IMPLICATIONS OF STRATABOUND CARLIN-TYPE GOLD DEPOSITS IN PALEOZOIC ROCKS OF NORTH-CENTRAL NEVADA: SLIDE PRESENTATION

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U.S. Geological Survey, Menlo Park, California, 2005

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NORTHERN CARLIN TREND GENERAL VIEW

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PURPOSE

TO EXAMINE IMPORTANT GEOLOGICAL CHARACTERISTICS OF CARLIN-TYPE SYSTEMS FAVORING PRIMARY SYNSEDIMENTARY GOLD IN NORTH-CENTRAL NEVADA CONSISTENT WITH WELL-DEVELOPED MODELS OF POLYMETALLIC SEDEX DEPOSITS

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OVERVIEW

- FILTERING OF CARLIN-TYPE DEPOSITS
- TIME- STRATIGRAPHIC ASCENT OF STRATABOUND CARLIN-TYPE DEPOSITS AND RELATED TENDENCIES
- HOST-ROCK FACIES DIVERSITY
- INFERRED PALEOZOIC HOT SPOT ACTIVITY AND SEDEX GOLD ACCUMULATION
- HOT SPOT TRACING BY PALEOZOIC MOTIONS OF NORTH AMERICA

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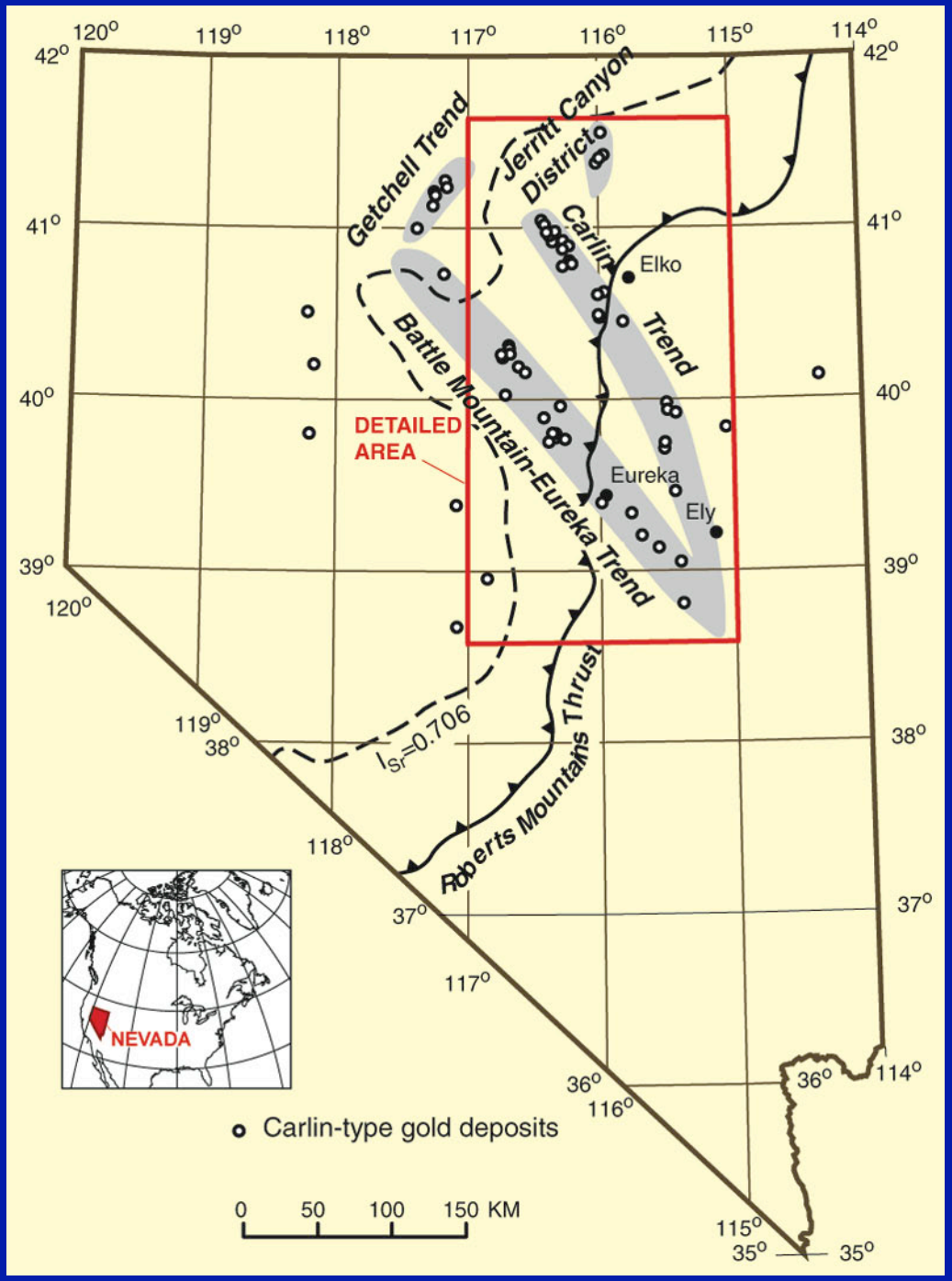
CARLIN-TYPE GOLD DEPOSITS IN NEVADA

From McFaul et al. (2000), Hofstra and Cline (2000), and Tosdal et al. (2000)



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FILTERING OF CARLIN-TYPE GOLD DEPOSITS

- MODELS OF SEDEX DEPOSITS PROVIDE CRITERIA TO DESIGN THREE CONSISTENT FILTERS TO SCREEN ENTIRE POPULATION OF >100 CARLIN-TYPE DEPOSITS IN GREAT BASIN

- FILTERING AIMED TO SELECT MOST CONVINCING CARLIN-TYPE DEPOSITS CONSIDERED TO HAVE REMNANTS OF SYNSEDIMENTARY FEATURES

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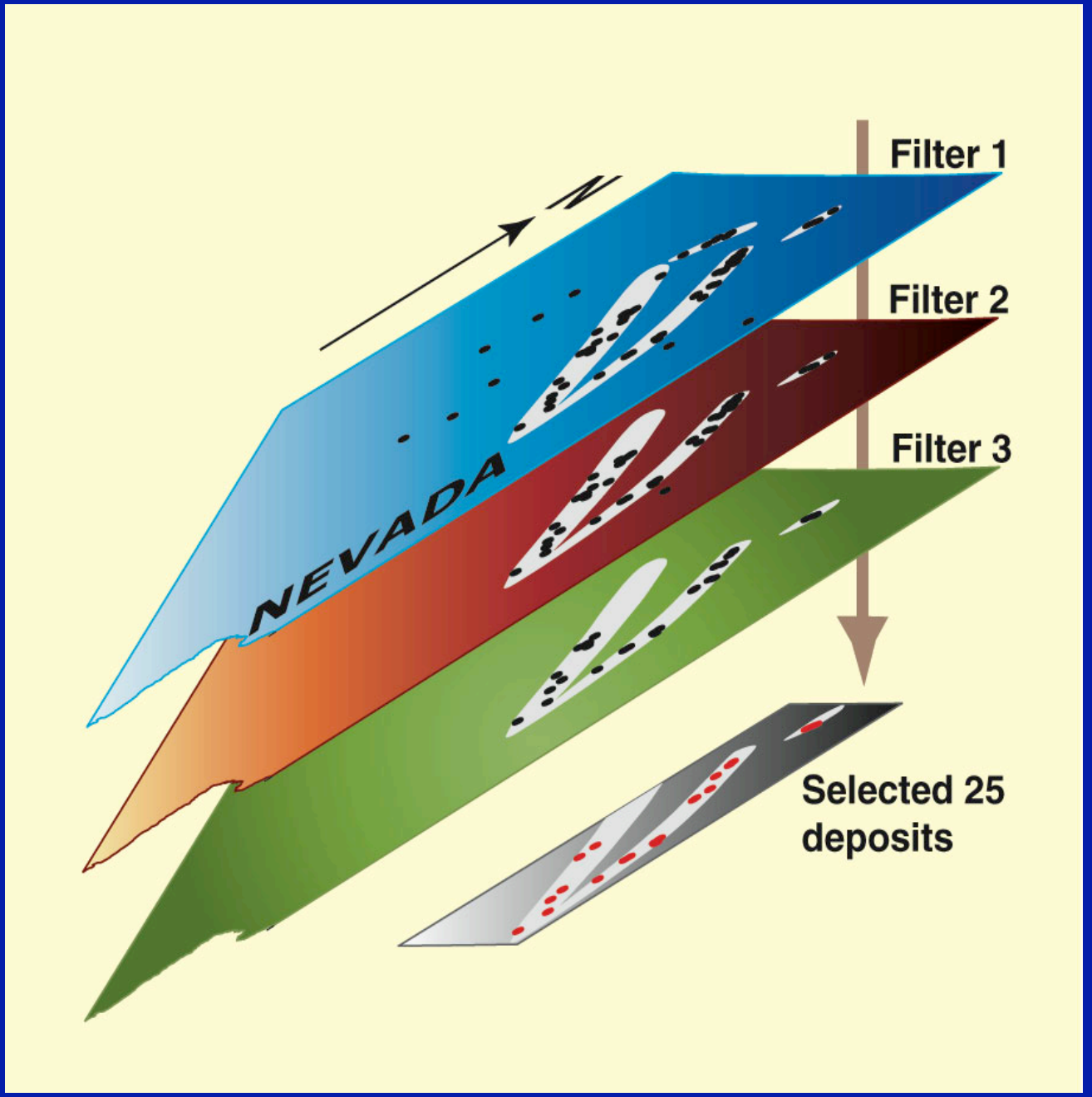
THREE FILTERS IN ACTION



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FILTER 1

SELECT CARLIN-TYPE DEPOSITS:

- **PRESENT IN AUTOCHTHONOUS (OR PARAUTOCHTHONOUS) SEDIMENTARY SEQUENCES OF EASTERN ASSEMBLAGE (LOWER PLATE)**
- **FORMED IN EPICRATONIC BASINS ORIGINATED BEFORE OR DURING MIDDLE TO LATE PALEOZOIC ANTLER OROGENY**
- **THUS EXCLUDES DEPOSITS IN ALLOCHTHONOUS UPPER PLATE (GETCHELL AND OTHERS)**

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FILTER 2

- EXCLUDE CARLIN-TYPE DEPOSITS THAT HAVE BEEN SUBSTANTIALLY INTRUDED BY MESOZOIC AND TERTIARY IGNEOUS ROCKS

- NOTE: INTRUSIONS AND DIKE CLUSTERS COMMONLY ACCOMPANIED BY INTENSE FAULTING WOULD MOSTLY DESTROY SYNSEDIMENTARY MINERALIZED ROCKS, IF PRESENT

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FILTER 3

SELECT CARLIN-TYPE DEPOSITS PRESENT AS STRATABOUND MINERALIZATION:

- **COMPRISED OF CONFORMABLE TABULAR, LENTICULAR, AND RIBBON-SHAPED ORE BODIES ASSOCIATED WITH FEEDER CHANNELS**
- **CONFINED TO DEFINITE SEDIMENTARY HORIZON(S)**
- **MINIMALLY DISTURBED BY FAULTS AND (OR) MAGMATIC EFFECTS**

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SELECTED STRATABOUND CARLIN-TYPE DEPOSITS IN N.-CENTRAL NEVADA

JERRITT CANYON DISTRICT
1. Generator Hill
2. Winters Creek
3. Wright Window

N. CARLIN TREND
4. Rodeo
5. Screamer
6. West Leeville
7. Carlin

MAGGIE CREEK DISTRICT
8. Gold Quarry

C. CARLIN TREND
9. Rain
10. Emigrant Springs
11. Trout Creek
12. South Bullion
13. Cord Ranch

S. CARLIN TREND
14. White Pine
15. Casino
16. Alligator Ridge
17. Yankee
18. Illipah

SOUTHERN BATTLE MOUNTAIN-EUREKA TREND
19. Chert Cliff
20. Afgan
21. Pan
22. Easy Junior
23. Green Springs
24. Griffon
25. Gold Point

