Seismic Source Characterization of the Southern Midland Fault, Sacramento-San Joaquin Delta

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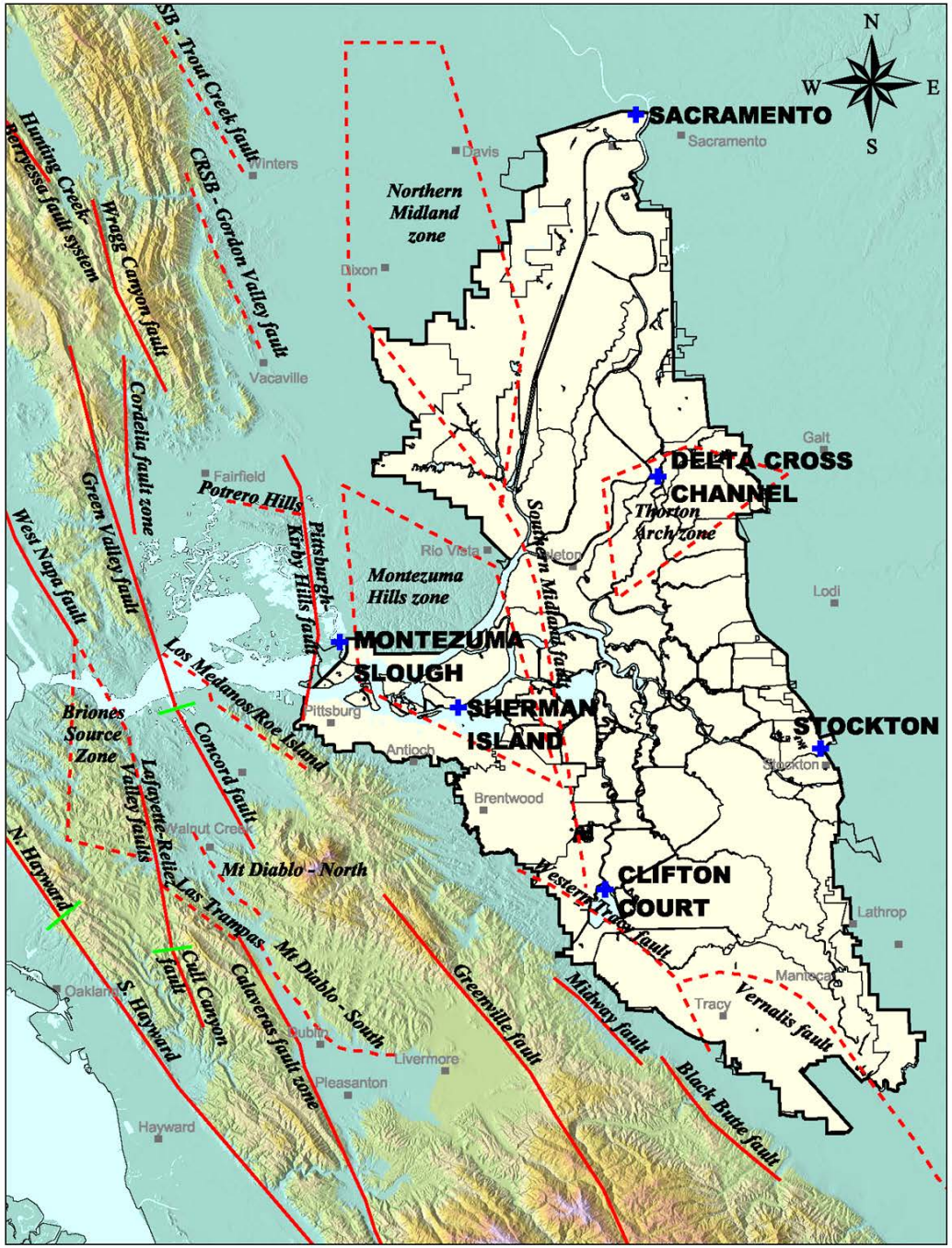
