Directions to meeting point for walk to the OSW outcrop of Paleocene Mount Soledad Conglomerate

Meet at the Torry Pines Glider Port. We will escort the group down the stairs to Blacks Beach starting at 9:30 AM on February 22. Park in the Southern lot of the Glider Port which is at the end of Torrey Pines Scenic Drive

https://maps.app.goo.gl/KJrf3ccYUTSw3uzL8

Getting to the south end of the Torrey Pines Glider Port parking area

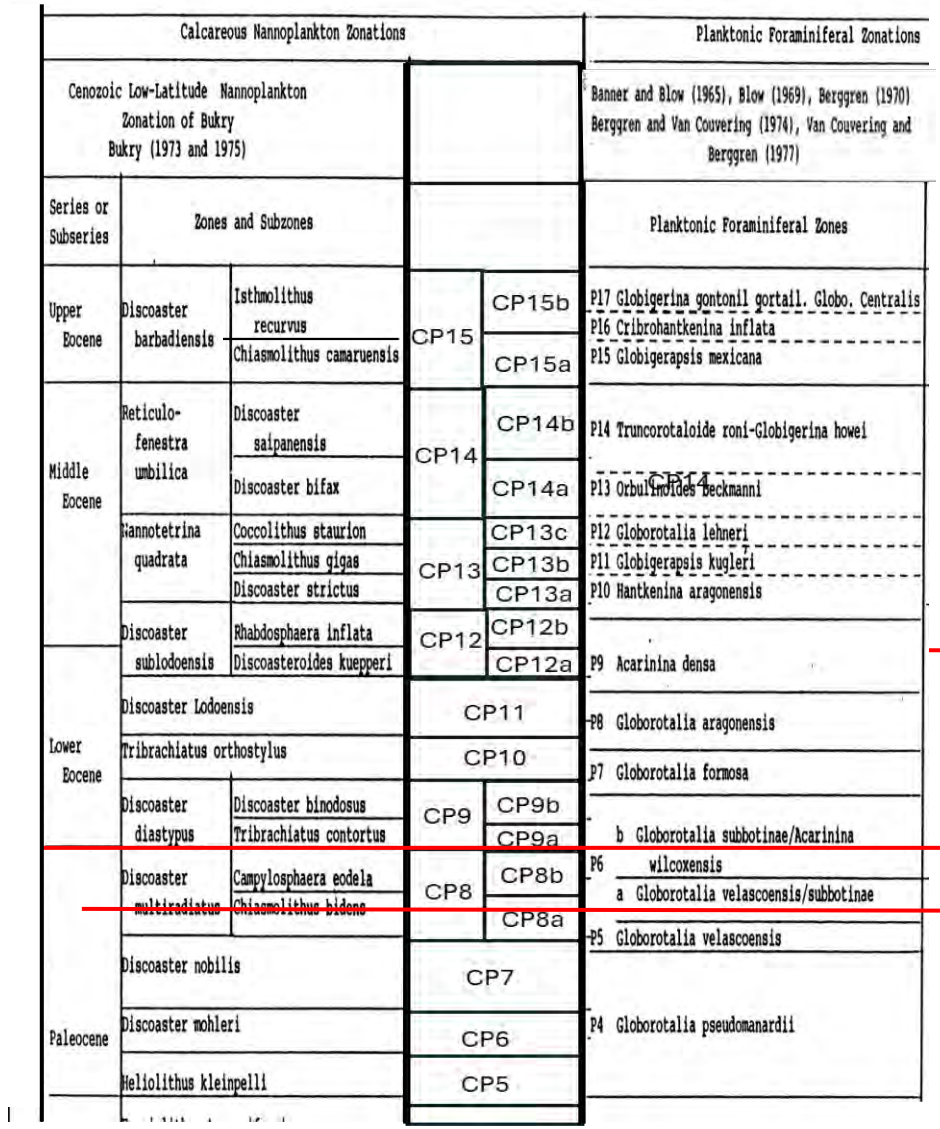
The Torrey Pines Glider Port is accessed off Highway 5.
Take Genesse Ave exit headed West.
At the third light take the left on to North Torrey Pines Road headed south.
Take a right at the second light off Torry Pine Road on to Torrey Pines Scenic Drive.
Drive to the end of the road to the dirt parking lot and find a place to park