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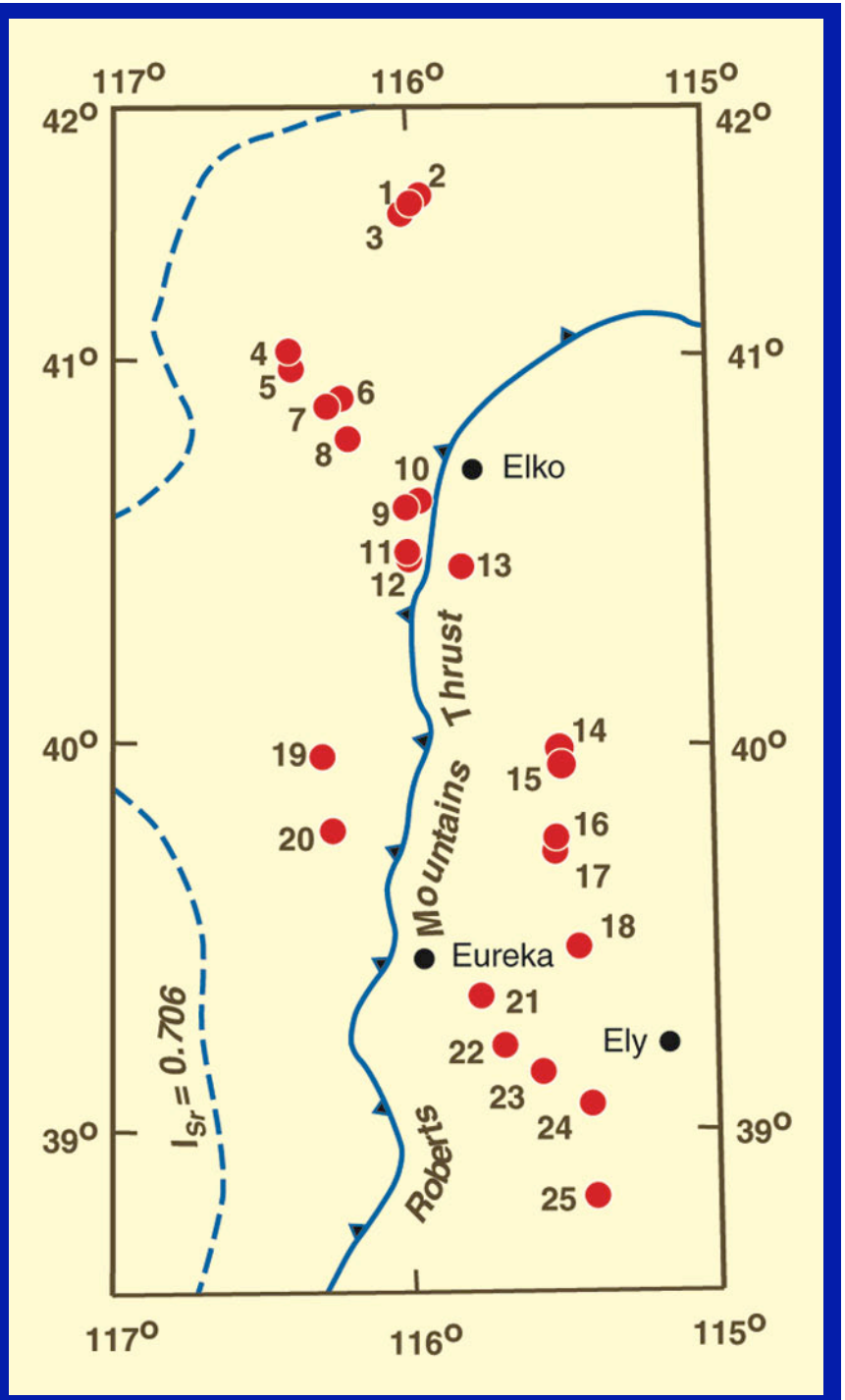
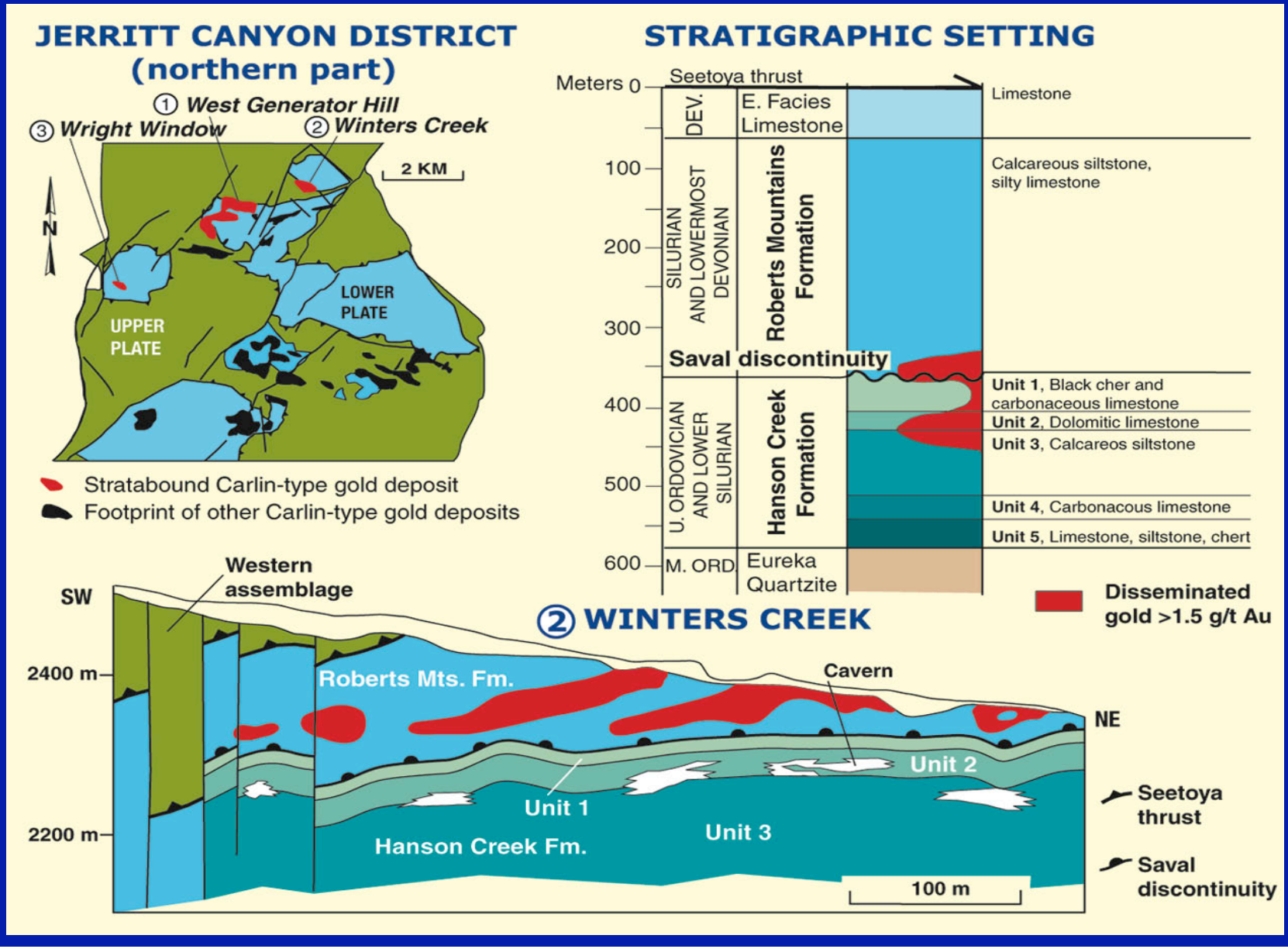


JERRITT CANYON DISTRICT

From Birak and Hawkins (1985), Bratland (1991), Daly et al. (1991), Folger et al. (1996), Hofstra et al. (1999), and Peters at al. (2003)



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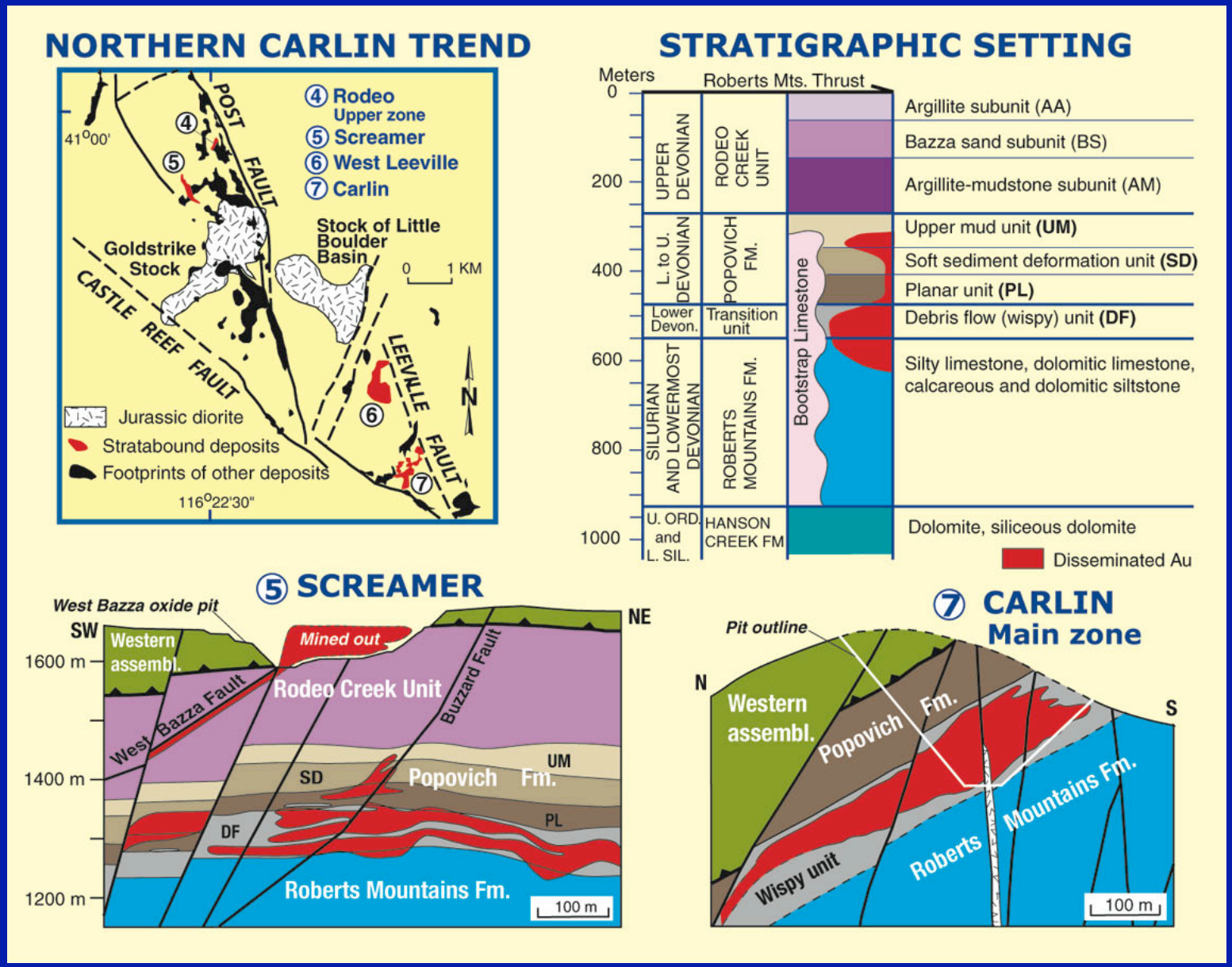
NORTHERN CARLIN TREND

From Armstrong et al. (1997), Bettles (2002), Christensen (1993), Lauha (1998), Myers (1993), Radtke (1985), Teal and Jackson (1997), and Theodore et al. (2003)