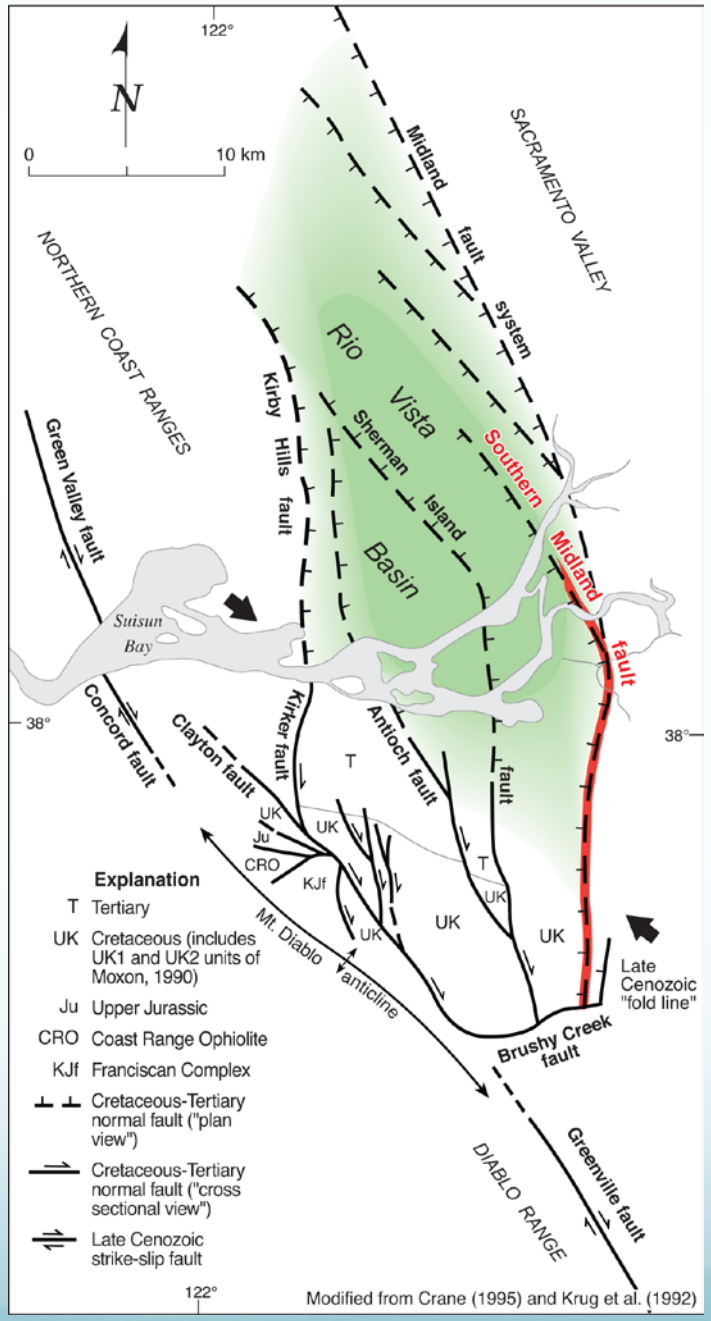
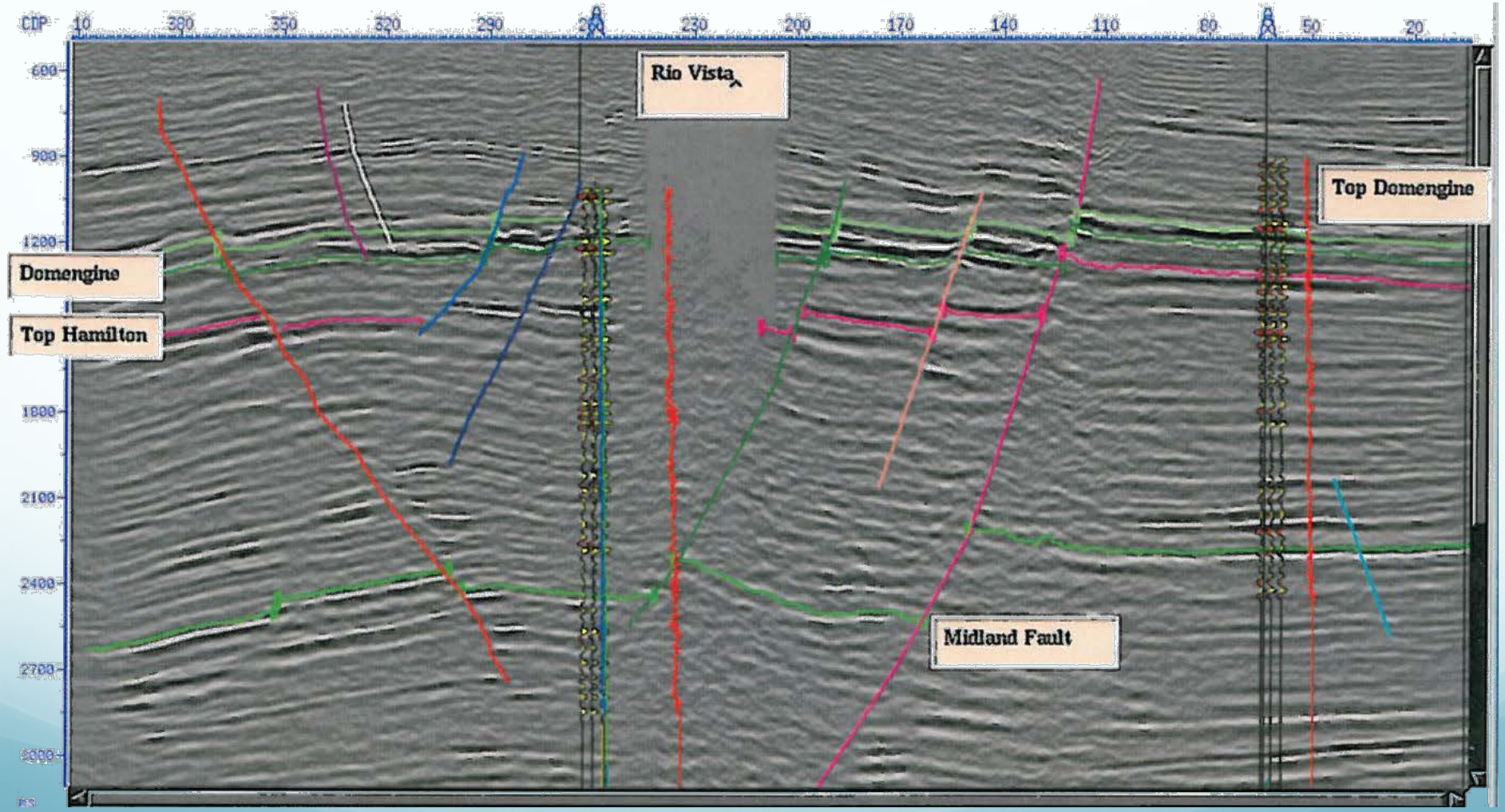
Seismic sources in and near the Delta for the DRMS study (URS/JBA 2008)