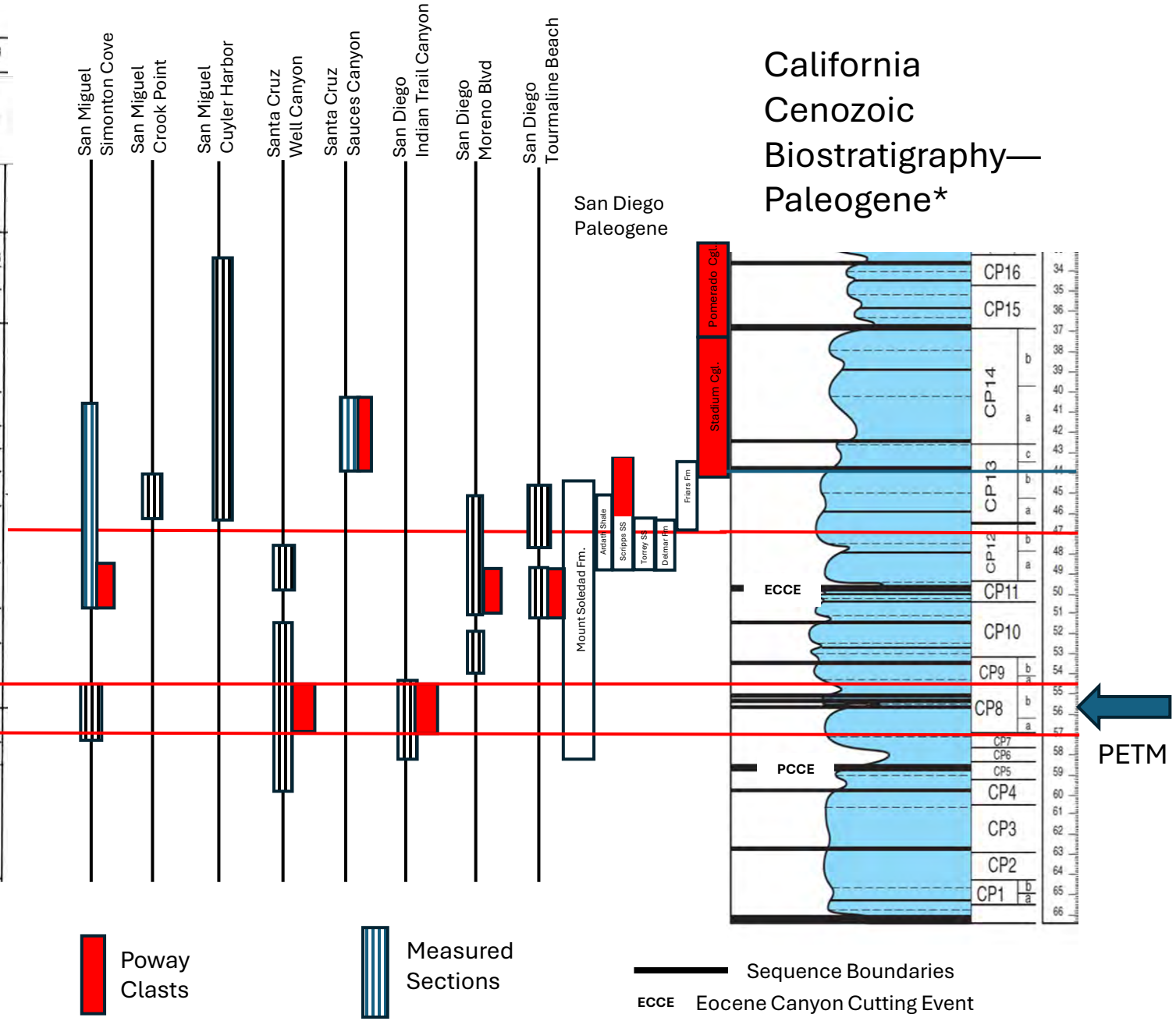
Paleocene–Eocene Thermal Maximum in San Diego