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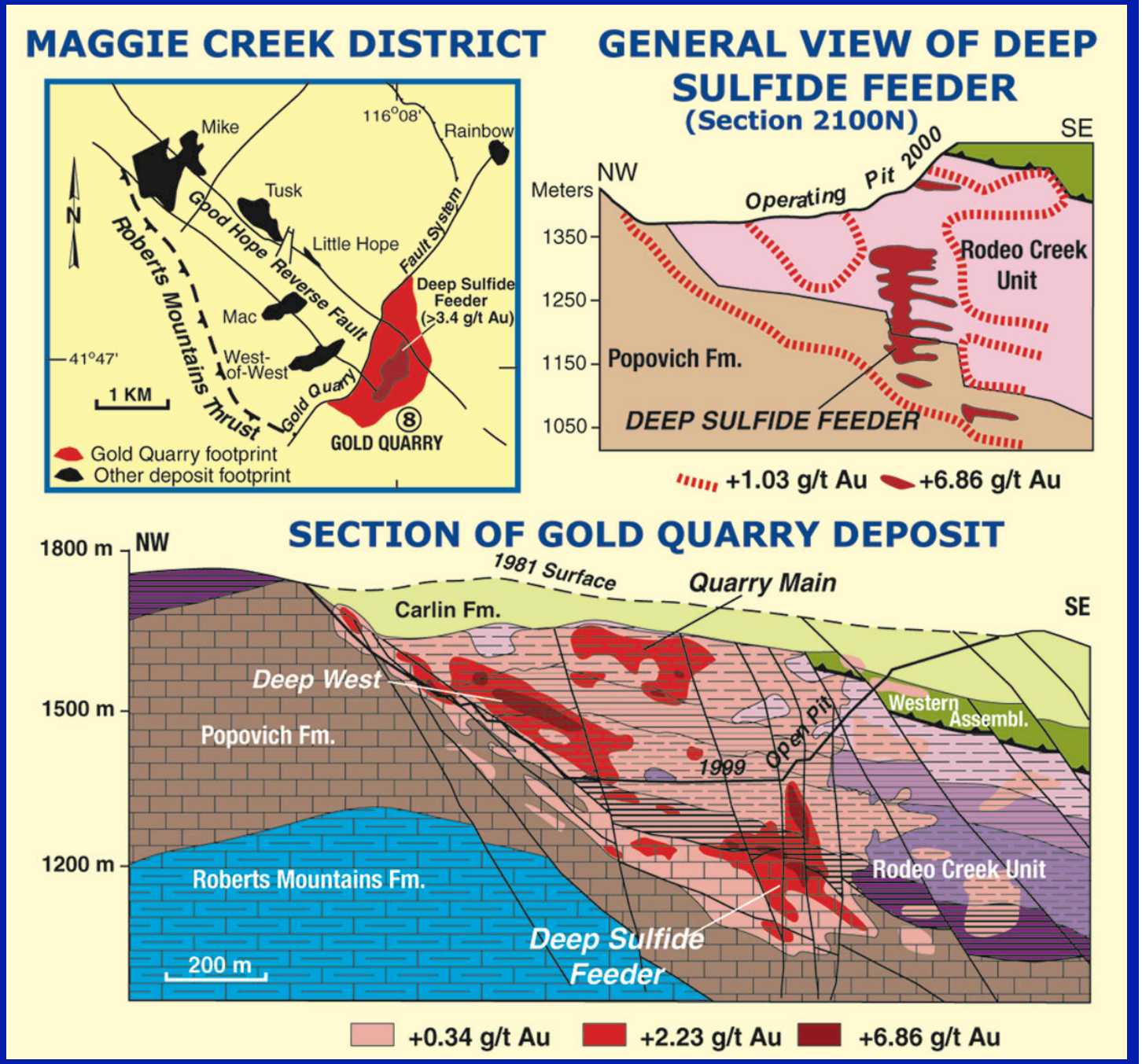
GOLD QUARRY DEPOSIT

From Harlan (2000), Harlan et al. (2002), and Rota (1996)



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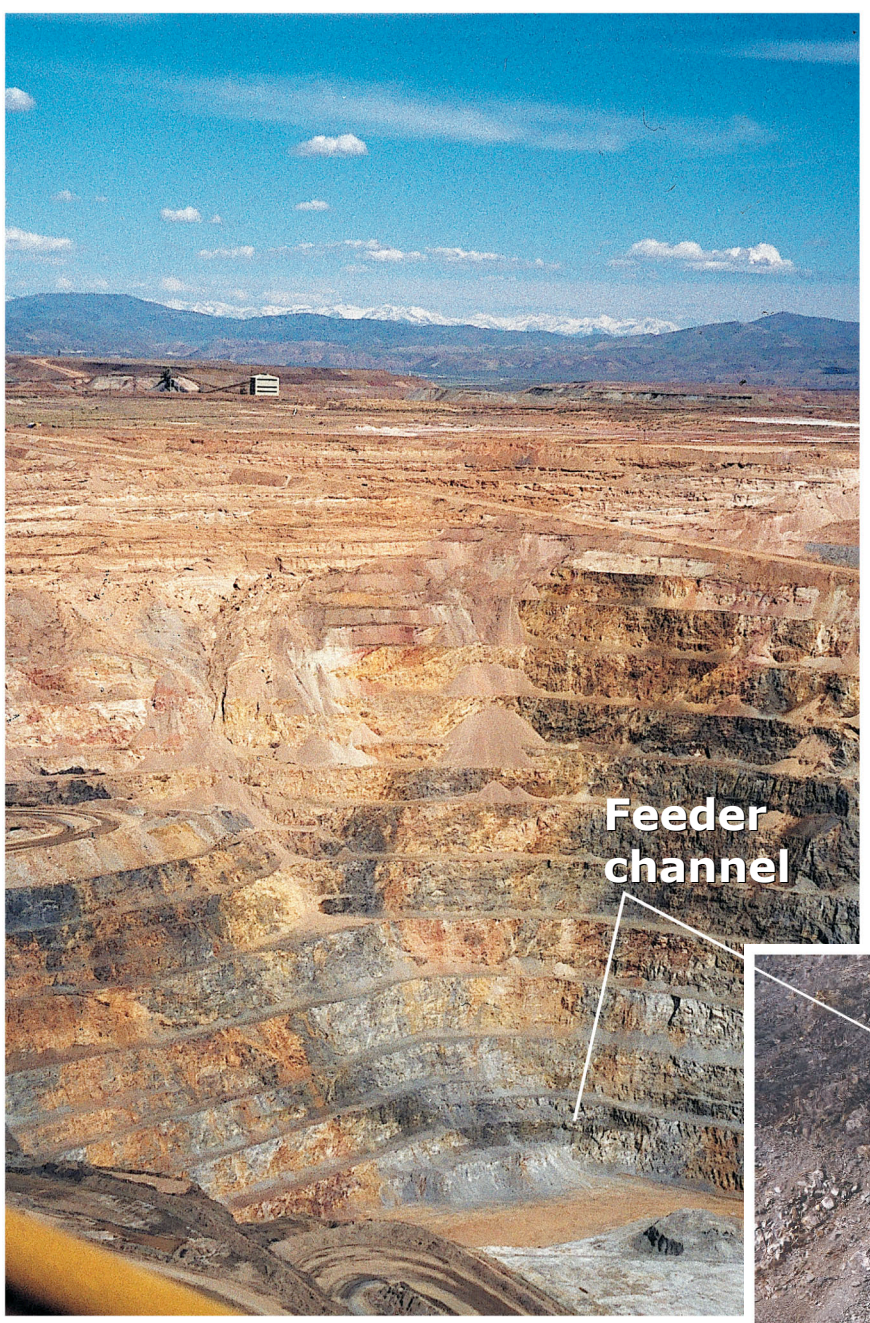
GOLD QUARRY DEEP SULFIDE FEEDER

Looking ESE



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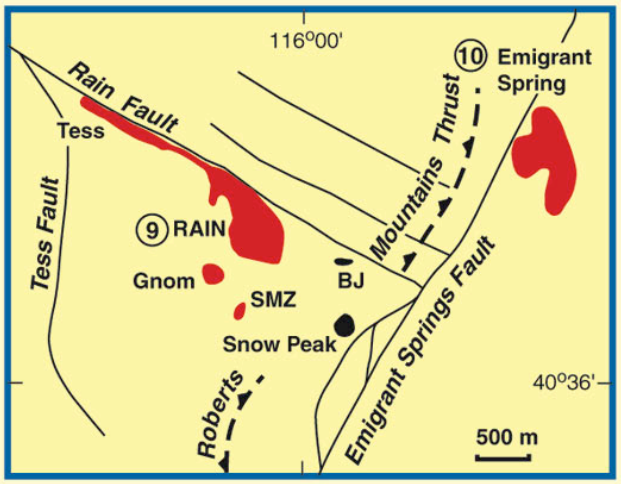
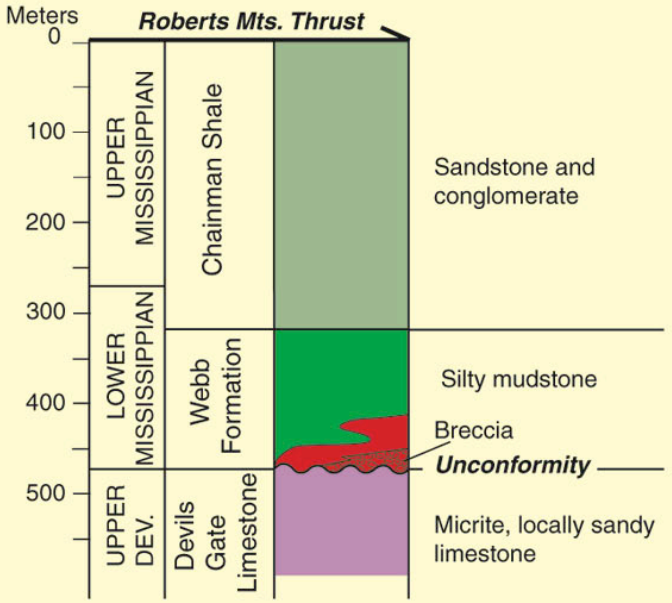
CENTRAL CARLIN TREND

From Mathewson (2001), Mathewson and Beetler (1998), Thoreson (1991), and Williams et al. (2000)

