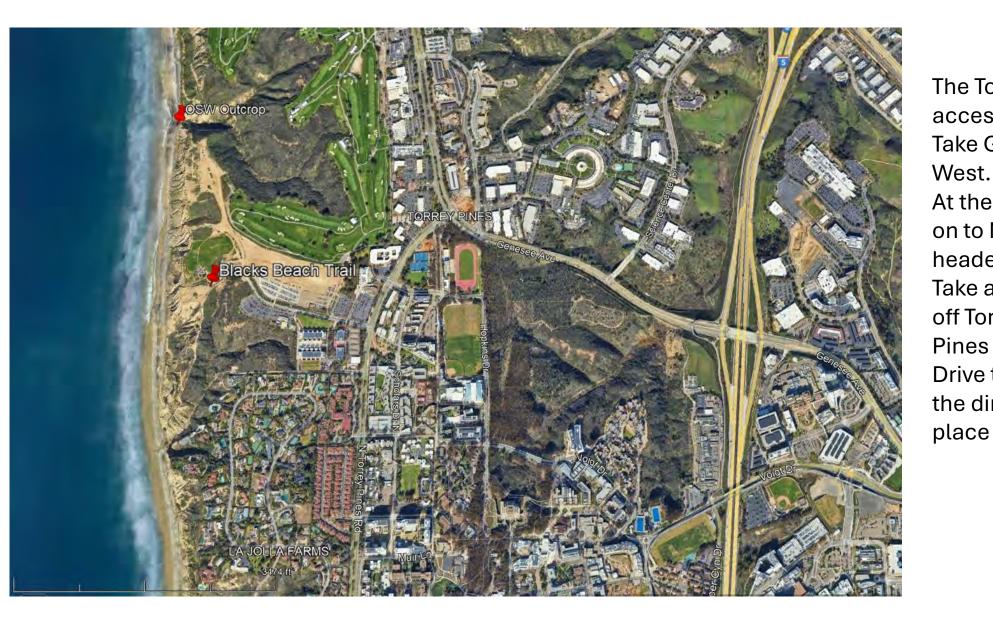
Directions to meeting point for walk to the OSW outcrop of Paleocene Mount Soledad Conglomerate

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



### 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

At the third light take the left on to North Torrey Pines Road headed south.

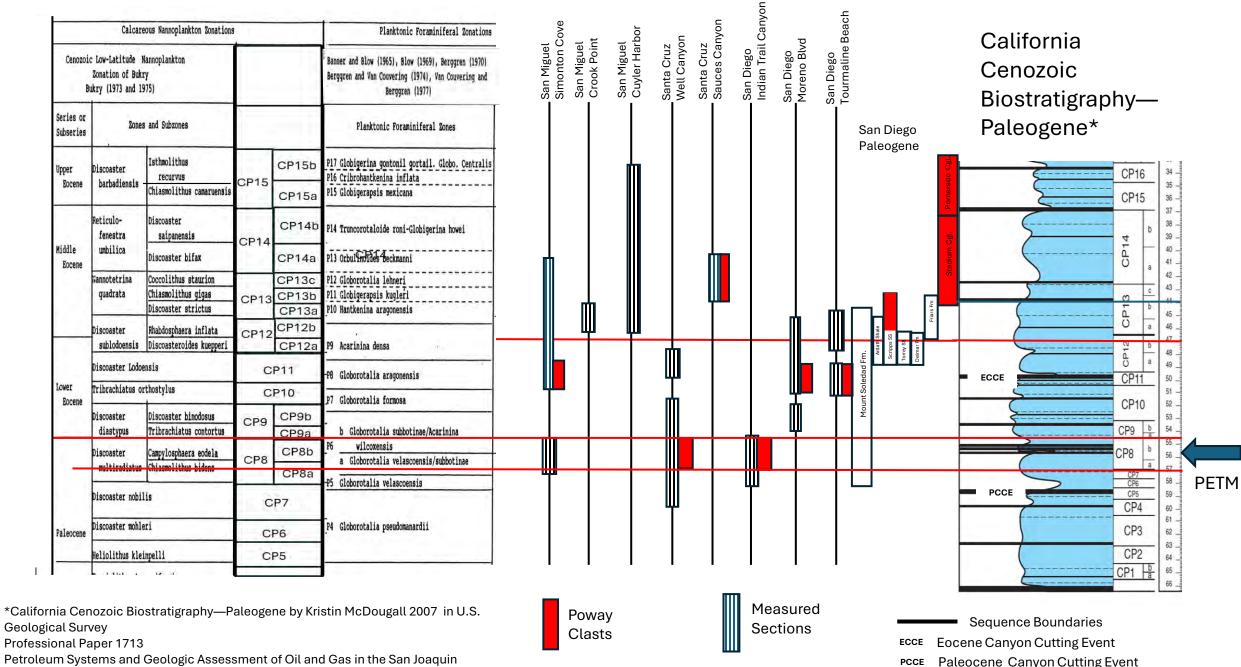
Take a right at the second light off Torry Pine Road on to Torrey Pines Scenic Drive.