The impact of the Paleocene-Eocene Thermal Maximum (PETM) may be observed on an uppermost Paleocene conglomerate containing Poway rhyolite clasts and assignable to the Mount Soledad Formation in San Diego. This key 11-meter-thick section is in a relict hill that stands up within younger abutting Lower and Middle Eocene rocks in the cliffs in Torrey Pines State Beach. The most striking aspect of the conglomerate is its weathering profile . Upper horizons of this paleosol consist only of kaolinite and siliceous particles such as quartz grains and quartzite clasts. Poway rhyolite clasts well below the most intensely weathered part of the section are still recognizable but even these once ultradurable cobbles and pebbles are reduced to ghost-like outlines and their only unaltered parts are their original quartz phenocrysts. Although the effects of chemical weathering are pervasive, many original sedimentary structures are still recognizable and indicate deposition within the nonmarine part of a fan delta. Lithofacies, as well as nearly identical conglomerate-clast compositions, allow correlation with marine conglomerates at Well Canyon on Santa Cruz Island where calcareous nannofossils bracket these unique conglomerates between CP8a and CP9a zones at the Paleocene-Eocene boundary.

The age-equivalent heavily weathered, kaolinized conglomerate in outcrop at Indian Trail Canyon at Torrey Pines would then be no older than 57.2 MYA (CP8a zone) and no younger than 54 MYA (CP9a zone), an age range that encompasses the PETM (56 MYA). There is a 0.75 meter-thick interval with high purity kaolinite at the top of the section lying just below Late Early Eocene (CP12; 49.2 MYA) submarine canyon sandstone; this interval represents the maximum impact of chemical weathering under extremely high thermal conditions near the Paleocene-Eocene boundary.