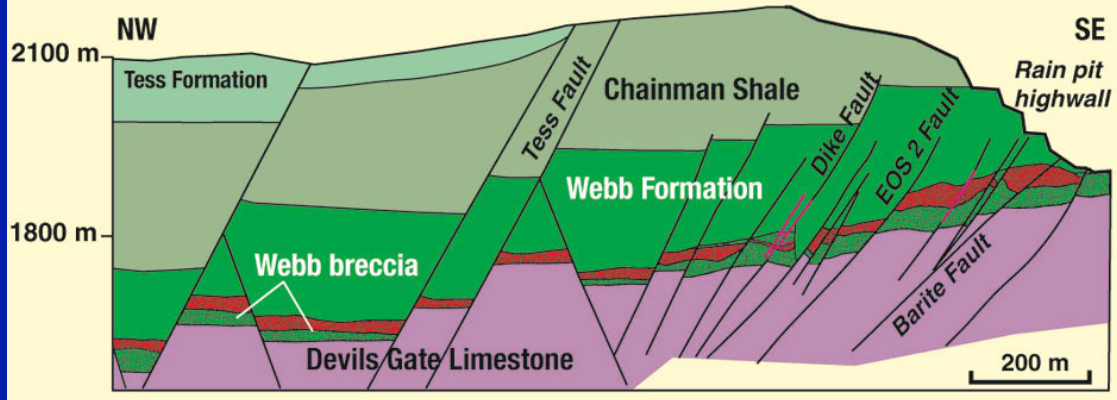
RAIN DISTRICT



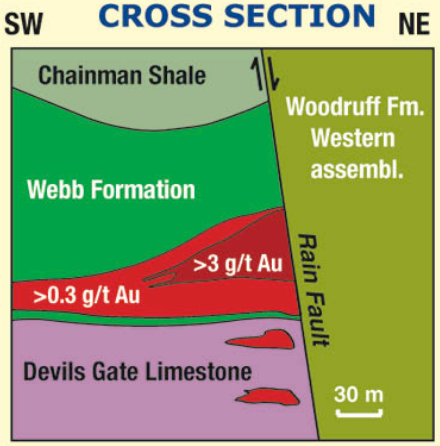
STRATIGRAPHIC SETTING



RAIN AND TESS DEPOSITS
NW LONG SECTION



TESS DEPOSIT
CROSS SECTION



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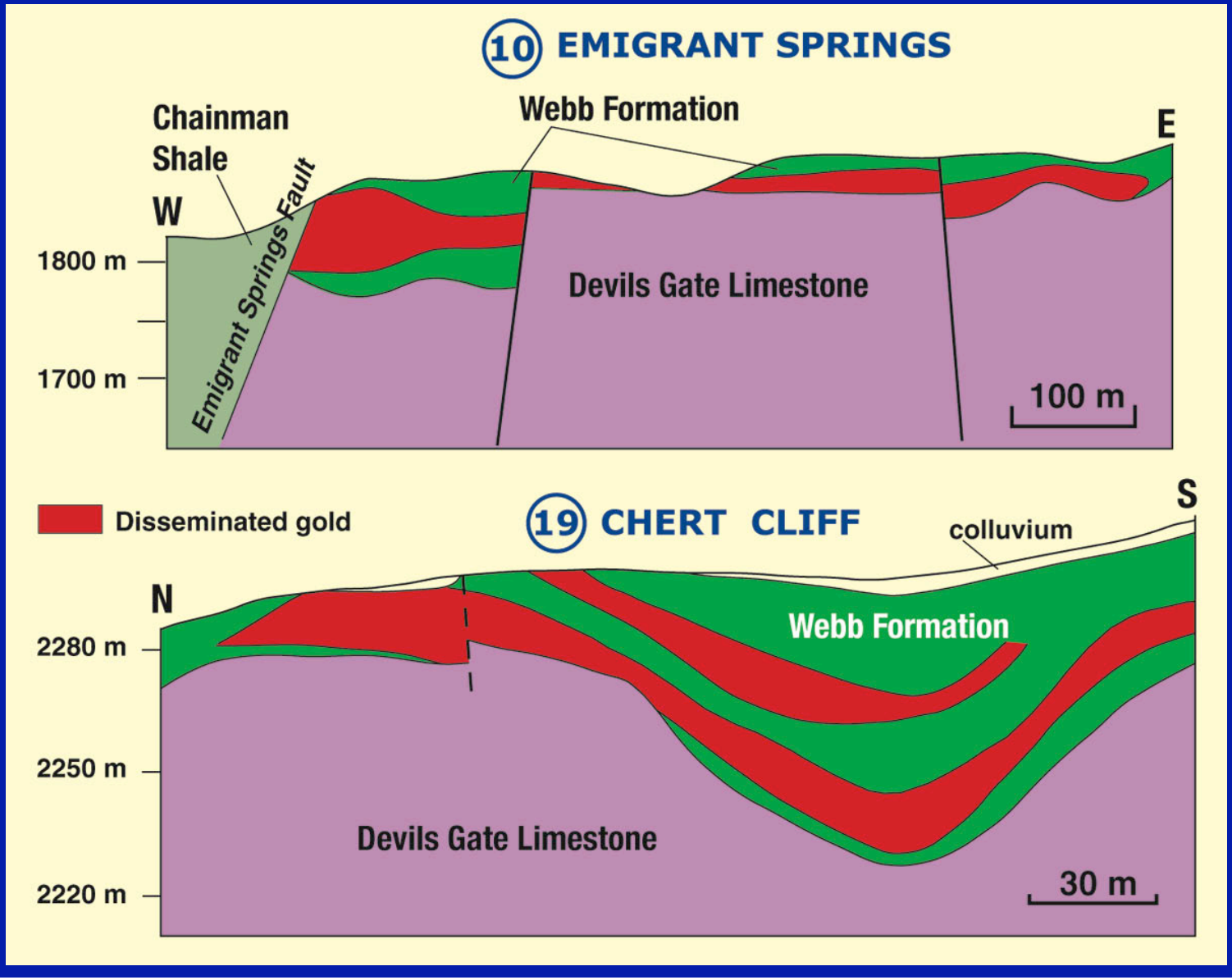
CENTRAL CARLIN + SOUTH BATTLE MT.-EUREKA TRENDS

From Jackson (1991), Thoreson (1991), and Vikre and Maher (1996)



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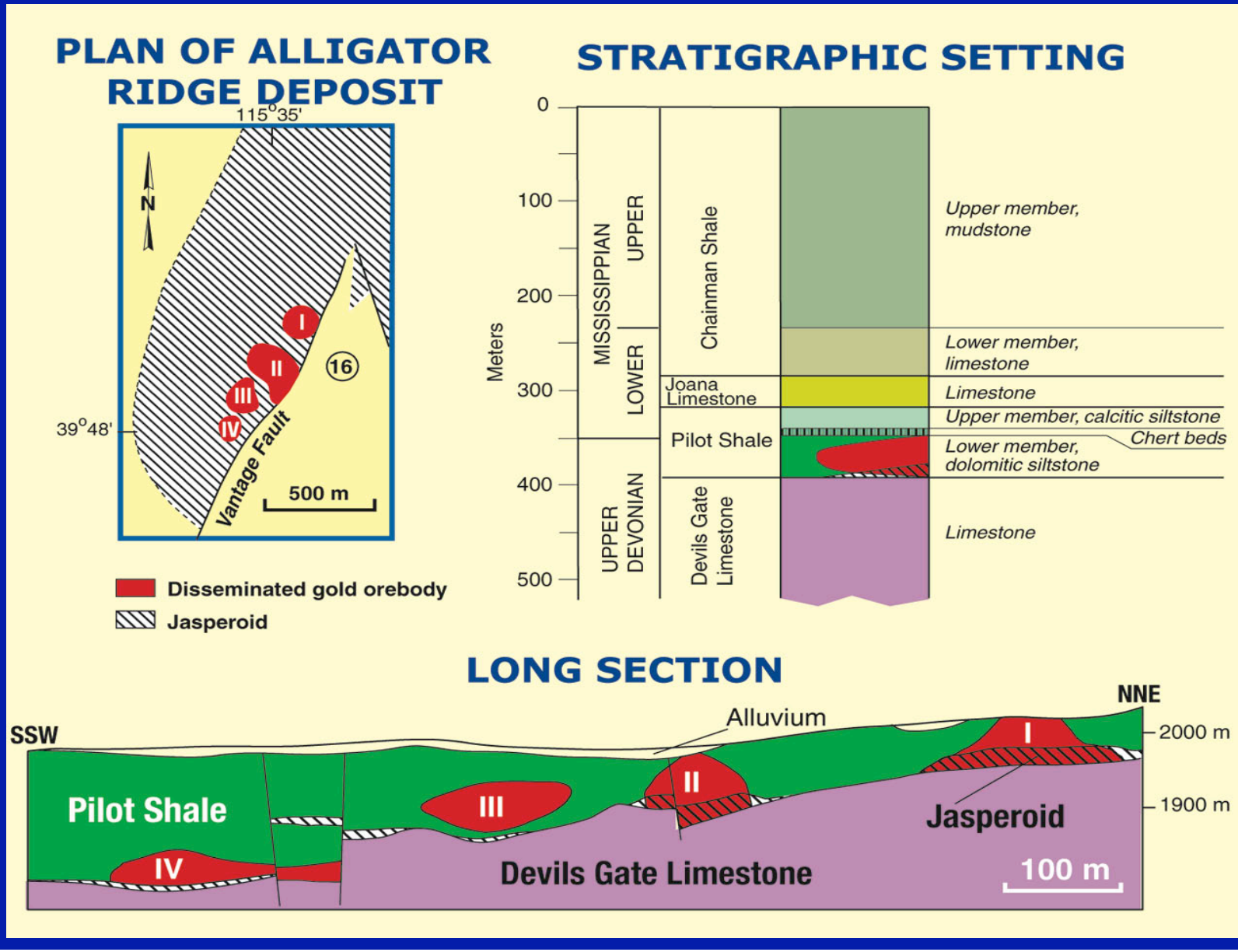
ALLIGATOR RIDGE DEPOSIT

From Ilchik (1990), Nutt et al. (2000), Tapper (1984), and Taylor (1986)



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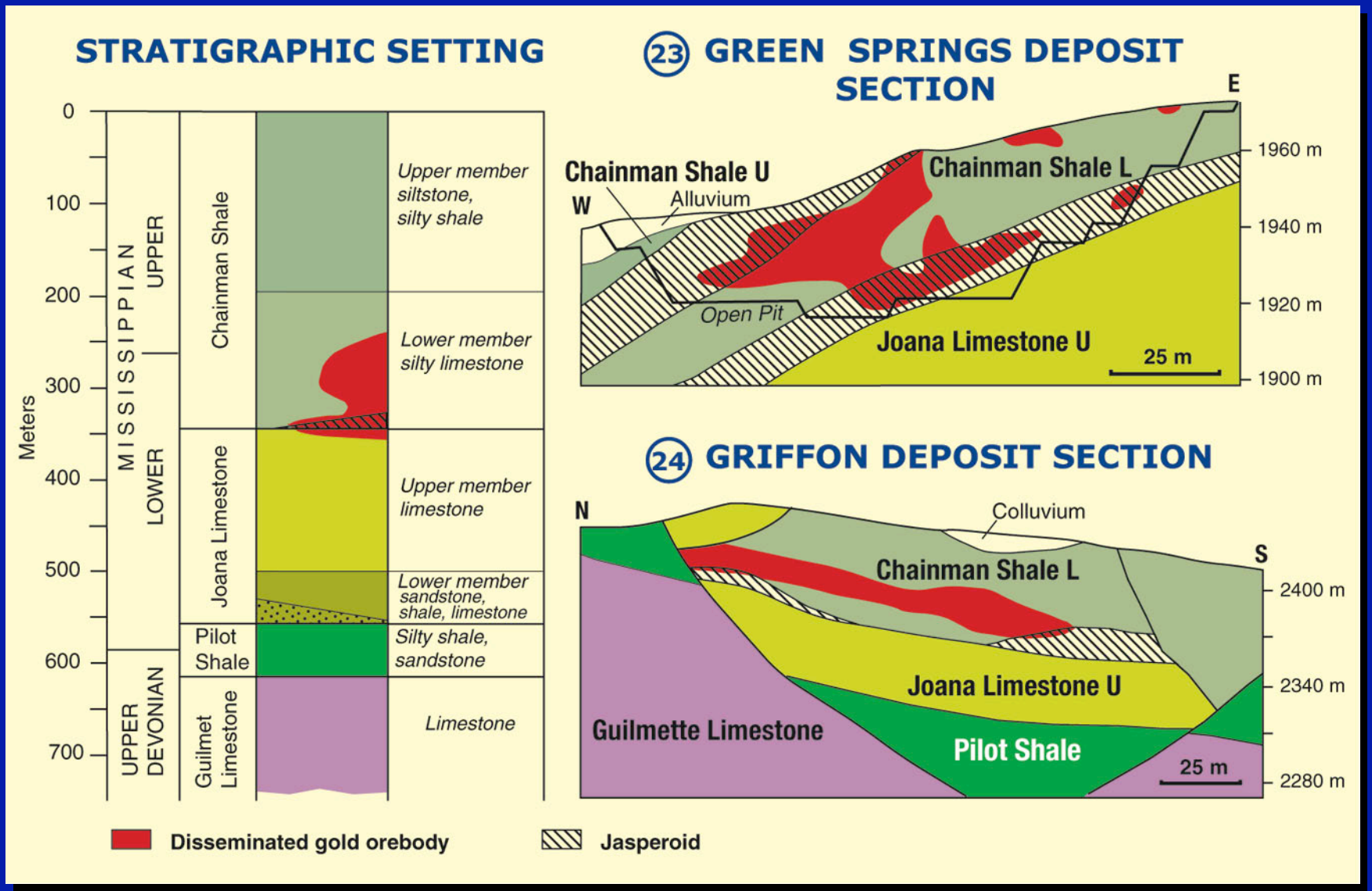
SOUTHERN BATTLE MOUNTAIN-EUREKA TREND