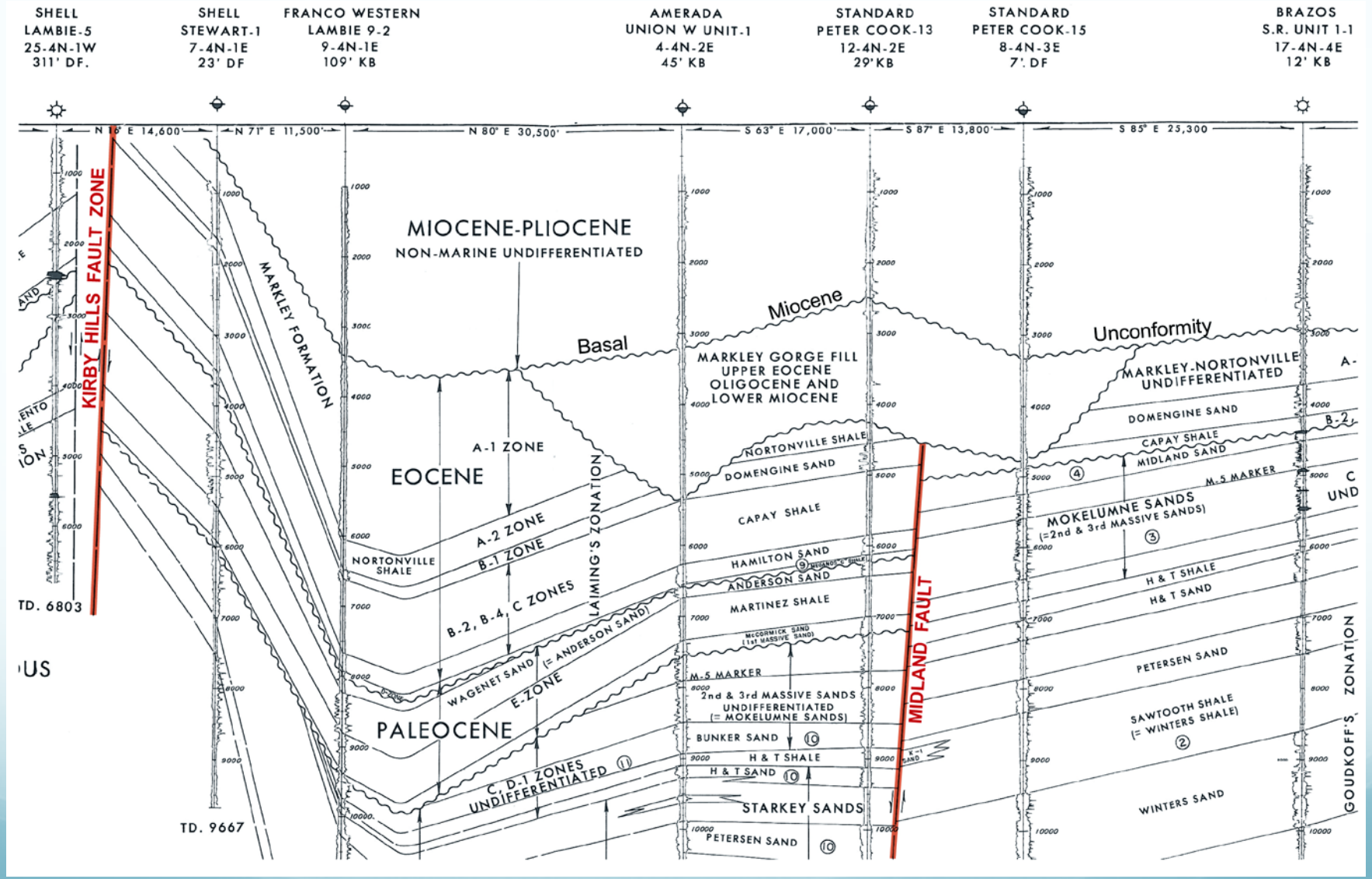

122°
N
0
10 km
Midland fault system
SACRAMENTO VALLEY
NORTHERN COAST RANGES
Rio Vista Basin
Sherman Island fault
Kirby Hills fault
Southern Midland fault
Green Valley fault
Suisun Bay
38°
Concord fault
Clayton fault
Kirker fault
Antioch fault
T
UK
Ju
CRO
KJf
Mt. Diablo anticline
Brushy Creek fault
Late Cenozoic "fold line"
Greenville fault
DIABLO RANGE
Explanation
T Tertiary
UK Cretaceous (includes UK1 and UK2 units of Moxon, 1990)
Ju Upper Jurassic
CRO Coast Range Ophiolite
KJf Franciscan Complex
Cretaceous-Tertiary normal fault ("plan view")
Cretaceous-Tertiary normal fault ("cross sectional view")
Late Cenozoic strike-slip fault
Modified from Crane (1995) and Krug et al. (1992)