California Cenozoic Biostratigraphy—Paleogene*

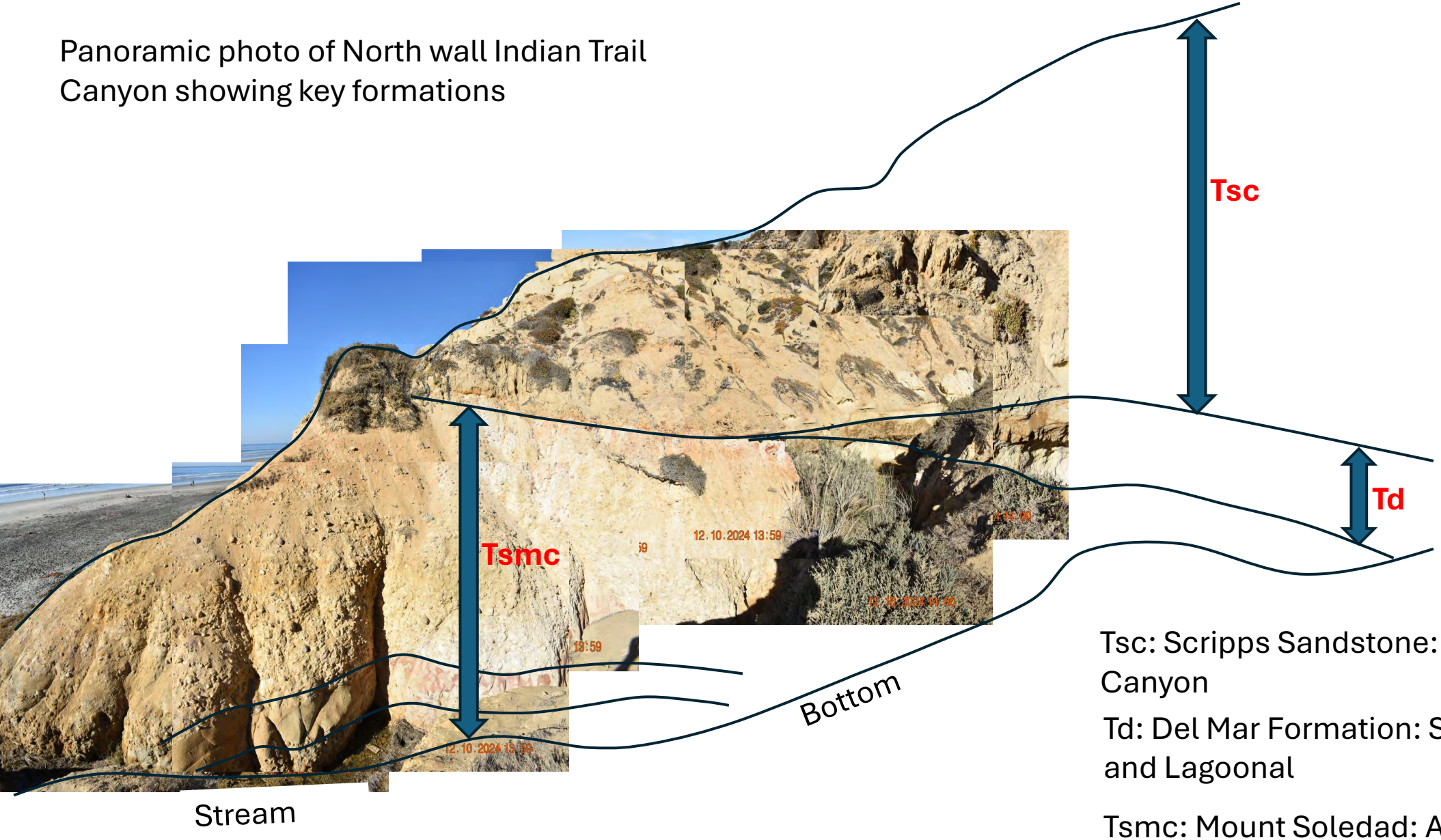




*California Cenozoic Biostratigraphy—Paleogene by Kristin McDougall 2007 in U.S. Geological Survey
Professional Paper 1713
Petroleum Systems and Geologic Assessment of Oil and Gas in the San Joaquin Basin Province, California
Edited by Allegra Hosford Scheirer