From Carden (1989,1991), Robinson (2000), and Wilson et al. (1989, 1991)



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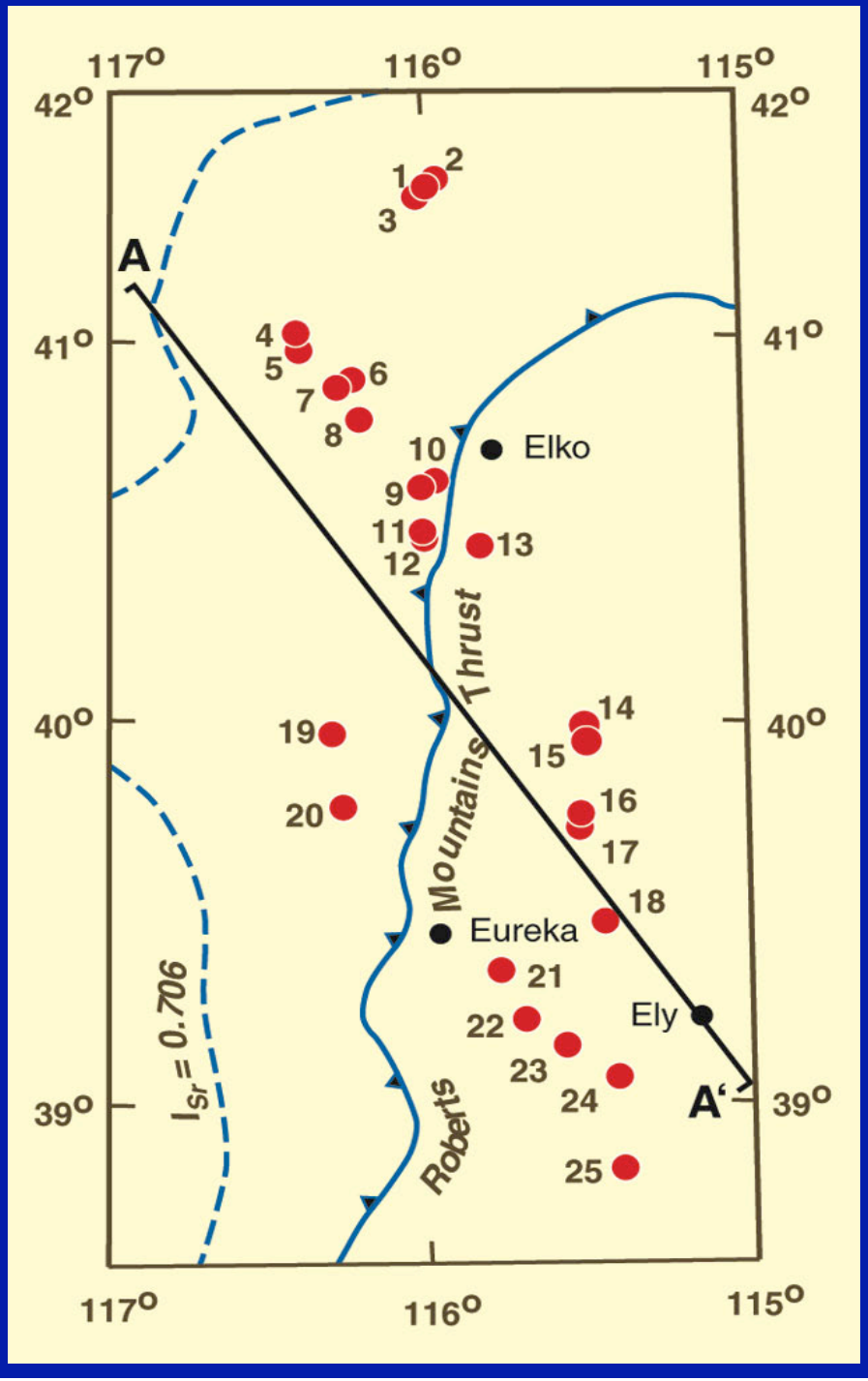
POSITION OF PROJECTED PROFILE AA', NORTH-CENTRAL NEVADA



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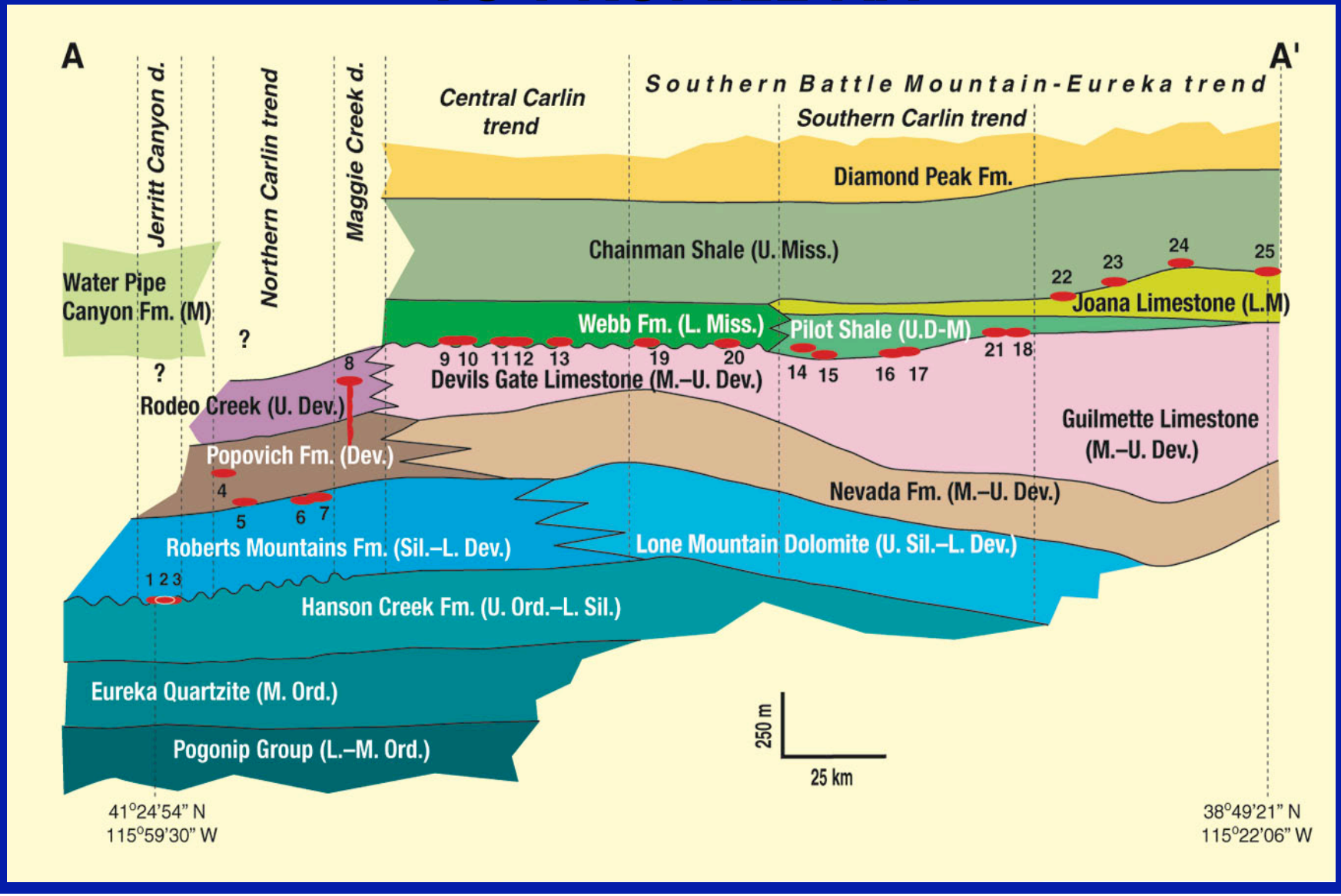
SETTINGS OF STRATABOUND CARLIN-TYPE DEPOSITS PROJECTED TO PROFILE AA'



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SOUTHWARD TIME-STRATIGRAPHIC ASCENT

Southward ascent of stratabound Carlin-type host horizons obvious, unit ages change gradually:

- **Jerritt Canyon, Late Ord. to Early Sil.**
- **Northern Carlin, Early to Late Dev.**
- **Maggie Creek, Middle to Late Dev.**
- **Central & South Carlin & North & central of South BM-Eur., Late Dev. to Early Miss.**
- **South end of BM-Eur., Early to Late Miss.**

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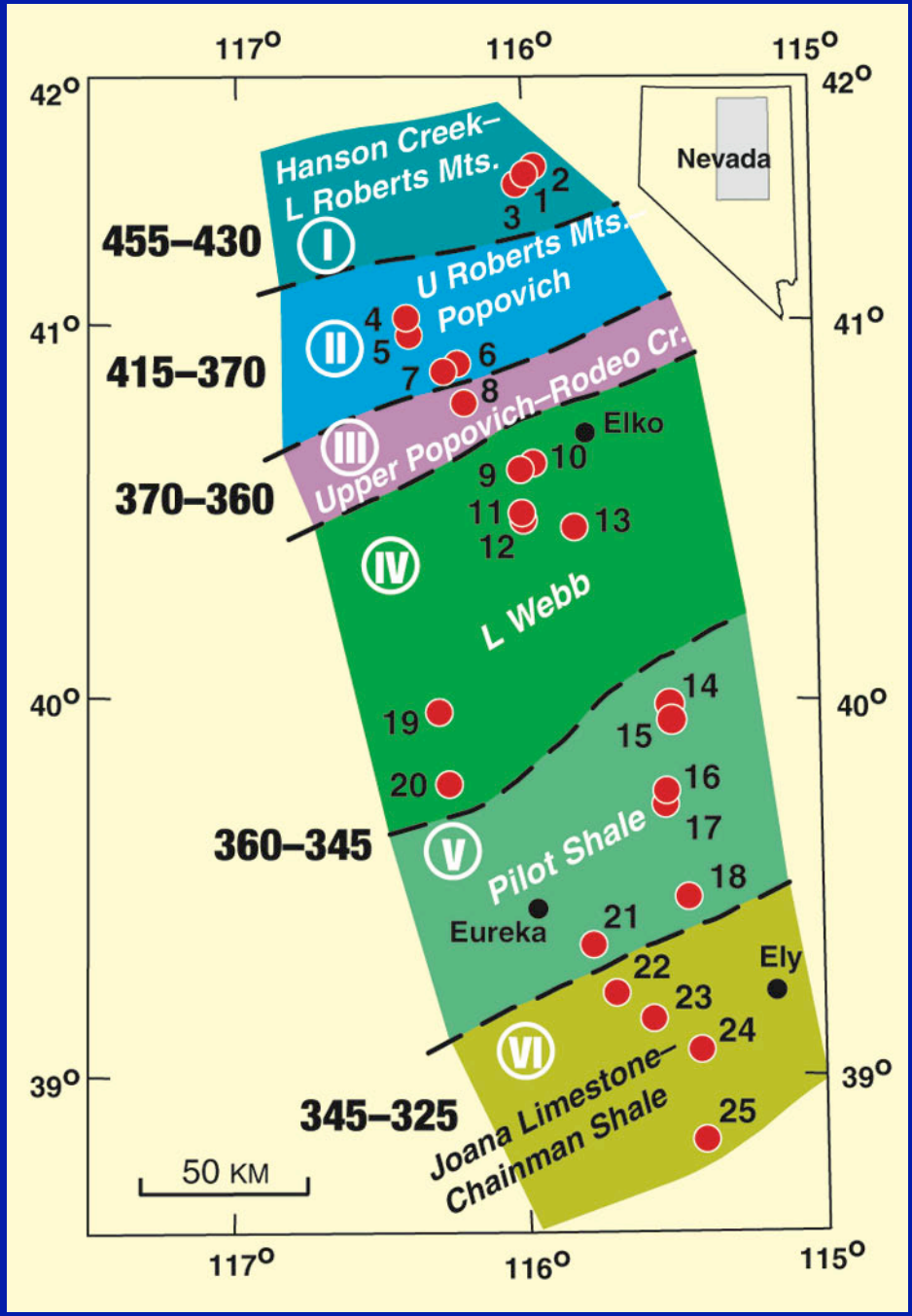
SOUTHWARD DECREASE OF AGES OF ORE-HOST UNITS