Late Cenozoic Reactivation of the Southern Midland Fault

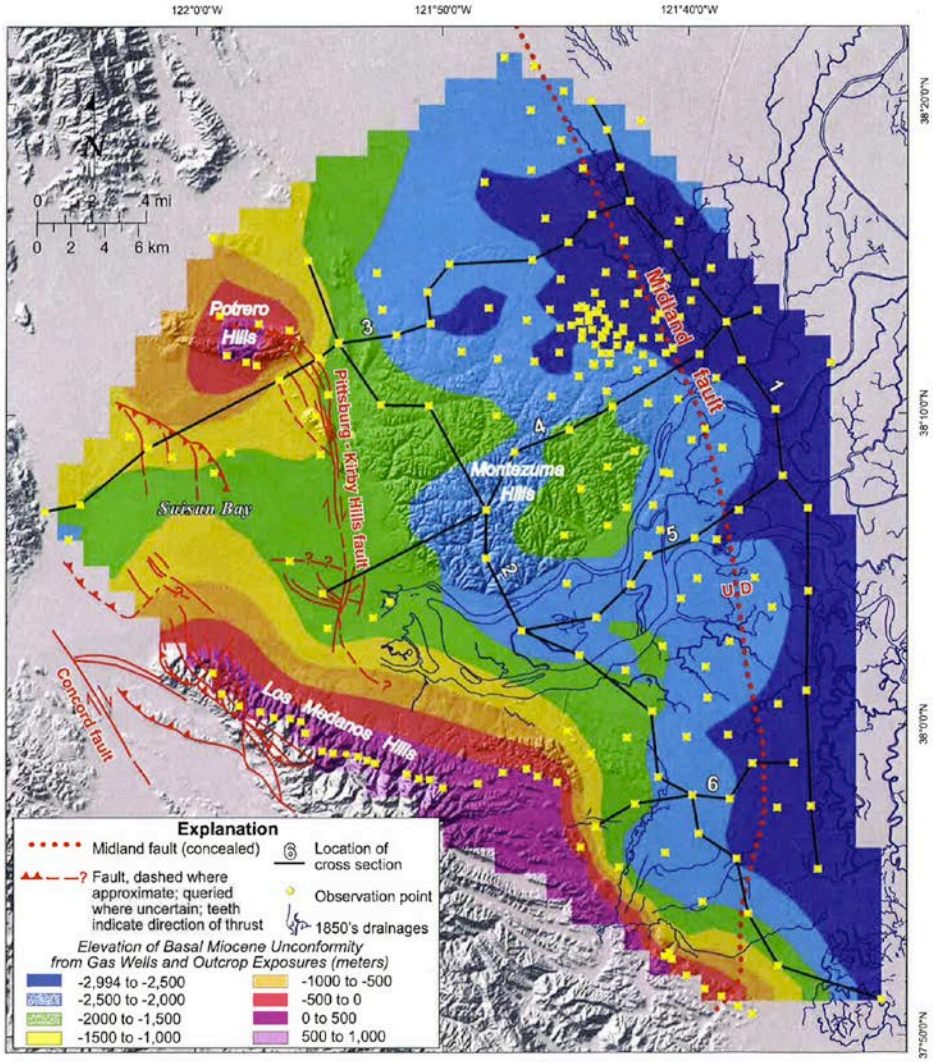
West East



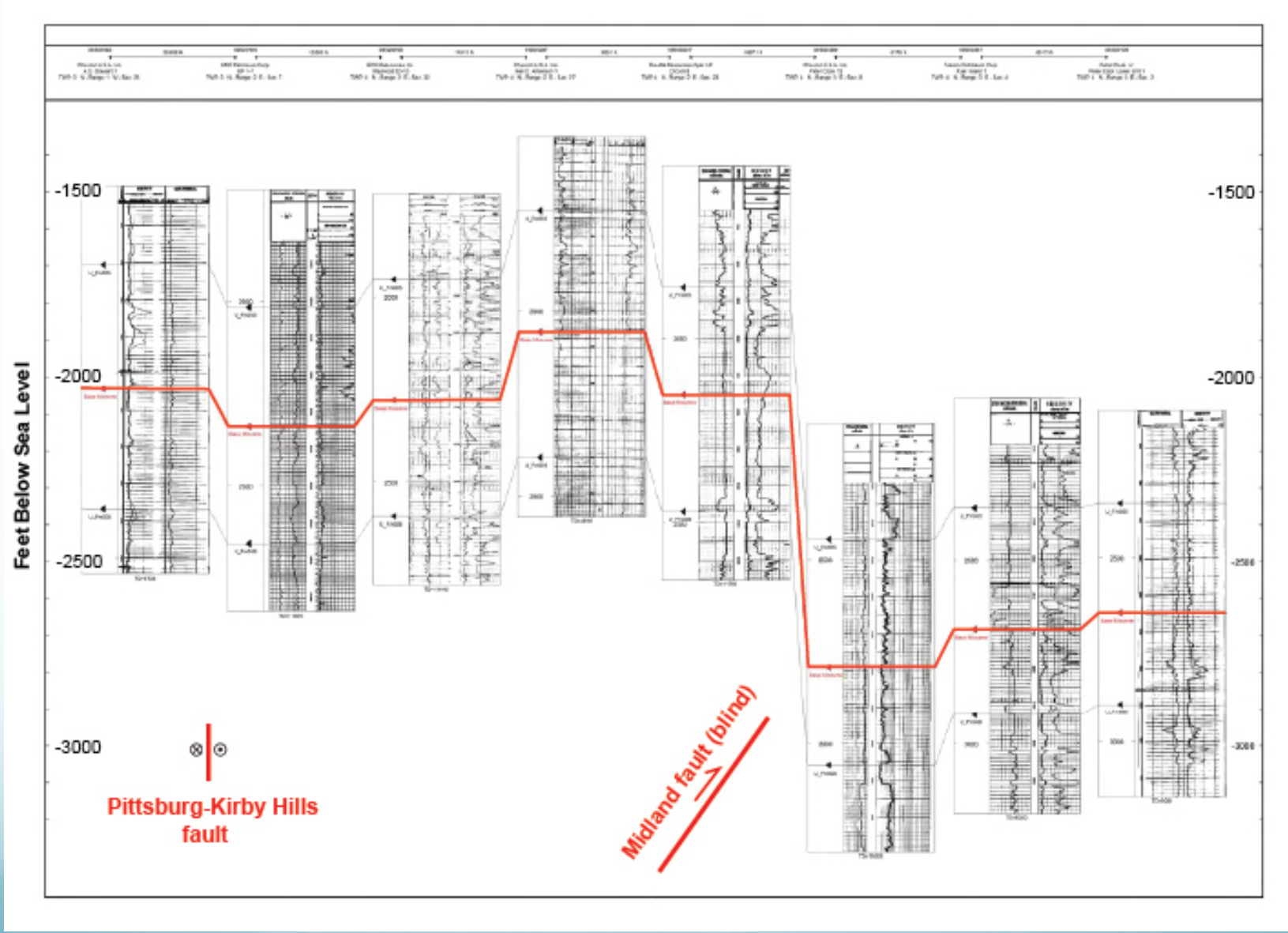
West East



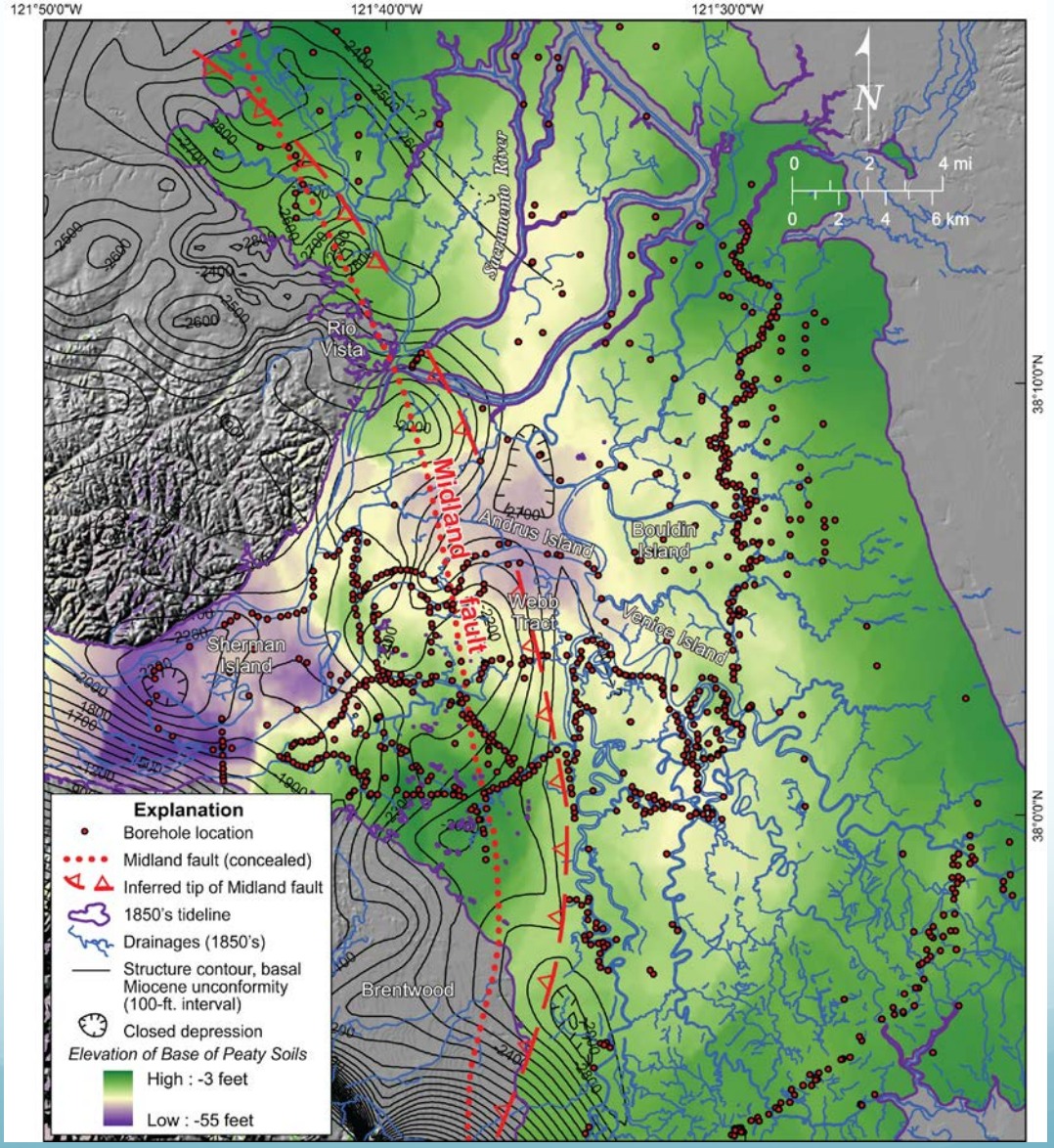
Pasquini and Milligan 1967


122°0'0"W
121°50'0"W
121°40'0"W
38°20'0"N
38°10'0"N
38°0'0"N
37°50'0"N
N
0 2 4 mi
0 2 4 6 km
Potrero Hills
Suisun Bay
Pittsburg - Kirby Hills fault
Montezuma Hills
Midland fault
U
D
Los Medanos Hills
Concord fault
1
2
3
4
5
6
Explanation
Midland fault (concealed)
Fault, dashed where approximate; queried where uncertain; teeth indicate direction of thrust
Location of cross section
Observation point
1850's drainages
Elevation of Basal Miocene Unconformity from Gas Wells and Outcrop Exposures (meters)
-2,994 to -2,500
-2,500 to -2,000
-2000 to -1,500
-1500 to -1,000
-1000 to -500
-500 to 0
0 to 500
500 to 1,000