Panoramic photo of North wall Indian Trail Canyon

Panoramic photo of North wall Indian Trail Canyon showing key formations

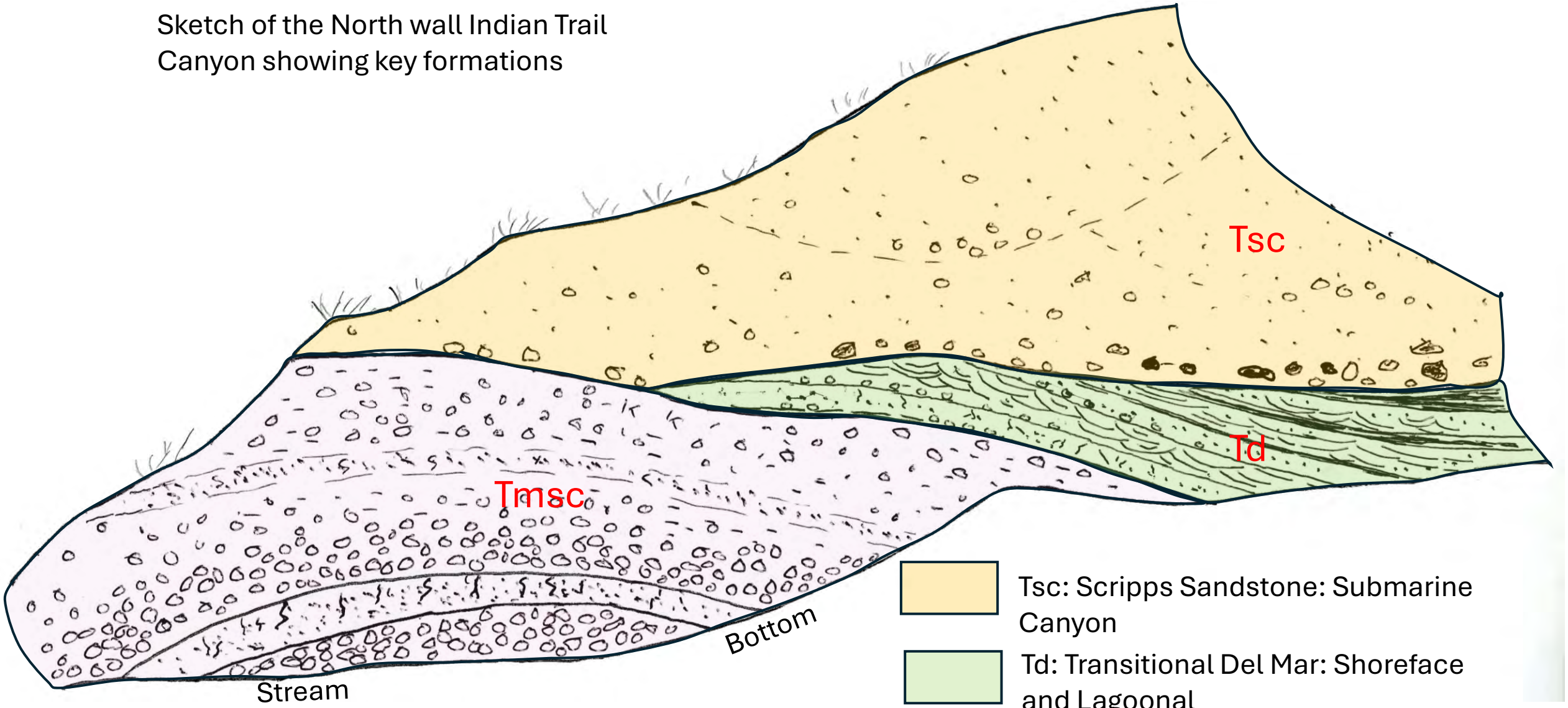


Tsc: Scripps Sandstone: Submarine Canyon

Td: Del Mar Formation: Shoreface and Lagoonal

Tsmc: Mount Soledad: Alluvial Fan to Subaqueous Fan Delta. Increasingly weathered upward

Sketch of the North wall Indian Trail Canyon showing key formations



Tsc: Scripps Sandstone: Submarine Canyon

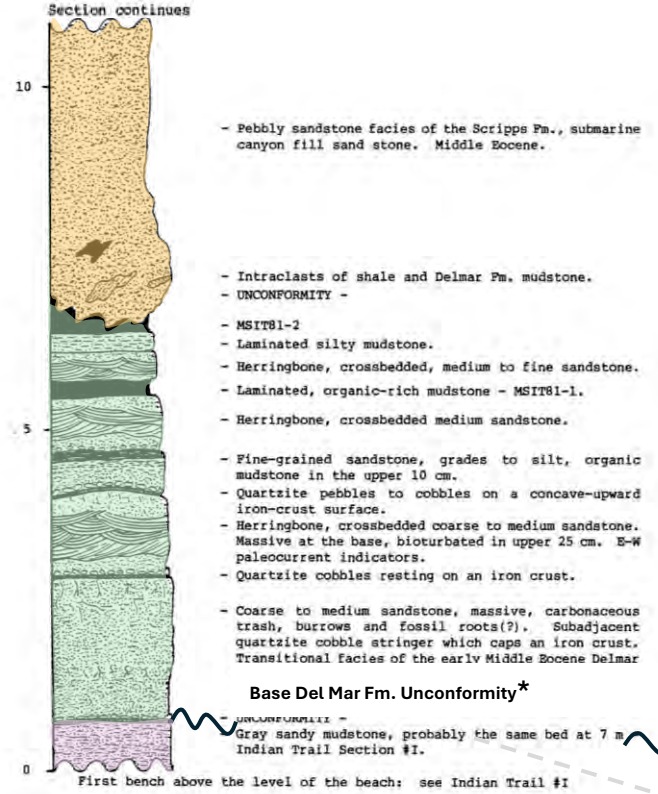
Td: Transitional Del Mar: Shoreface and Lagoonal

Tmsc: Mount Soledad: Alluvial Fan to Subaqueous Fan Delta. Increasingly weathered upward

Beach exposure of the Paleocene Mount Soledad Formation (Tmsc), Middle Eocene Scripps Sandstone (Tsc) and younger canyon fill (Qt)

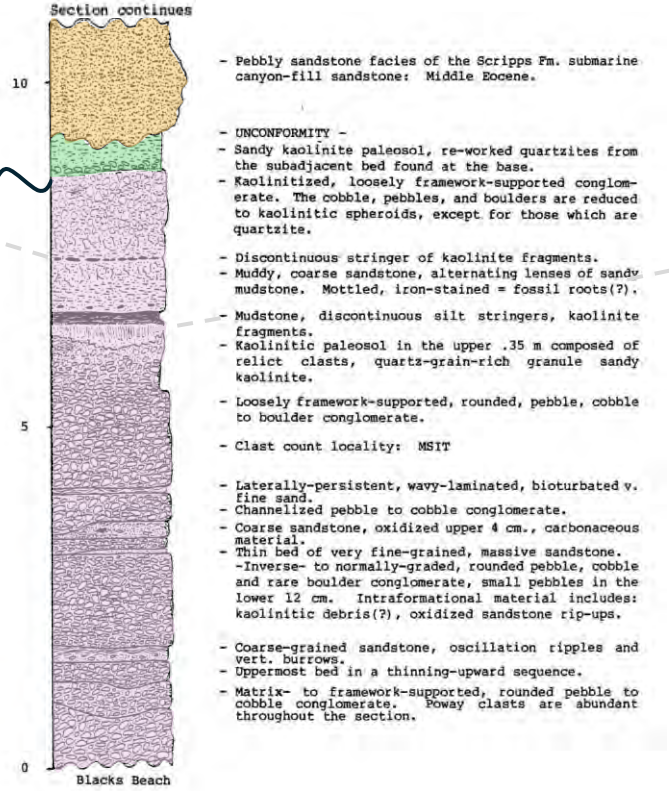
Traverse through Indian Trail to measure detail sections on the North and South walls of the canyon