Drive to the end of the road to the dirt parking lot and find a place to park

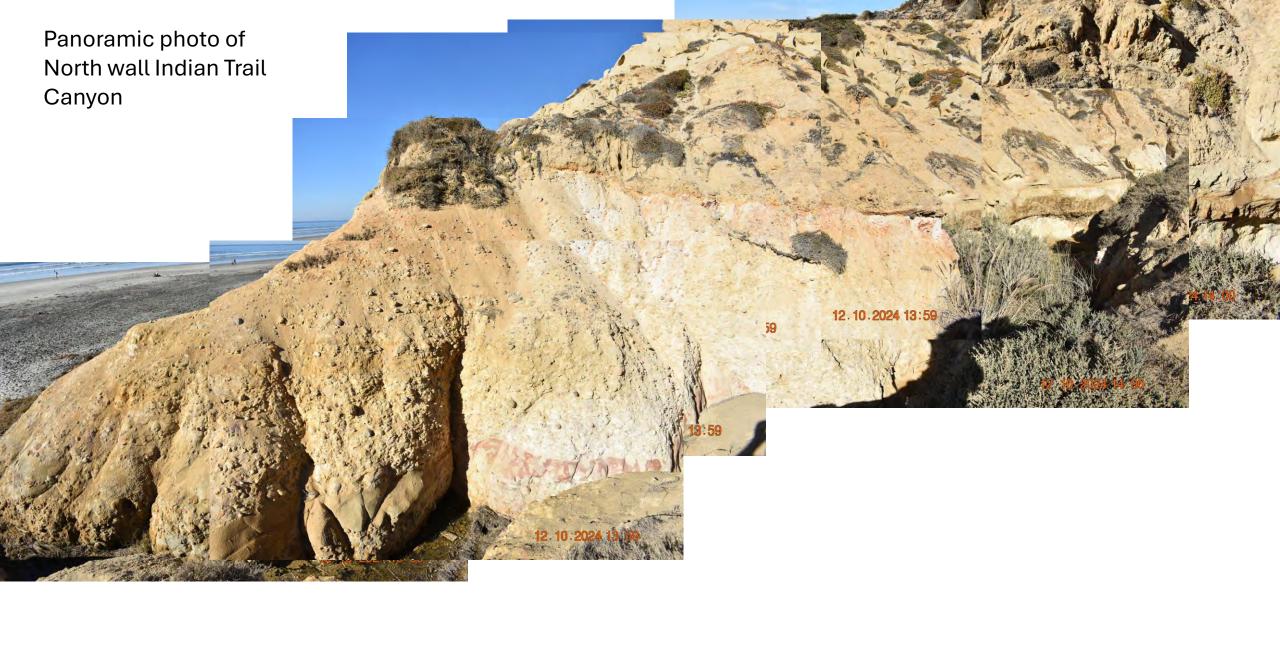
## Paleocene-Eocene Thermal Maximum in San Diego