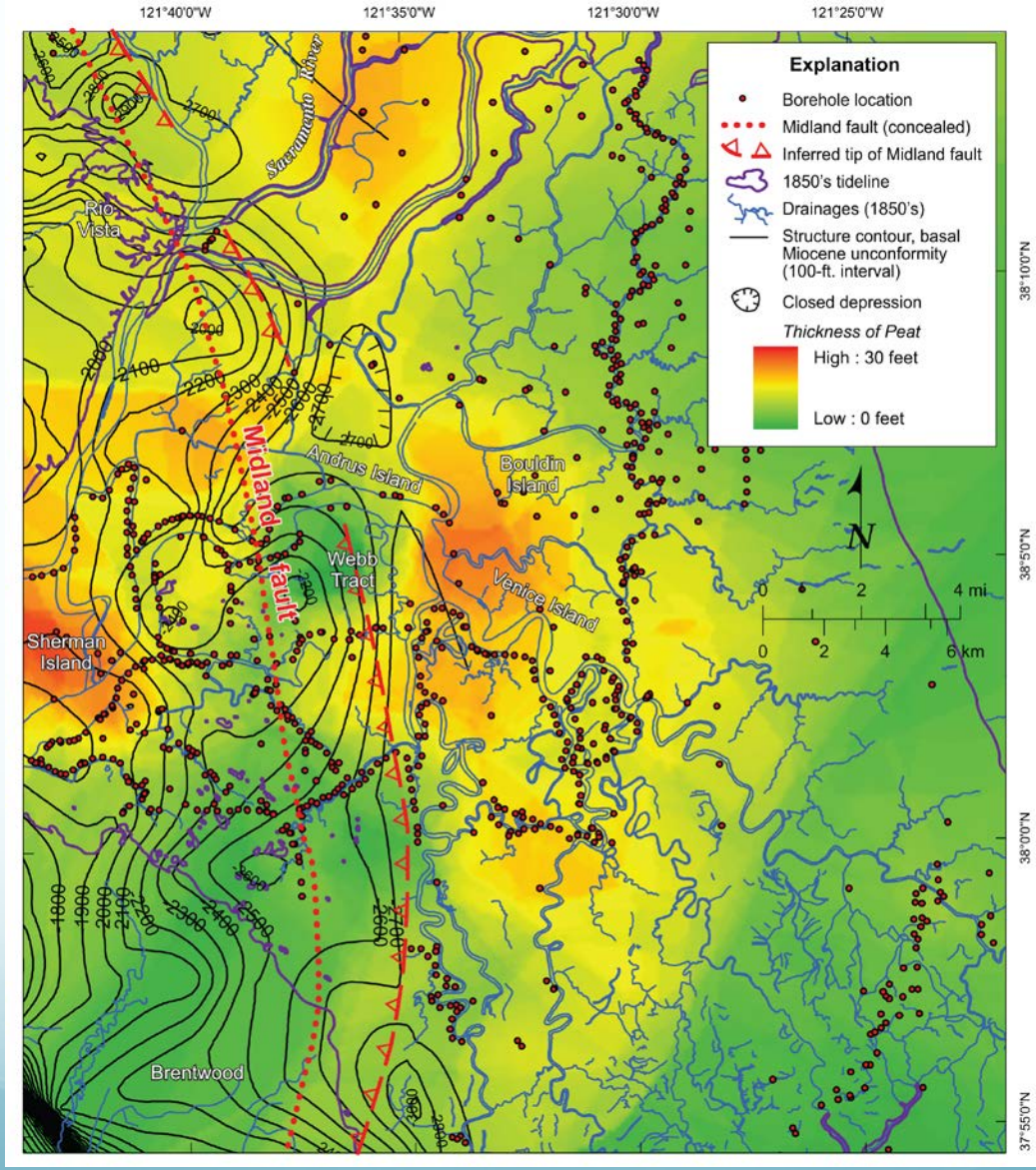
West East

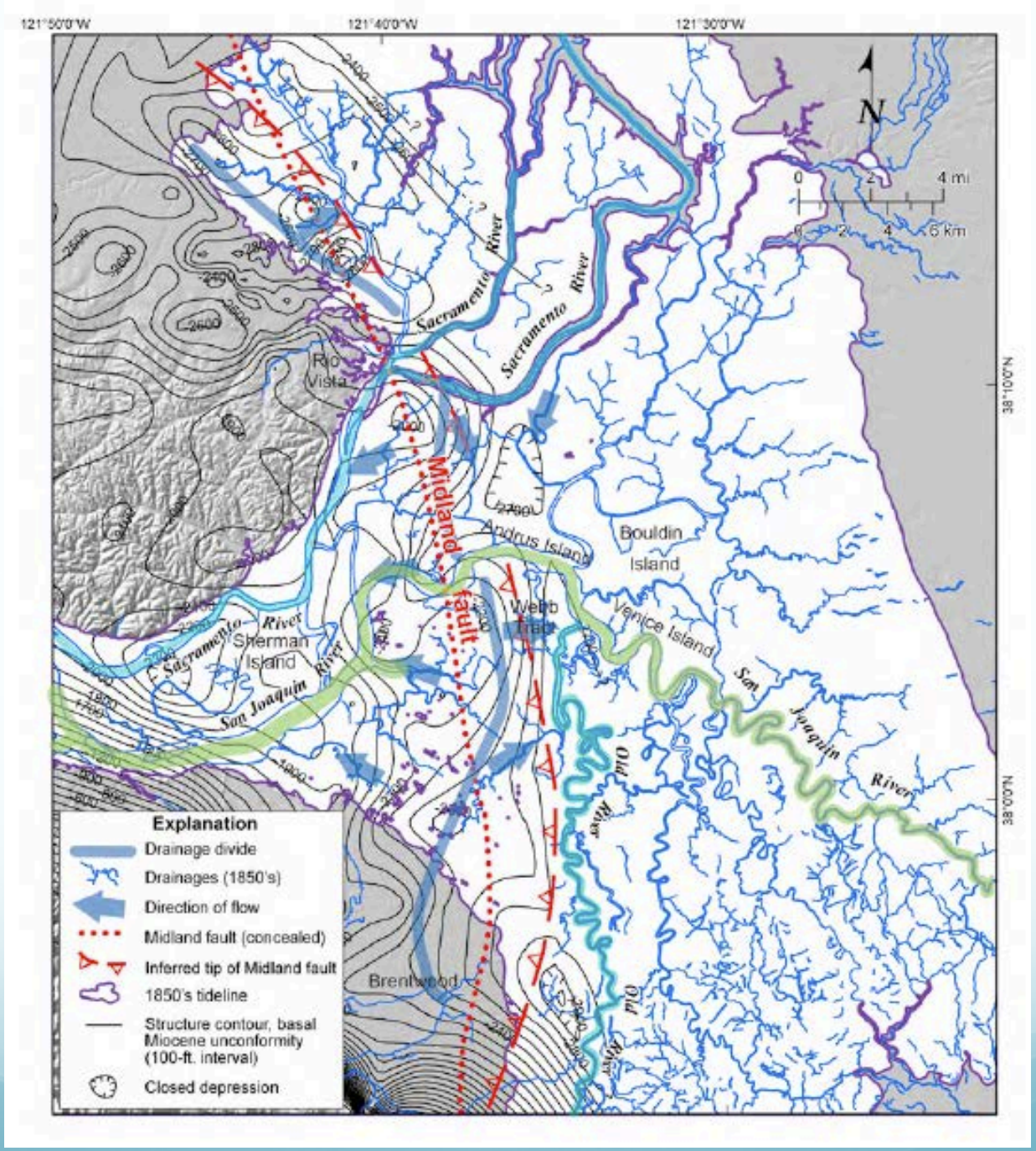

Feet Below Sea Level
-1500
-2000
-2500
-3000
-1500
-2000
Pittsburg-Kirby Hills fault
Midland fault (blind)

Structural Relief on the Base of Holocene Peat Deposits



Isopachs of Holocene Peat Thickness




121°50'0"W
121°40'0"W
121°30'0"W
38°10'0"N
38°0'0"N
N
0
2
4 mi
0
2
4
6 km
Sacramento River
Sacramento River
Rio Vista
Midland fault
Andrus Island
Bouldin Island
Webb Tract
Venice Island
Sherman Island
Sacramento River
San Joaquin River
San Joaquin River
Old River
Old River
Brentwood
Explanation
Drainage divide
Drainages (1850's)
Direction of flow
Midland fault (concealed)
Inferred tip of Midland fault
1850's tideline
Structure contour, basal Miocene unconformity (100-ft. interval)
Closed depression

Southern Midland Fault

- Late Cretaceous-Early Tertiary normal fault
- Reactivated as a reverse or oblique fault in late Cenozoic time
- Holocene peat thins westward in hanging wall
- Early 20th century drainage pattern suggest positive topographic relief in the hanging wall
- 213 m +/- 61 m late Cenozoic structural relief (0.07-0.1 mm/yr since about 5 Ma)
- 32 km long; **M** 6½ (SRL) to **M** 6¾ (RA)

Thanks!