Indian Trail Section #2: North Side of Indian Trail Canyon

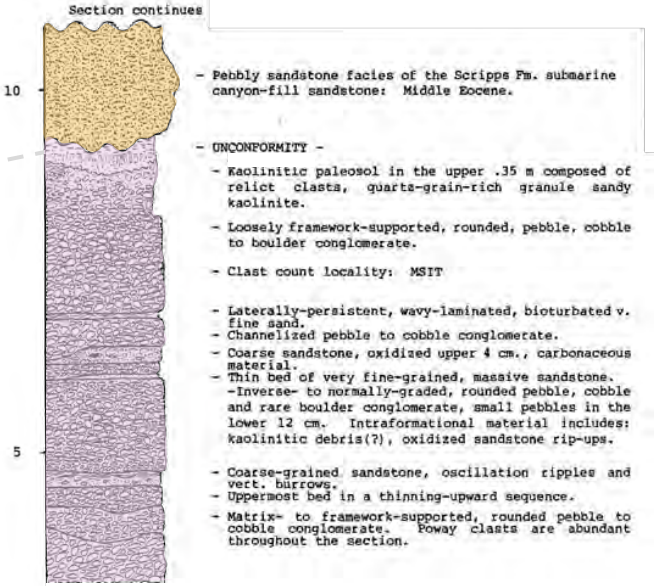


Stratigraphic correlation between North and South walls of Indian Trail Canyon and equivalents at the beach exposure

Indian Trail Section #1: South Side of Indian Trail Canyon



Section Exposed at Beach Level (see Photo)