Black numbers indicate unit age limits, Ma

Circled white numbers indicate segments



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SOUTHWARD DECLINE OF GOLD CONTENT IN STRATABOUND CARLIN-TYPE GOLD DEPOSITS BY HOST UNITS

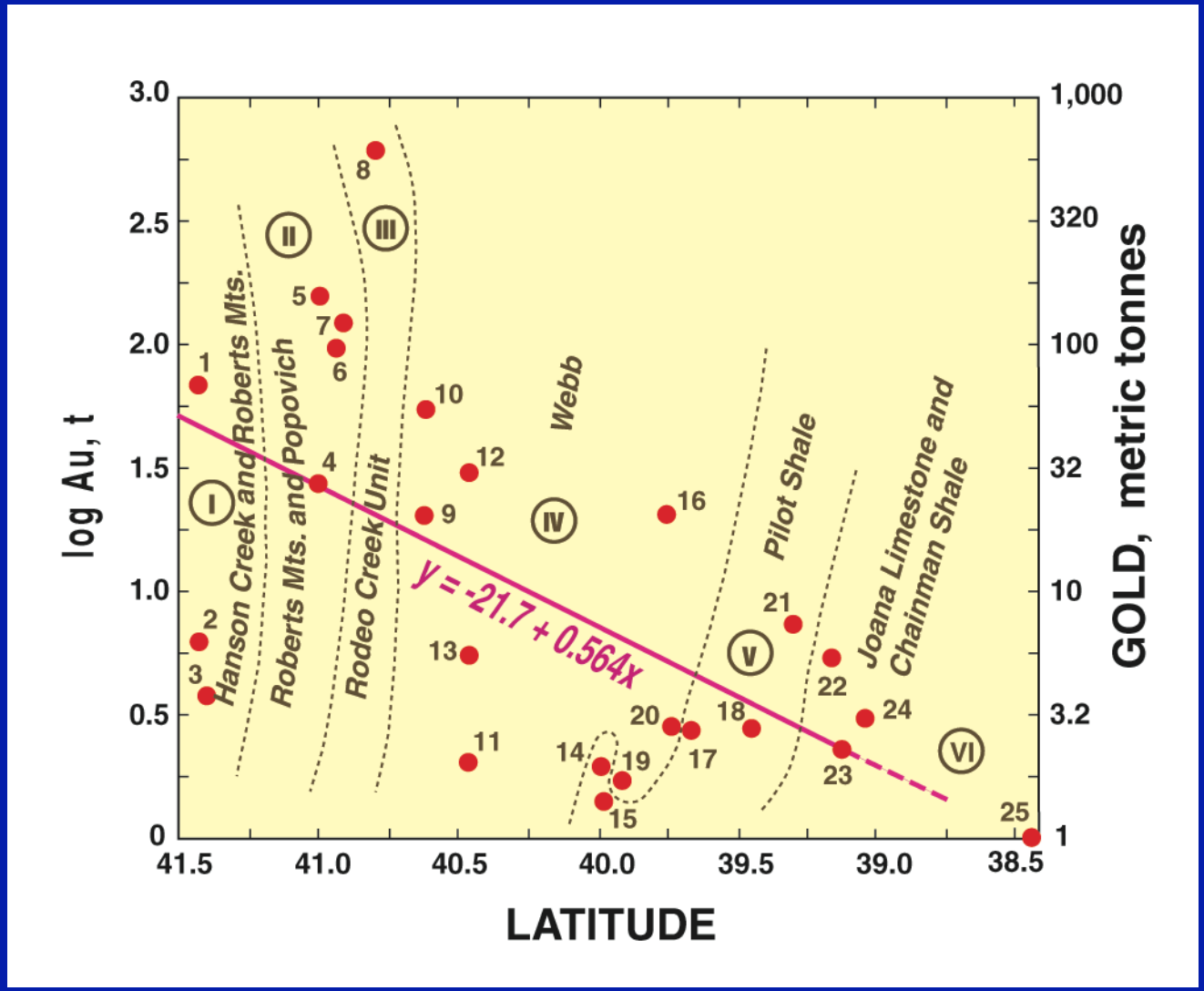
Stratabound Carlin-type deposits

Webb

Host unit

IV

Trend segment



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ENDOWMENT OF STRATABOUND GOLD BY HOST STRATA IN N.-C. NV

SEGMENT	HOST STRATA			Total gold, metric t, in strata-bound CTD	Total gold, metric t, in all type gold deposits
	Unit	Geologic age	Absolute age, Ma		
I. Jerritt Canyon	U.Hansen Creek and Roberts Mts Fms.	Late Ordovician to Early Silurian	455 to 430	81	378
II. North Carlin	U. Roberts Mts. and Popovich Fms.	Late Silurian to Late Devonian (Frasnian)	415 to 370	412	2718
III. Maggie Creek	U. Popovich Fm. and Rodeo Creek Unit	Late Devonian	370 to 360	628	903
IV. Central Carlin and north South Battle Mtn.-Eureka	U. Devil Gate Limestone to L. Webb Fm.	Late Devonian to Early Mississippian (Kinderhookian)	360 to 345	120	643
V. South Carlin and central South Battle Mtn.-Eureka	Pilot Shale	Late Devonian to Early Mississippian (Kinderhookian)	360 to 345	38	279
VI. South end of South Battle Mtn.-Eureka	U. Joana Limestone and L. Chainman Shale	Early to Late Mississippian	345 to 325	11	69

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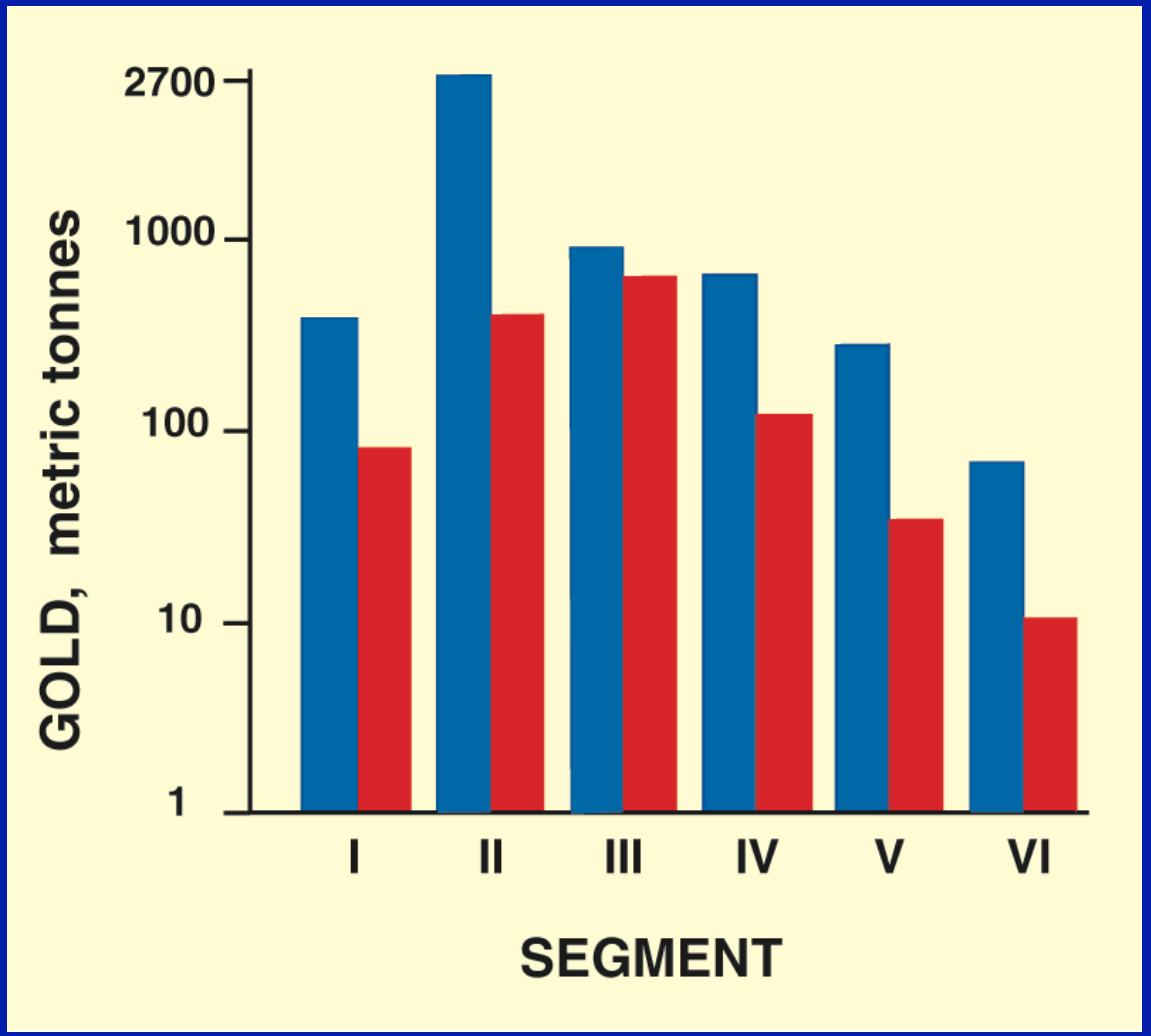
GOLD CONTENT IN ALL DEPOSIT TYPES VS STRATABOUND CARLIN-TYPE DEPOSITS WITHIN SEGMENTS

Total gold all deposit types

Total gold stratabound Carlin-type deposits



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HOST-ROCK FACIES DIVERSITY

- Host-rocks of stratabound Carlin-type gold deposits present in carbonate and siliciclastic facies deposited in oxygenated and anoxic environments during pre-Antler time or coeval with Antler orogeny

- "Favorable" lithology cannot be defined at regional scale. It is characteristic at segment scale as in Lower Dev. "wispy unit" in Northern Carlin trend

- Ore-host strata depend on ages rather than specific "favorability"

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TWO COMMON FEATURES OF MINERALIZED HORIZONS

1. Synsedimentary local uplift limited in time, coeval with deposition of ore-host horizons superposed upon
   - Shallow water sediments
   - Reef and connected apron talus
   - Discontinuities with erosion surface & paleokarst
2. Conformable jasperoid combined with chert & bedding relicts might indicate submarine fluid discharge

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PALEOZOIC HOT SPOT AND RELATED FAILED RIFT ACTIVITY IN N.-C. NV

- Northwest striking faults in supracrustal rocks of cratonal margin underneath Carlin & BM-Eur. trends
- Random parallel synsedimentary faults in ore-host Dev. & Miss. rocks
- Synsedimentary uplifts related to inferred hot spot & failed rift—coeval to proposed SEDEX gold
- Conformable gold-associated jasperoid possibly derived from hot spot activity projected onto sea floor

