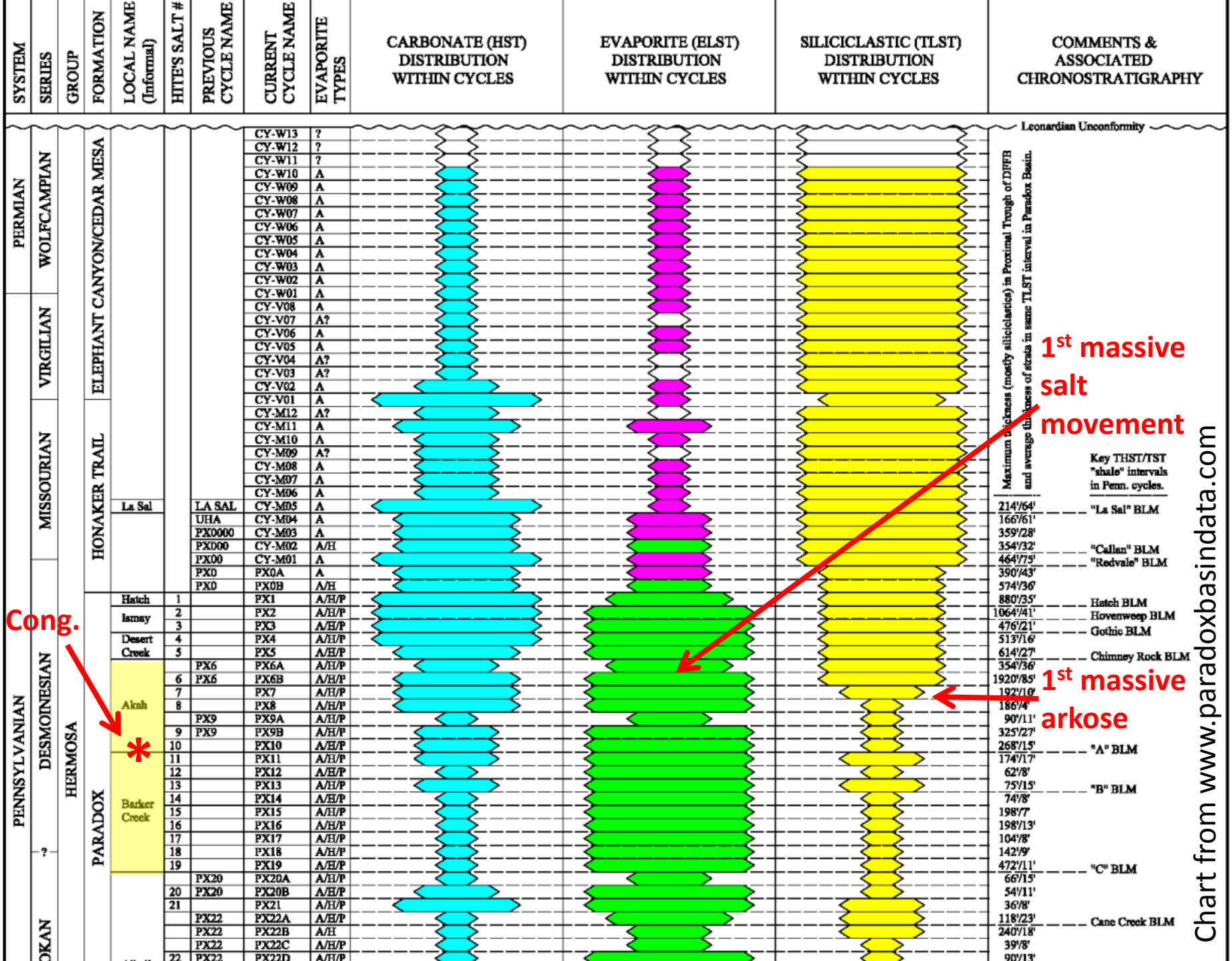
170-185” – shales are very rich with conodonts