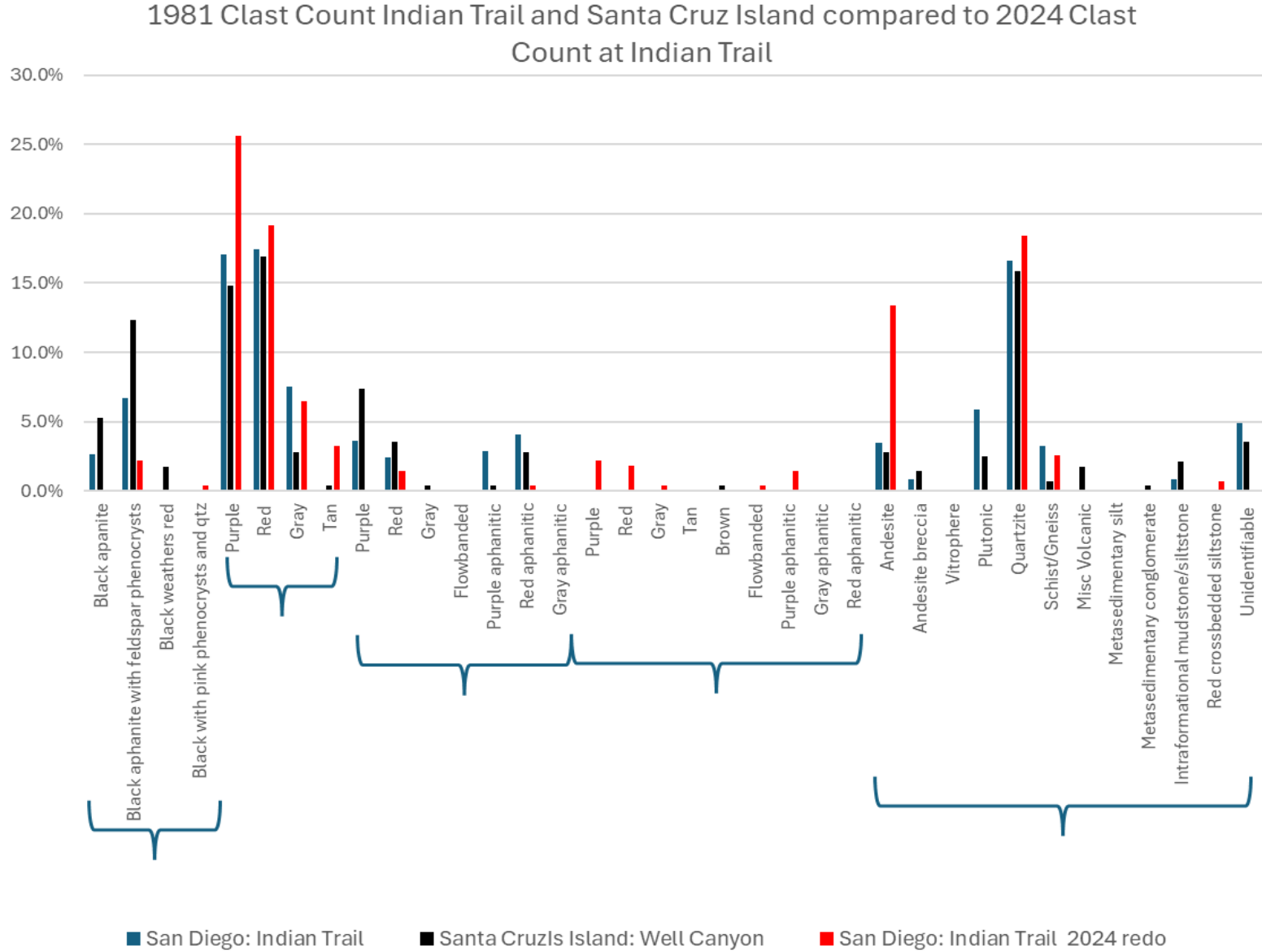


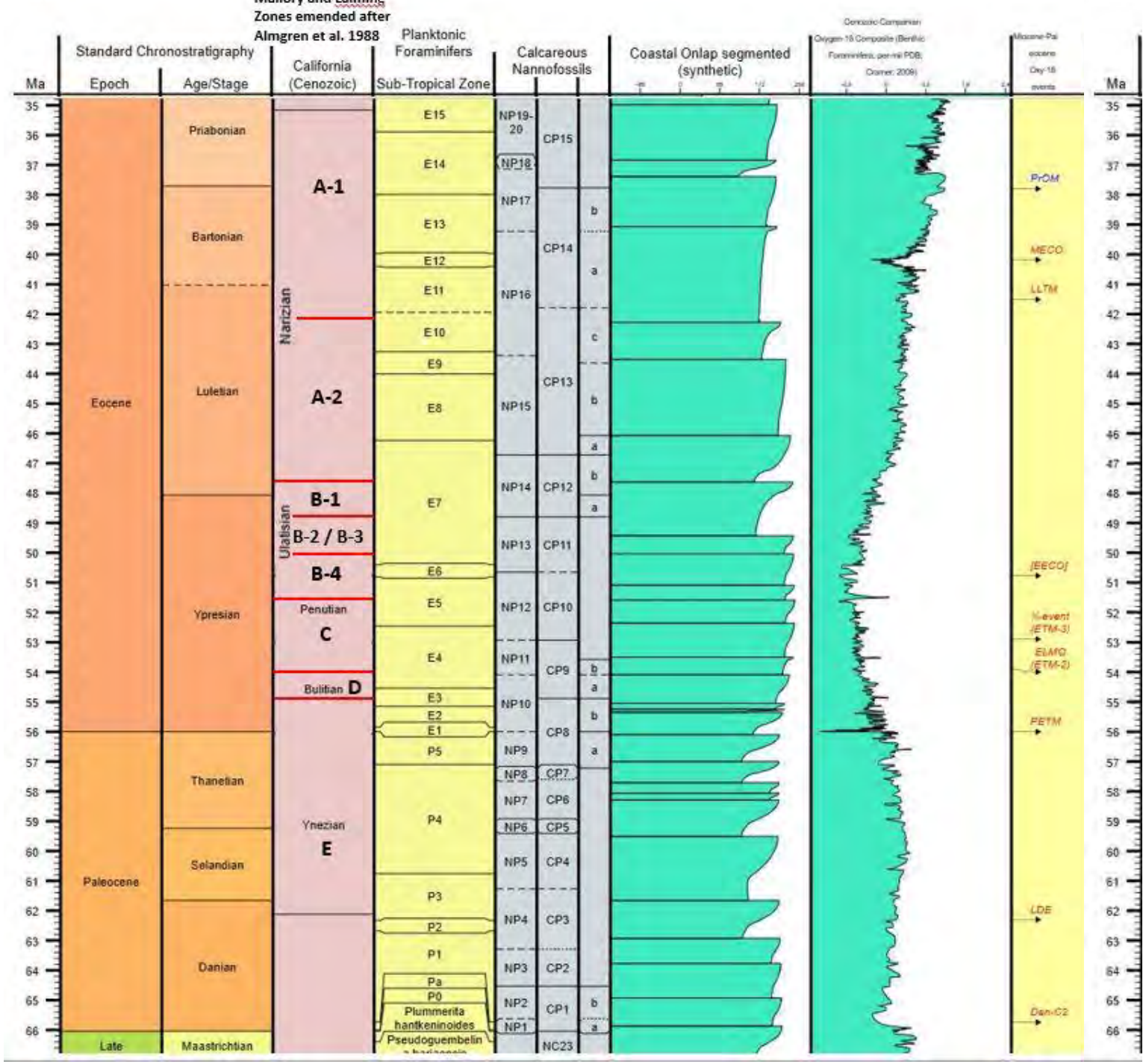
Scripps Sandstone: Submarine Canyon 49.2 to 39.0 Ma