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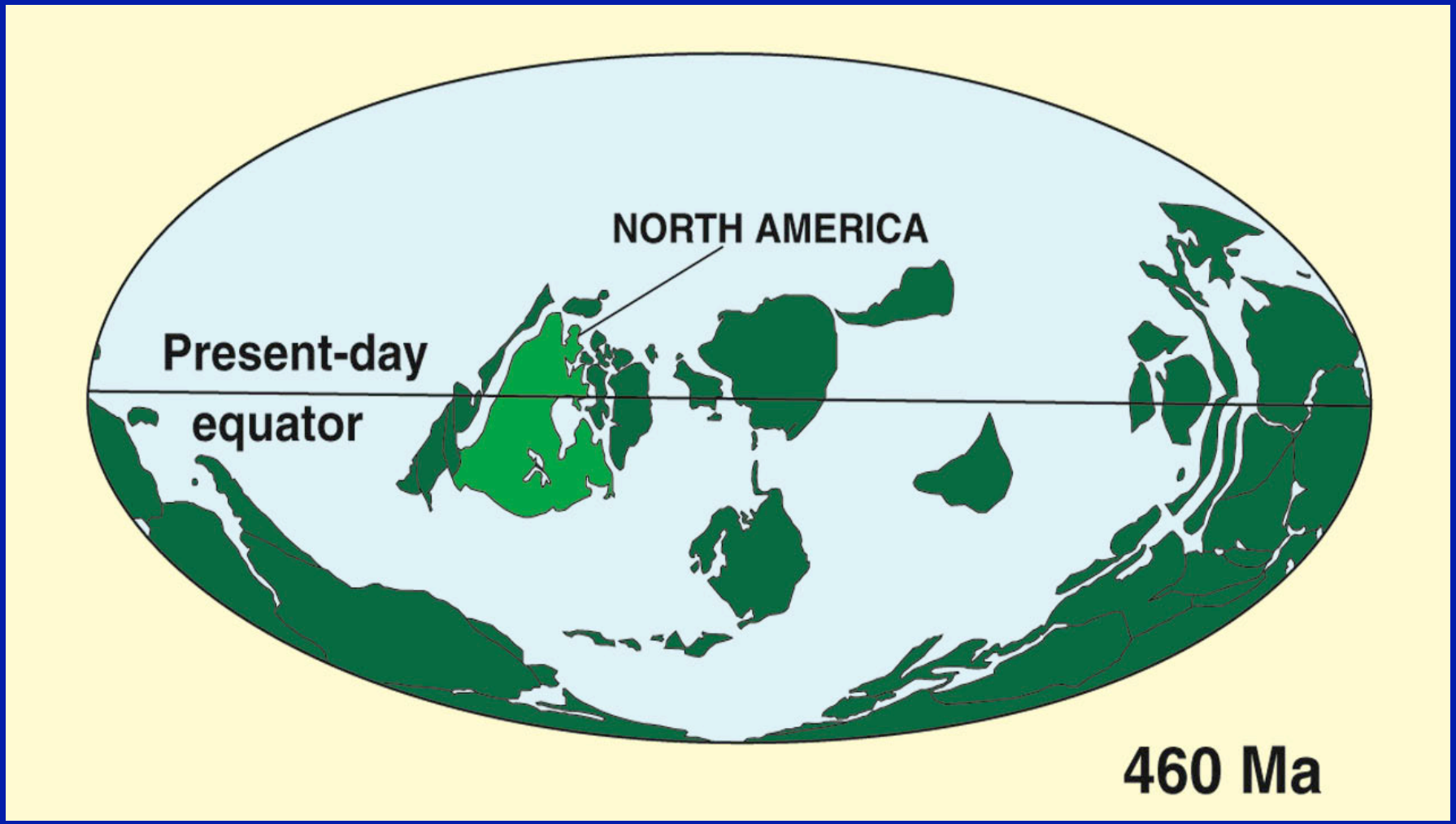
CONTINENTS AT 460 MA
ACCORDING TO SCOTESE (1997)



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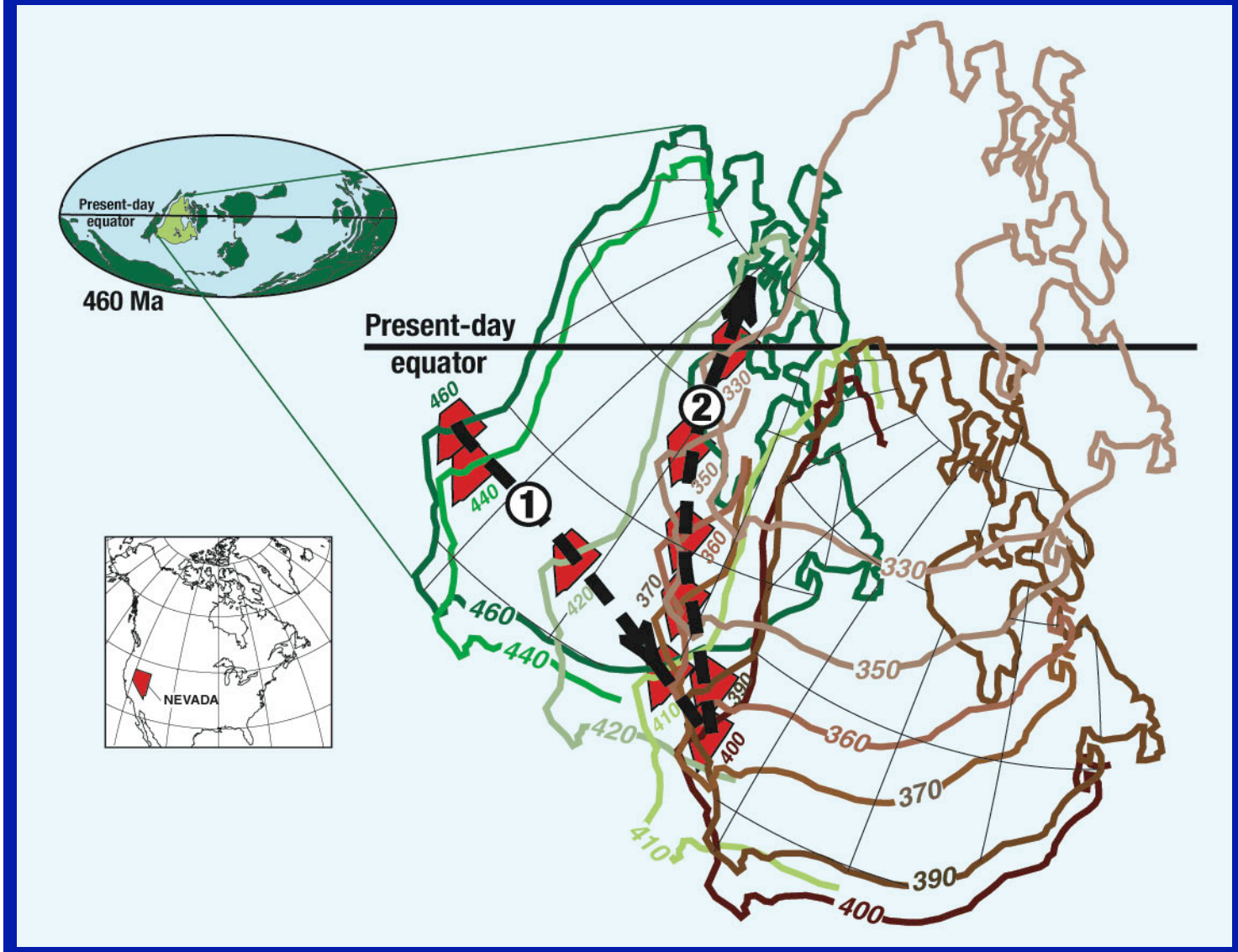
MOTIONS OF NV DURING PALEOZOIC DRIFT OF NORTH AMERICA



Continent drift 460 to 330 Ma from Scotese (1997), Nevada motion vectors (1) & (2)

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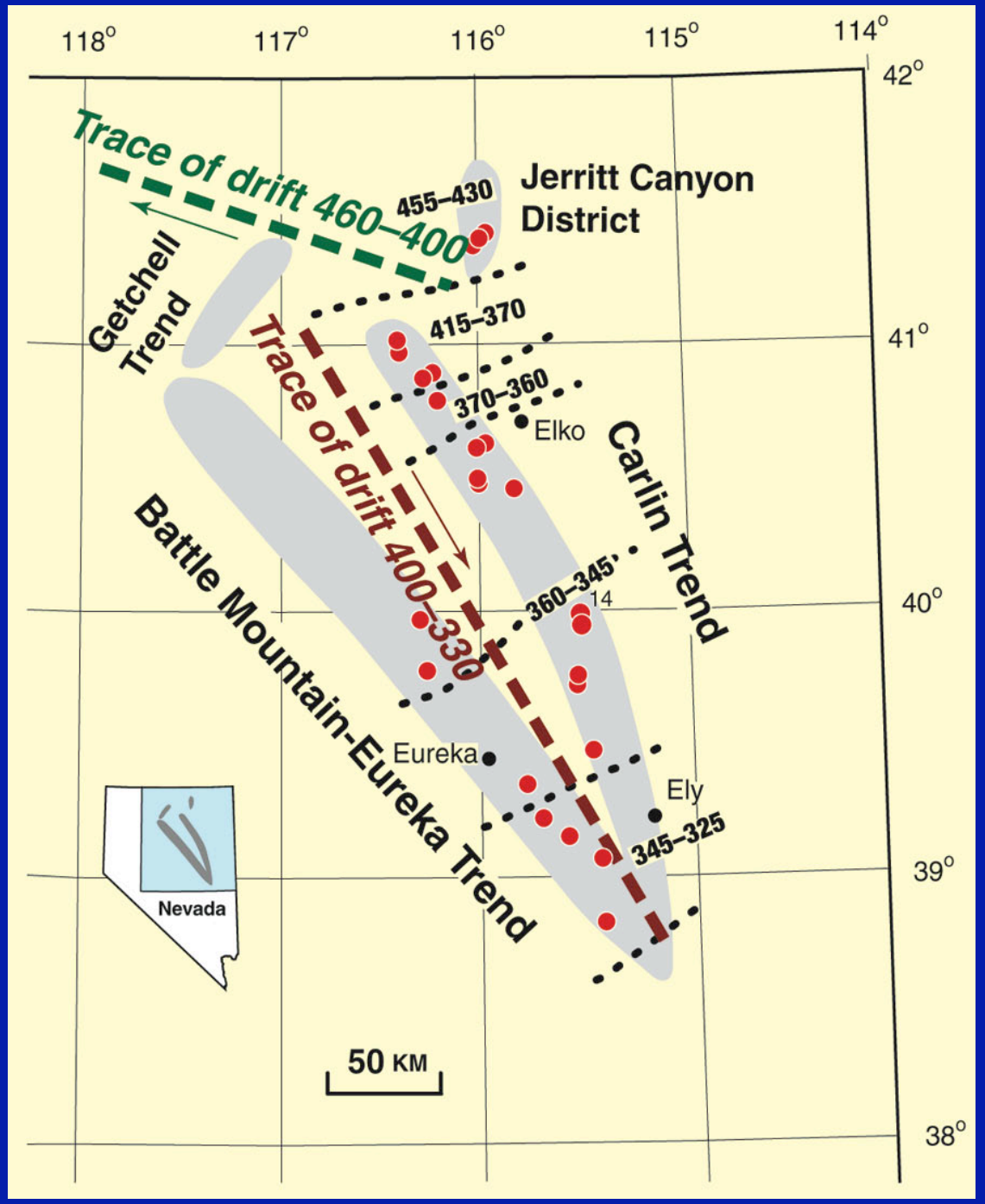
VECTORS OF NORTH AMERICA PALEOZOIC DRIFT FROM 460 TO 330 Ma IN N.-C. NEVADA