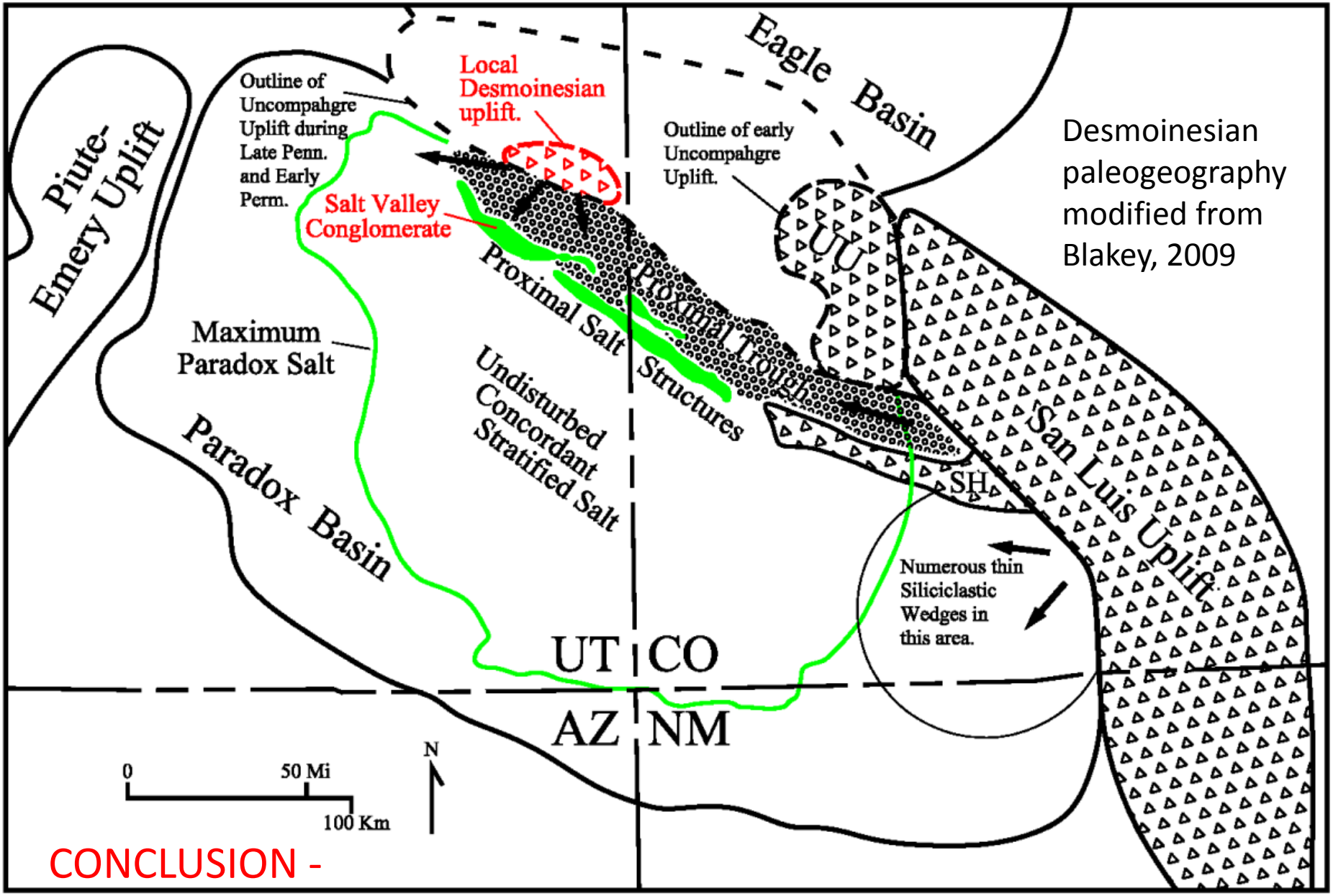
Bulk samples taken from zones with potentially abundant microfossils



Conodonts are similar to *Idiognathodus obloquies* known from the Akah and Barker Creek stages of the Paradox Fm –

from Plate 6 of Ritter et al. 2002


SYSTEM
SERIES
GROUP
FORMATION
LOCAL NAME (Informal)
HITE'S SALT #
PREVIOUS CYCLE NAME
CURRENT CYCLE NAME
EVAPORITE TYPES
CARBONATE (HST) DISTRIBUTION WITHIN CYCLES
EVAPORITE (ELST) DISTRIBUTION WITHIN CYCLES
SILICICLASTIC (TLST) DISTRIBUTION WITHIN CYCLES
COMMENTS & ASSOCIATED CHRONOSTRATIGRAPHY
Leonardian Unconformity
PERMIAN
WOLFCAMPIAN
VIRGILIAN
MISSOURIAN
DESMOINESIAN
PENNSYLVANIAN
HERMOSA
PARADOX
ELEPHANT CANYON/CEDAR MESA
HONAKER TRAIL
La Sal
Hatch
Ismay
Desert Creek
Akah
Barker Creek
Cong.
1st massive salt movement
1st massive arkose
Maximum thickness (mostly siliciclastics) in Proximal Trough of DIFFB and average thickness of strata in same TLST interval in Paradox Basin.
Key THST/TST "shale" intervals in Penn. cycles.
"La Sal" BLM
"Callan" BLM
"Redvale" BLM
Hatch BLM
Hovenweep BLM
Gothic BLM
Chimney Rock BLM
"A" BLM
"B" BLM
"C" BLM
Cane Creek BLM
Chart from www.paradoxbasindata.com



Desmoinesian paleogeography modified from Blakey, 2009

CONCLUSION -

Fan-delta **was prior to** massive influx of arkosic from Uncompahgre Uplift into Proximal Trough and origin of the linear salt structures

Collared Lizard – *Crotaphytus collaris*

Thanks for your attention