Transitional Del Mar: Shoreface and Lagoonal 49.2 to 42.5 Ma

Mount Soledad: Alluvial Fan to Subaqueous Fan Delta. Increasingly weathered upward 55.0 to 57.0 Ma

*Unconformity at the base of the Del Mar Formation (Td) is marked by first occurrence of a gravel lag composed solely of reworked quartzite clasts from underlying weathered Mount Soledad Conglomerate (Tmsc).


1981 Clast Count Indian Trail and Santa Cruz Island compared to 2024 Clast Count at Indian Trail
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Black aphanite
Black aphanite with feldspar phenocrysts
Black weathers red
Black with pink phenocrysts and qtz
Purple
Red
Gray
Tan
Purple
Red
Gray
Flowbanded
Purple aphanitic
Red aphanitic
Gray aphanitic
Purple
Red
Gray
Tan
Brown
Flowbanded
Purple aphanitic
Gray aphanitic
Red aphanitic
Andesite
Andesite breccia
Vitrophere
Plutonic
Quartzite
Schist/Gneiss
Misc Volcanic
Metasedimentary silt
Metasedimentary conglomerate
Intraformational mudstone/siltstone
Red crossbedded siltstone
Unidentifiable
San Diego: Indian Trail
Santa CruzIs Island: Well Canyon
San Diego: Indian Trail 2024 redo


Zones emended after
Almgren et al. 1988
Standard Chronostratigraphy
Ma
Epoch
Age/Stage
California (Cenozoic)
Planktonic Foraminifers
Sub-Tropical Zone
Calcareous Nannofossils
Coastal Onlap segmented (synthetic)
Cenozoic Campanian
Oxygen-18 Composite (Benthic Foraminifera, per-mil PDB; Cramer, 2009)
Miocene-Pal
eocene
Oxy-18
events
Eocene
Paleocene
Late
Priabonian
Bartonian
Lutetian
Ypresian
Thanetian
Selandian
Danian
Maastrichtian
Narizian
Ulatisian
Penutian
Bulitian
Ynezian
A-1
A-2
B-1
B-2 / B-3
B-4
C
D
E
E15
E14
E13
E12
E11
E10
E9
E8
E7
E6
E5
E4
E3
E2
E1
P5
P4
P3
P2
P1
Pa
P0
Plummerita hantkeninoides
Pseudoguembelin
NP19-20
NP18
NP17
NP16
NP15
NP14
NP13
NP12
NP11
NP10
NP9
NP8
NP7
NP6
NP5
NP4
NP3
NP2
NP1
CP15
CP14
CP13
CP12
CP11
CP10
CP9
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP1
NC23
PrOM
MECO
LLTM
[EECO]
M-event (ETM-3)
ELMO (ETM-2)
PETM
LDE
Dan/C2