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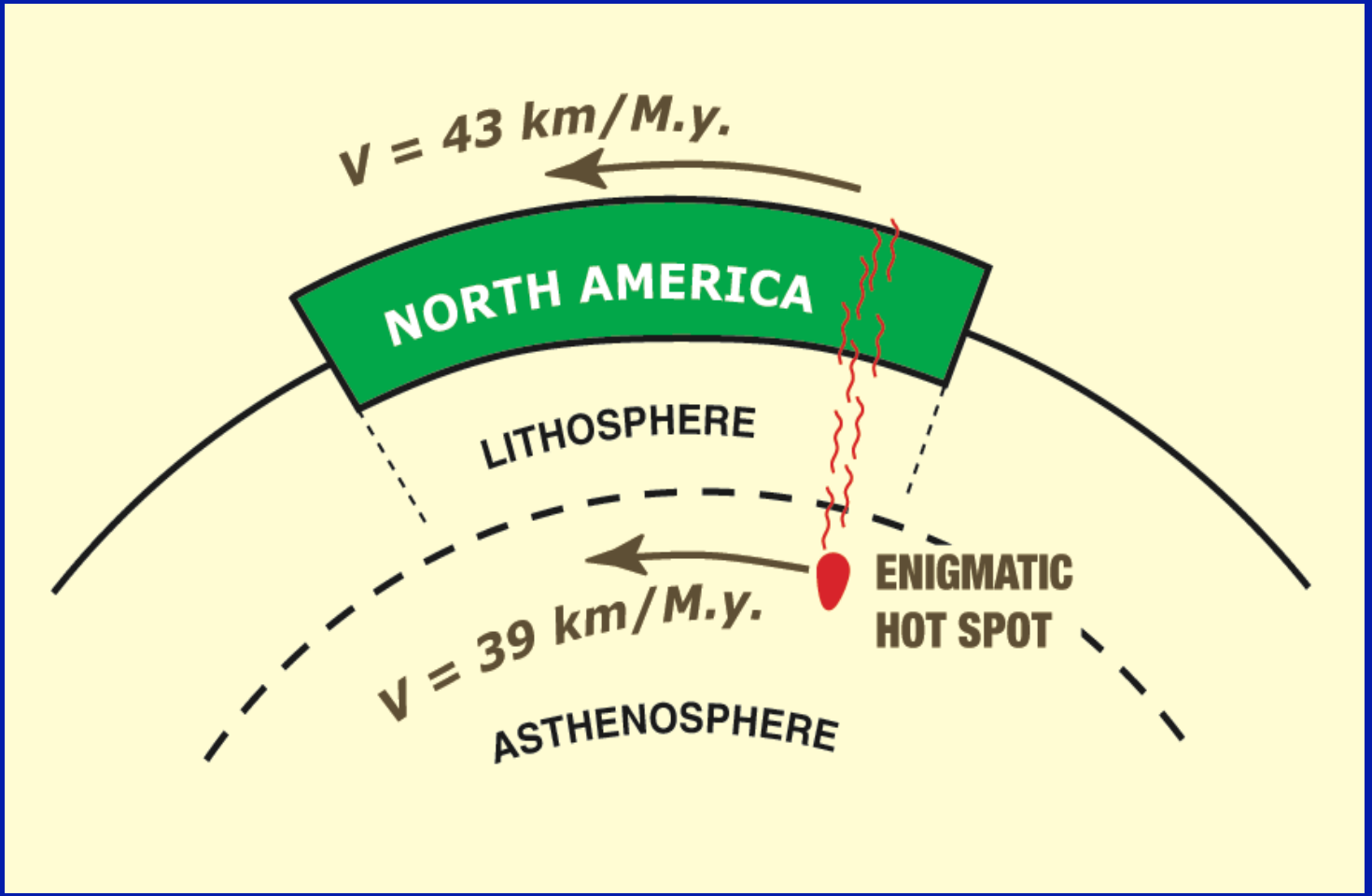
ENIGMATIC PALEOZOIC HOT SPOT IN NORTH-CENTRAL NEVADA



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CONCLUSIONS

- Time-stratigraphic ascent of stratabound Carlin-type gold deposits southward within N.-C. NV is consistent with hypothesis of Paleozoic SEDEX origin
- Hypothesis involves PZ hot spot beneath failed amagmatic rift, which resulted in hydrothermal gold influx into basins
- Time-space transposition of PZ SEDEX gold might be interpreted by tracing hot spot resultant from motions of North America

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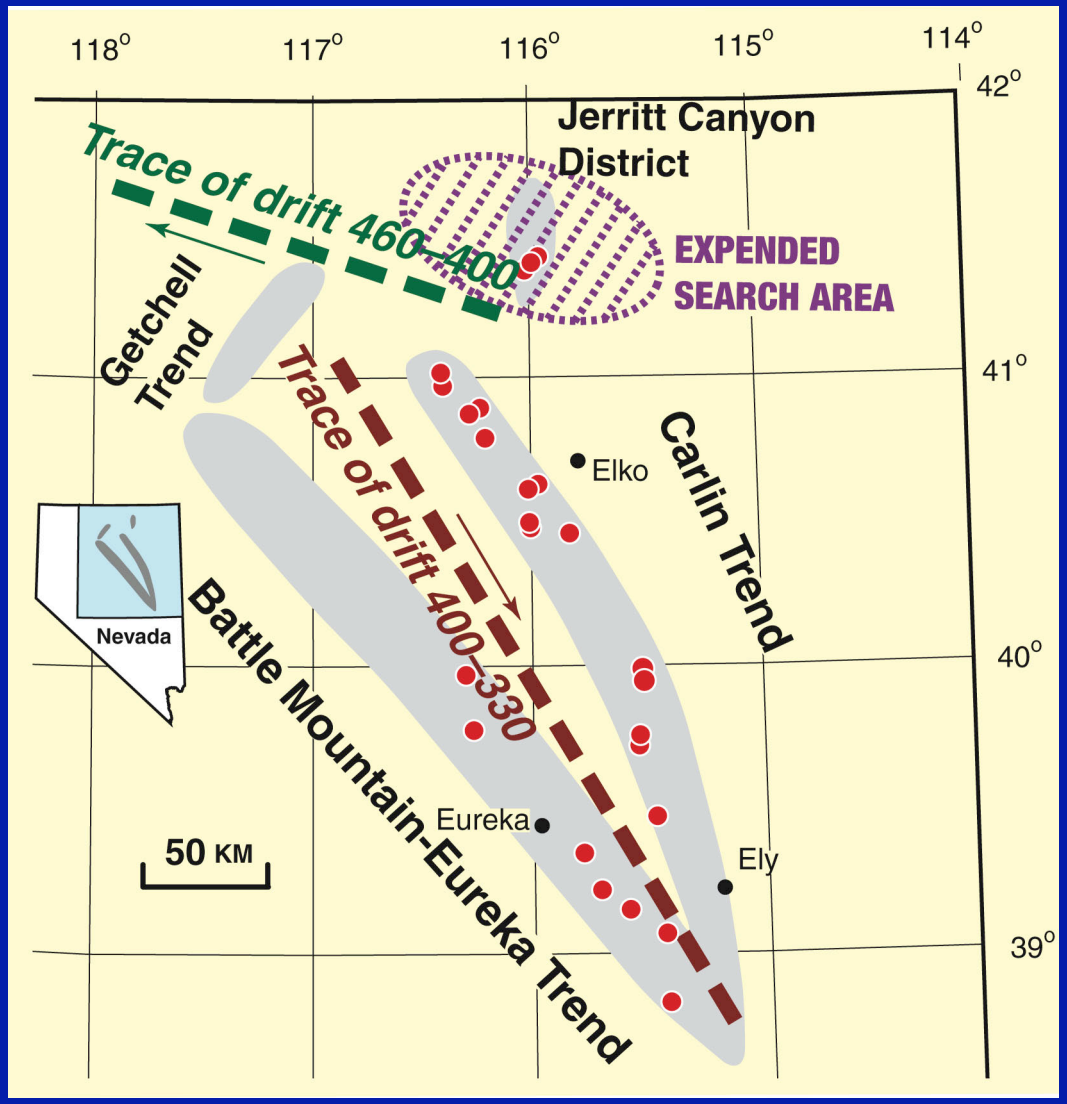
EXPLORATION IMPLICATION 1



Search areas may be expanded at right angles to Carlin-BM Eureka trends and in areas SE and NW of Jerritt Canyon

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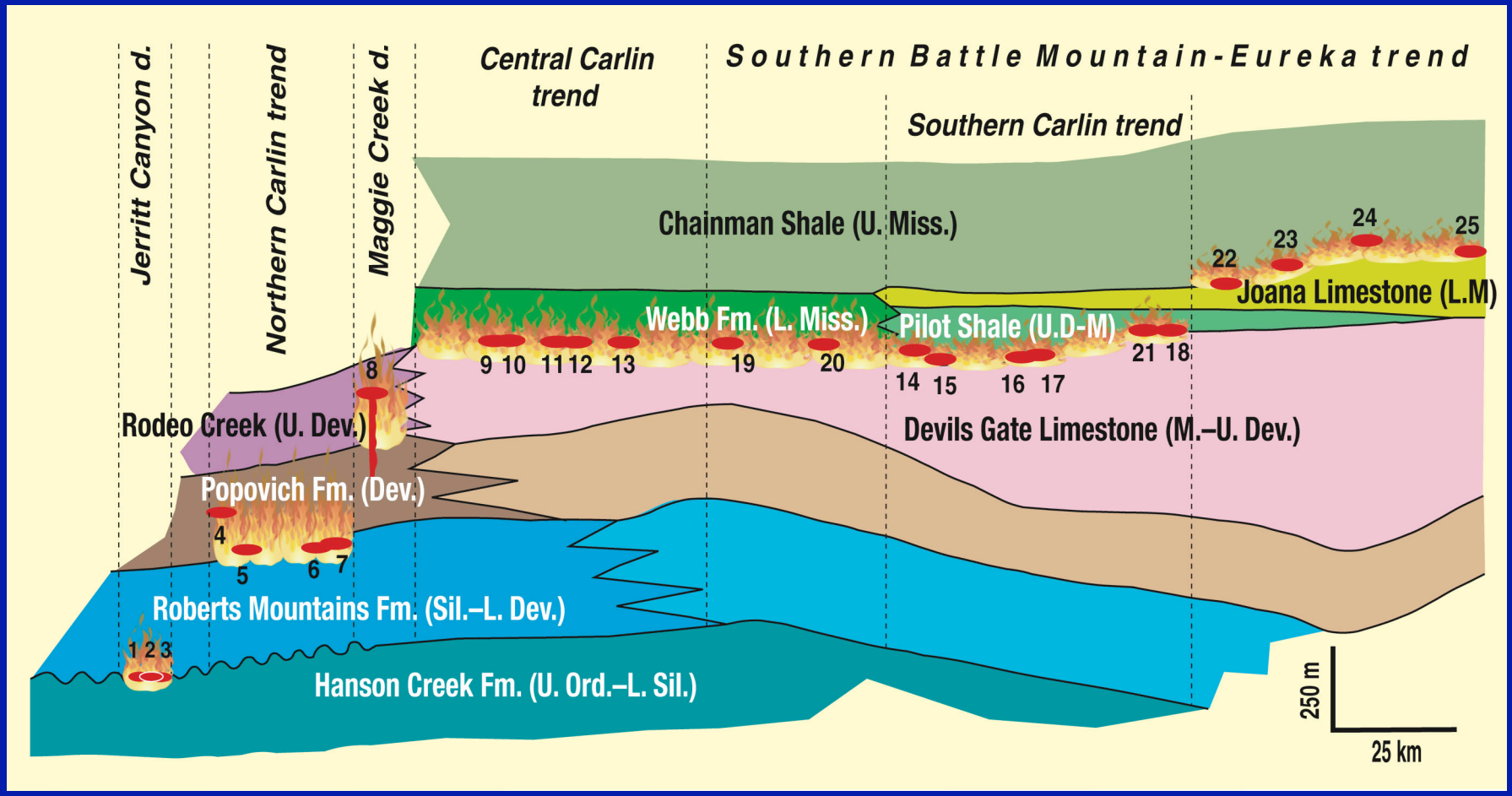
EXPLORATION IMPLICATION 2

Enhance exploration in lower plate by focusing on proper age rocks



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NEVADA GOLD FINAL PRODUCT

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