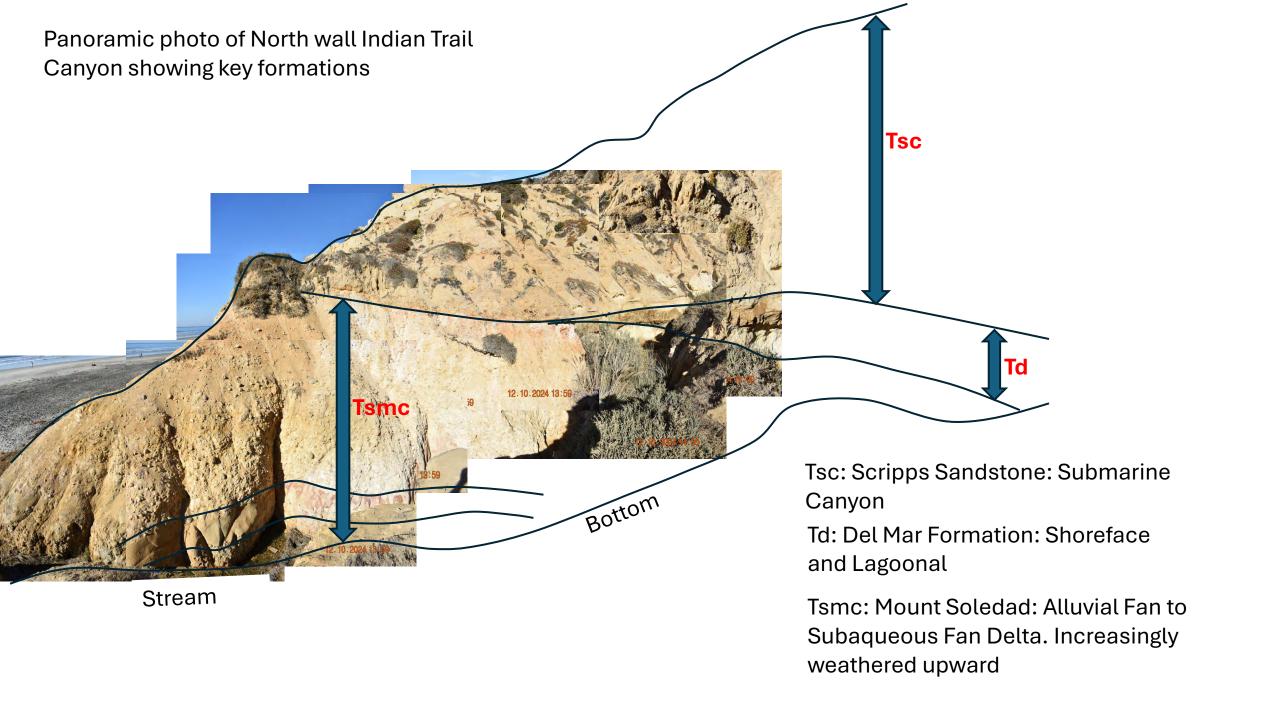
The impact of the Paleocene-Eocene Thermal Maximum (PETM) may be observed on an uppermost Paleocene conglomerate containing Poway rhyolite clasts and assignable to the Mount Soledad Formation in San Diego. This key 11-meter-thick section is in a relict hill that stands up within younger abutting Lower 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.

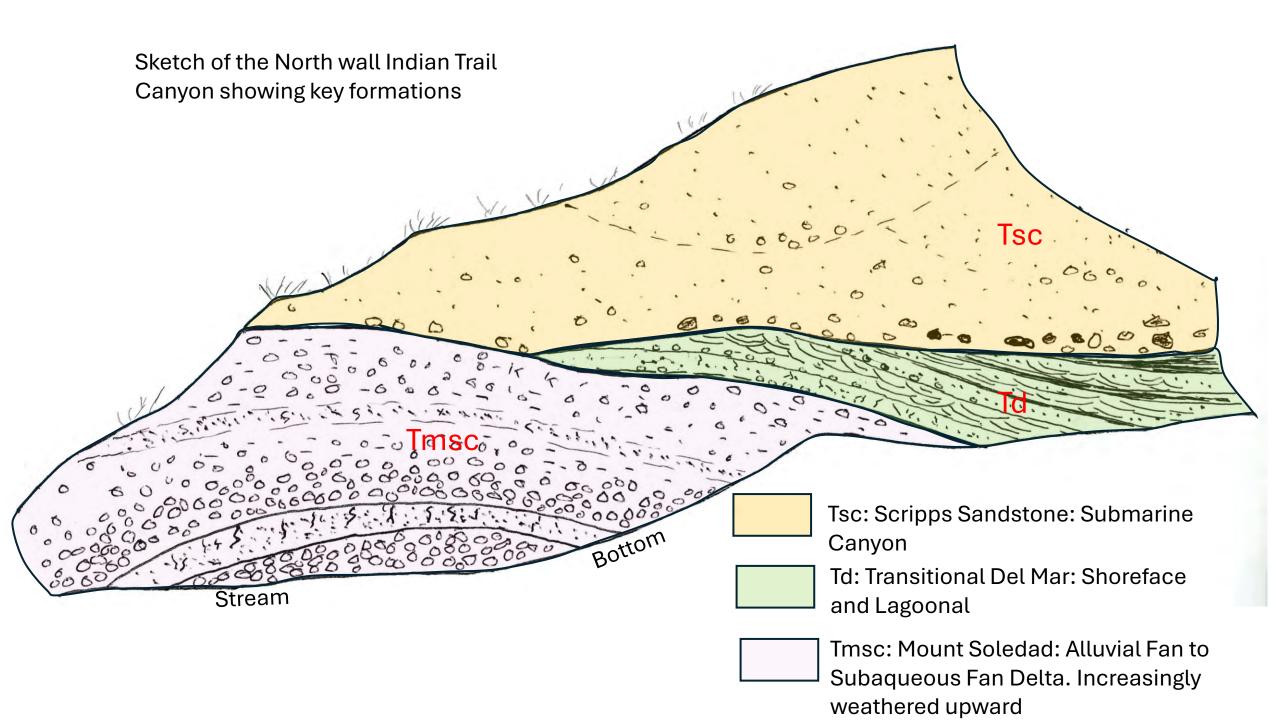
The age-equivalent heavily weathered, kaolinized conglomerate in outcrop at Indian Trail Canyon at Torrey Pines would then be no older than 57.2 MYA (CP8a zone) and no younger than 54 MYA (CP9a zone), an age range that encompasses the PETM (56 MYA). There is a 0.75 meter-thick interval with high purity 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.



Professional Paper 1713 Petroleum Systems and Geologic Assessment of Oil and Gas in the San Joaquin Basin Province, California Edited by Allegra Hosford Scheirer







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

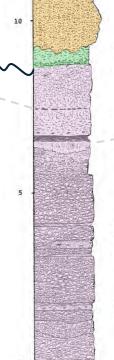


### Indian Trail Section #2: North Side of Indian Trail Canyon

10 - Pebbly sandstone facies of the Scripps Fm., submarine canyon fill sand stone. Middle Eocene. - Intraclasts of shale and Delmar Pm. mudstone. - UNCONFORMITY -- MSIT81-2 - Laminated silty mudstone. - Herringbone, crossbedded, medium to fine sandstone. - Laminated, organic-rich mudstone - MSIT81-1. - Herringbone, crossbedded medium sandstone. - Fine-grained sandstone, grades to silt, organic mudstone in the upper 10 cm. Quartzite pebbles to cobbles on a concave-upward iron-crust surface. Herringbone, crossbedded coarse to medium sandstone. Massive at the base, bioturbated in upper 25 cm. E-W paleocurrent indicators. - Quartzite cobbles resting on an iron crust. Coarse to medium sandstone, massive, carbonaceous trash, burrows and fossil roots(?). Subadjacent quartzite cobble stringer which caps an iron crust. Transitional facies of the early Middle Rocene Delmar Base Del Mar Fm. Unconformity Gray sandy mudstone, probably the same Indian Trail Section #1. First bench above the level of the beach: see Indian Trail #1 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).

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



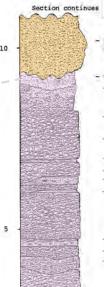
Blacks Beach

Section continues

- Pebbly sandstone facies of the Scripps Fm. submarine canyon-fill sandstone: Middle Eocene.

- Sandy kaolinite paleosol, re-worked quartzites from the subadjacent bed found at the base.
- Kaolinitized, loosely framework-supported conglomerate. The cobble, pebbles, and boulders are reduced to kaolinitic spheroids, except for those which are
- Discontinuous stringer of kaolinite fragments.
- Muddy, coarse sandstone, alternating lenses of sandy mudstone. Mottled, iron-stained = fossil roots(?).
- Mudstone, discontinuous silt stringers, kaolinite
- Kaolinitic paleosol in the upper .35 m composed of relict clasts, quartz-grain-rich granule sandy
- Loosely framework-supported, rounded, pebble, cobble to boulder conglomerate.
- Clast count locality: MSIT
- Laterally-persistent, wavy-laminated, bioturbated v.
- Channelized pebble to cobble conglomerate.
- Coarse sandstone, oxidized upper 4 cm., carbonaceous
- material.
  Thin bed of very fine-grained, massive sandstone. -Inverse- to normally-graded, rounded pebble, cobble and rare boulder conglomerate, small pebbles in the lower 12 cm. Intraformational material includes: kaolinitic debris(?), oxidized sandstone rip-ups.
- Coarse-grained sandstone, oscillation ripples and vert. burrows. Uppermost bed in a thinning-upward sequence.
- Matrix- to framework-supported, rounded pebble to cobble conglomerate. Poway clasts are abundant throughout the section.

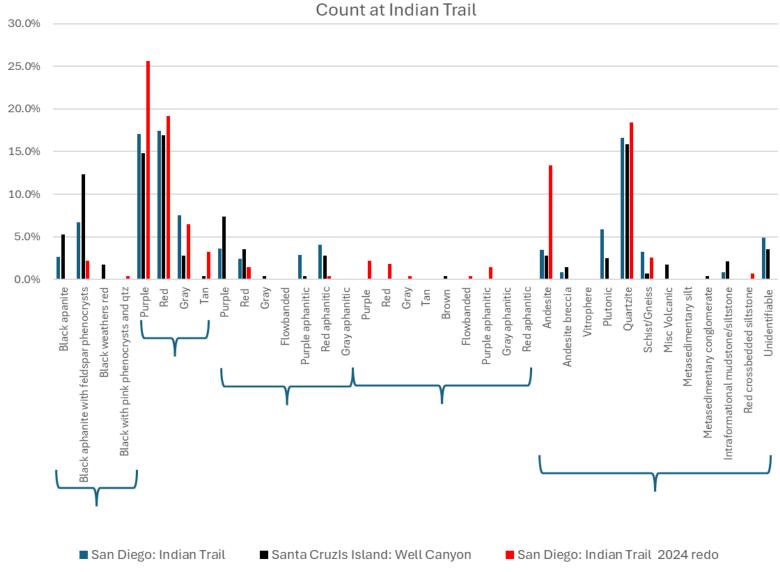
## Section Exposed at Beach Level (see Photo)



Pebbly sandstone facies of the Scripps Pm. submarine canyon-fill sandstone: Middle Eocene

- Kaolinitic paleosol in the upper .35 m composed of relict clasts, quarts-grain-rich granule sandy
- Loosely framework-supported, rounded, pebble, cobble to boulder conglomerate.
- Clast count locality: MSIT
- Laterally-persistent, wavy-laminated, bioturbated v. fine sand.
- Channelized pebble to cobble conglomerate.
- Coarse sandstone, oxidized upper 4 cm., carbonaceous
- material.
  Thin bed of very fine-grained, massive sandstone. -Inverse- to normally-graded, rounded pebble, cobble and rare boulder conglomerate, small pebbles in the lower 12 cm. Intraformational material includes: kaolinitic debris(?), oxidized sandstone rip-ups.
- Coarse-grained sandstone, oscillation ripples and vert. burrows. Uppermost bed in a thinning-upward sequence.
- Matrix- to framework-supported, rounded pebble to cobble conglomerate. Poway clasts are abundant cobble conglomerate. throughout the section.

# 1981 Clast Count Indian Trail and Santa Cruz Island compared to 2024 Clast



Zones emended after Concesso Companyon Almgren et al. 1988 Planktonic Ovygen 18 Composite (Berdhic Moone Pai Standard Chronostratigraphy Foraminifers Calcareous Coastal Onlap segmented eccere Forenvilless, per mi PDB; California Nannofossils (synthetic) Day-15 Dramer: 2009) Ma Epoch Age/Stage (Cenozoic) Sub-Tropical Zone Ma 35 -35 E15 NP19-Priabonian 20 36 -36 -CP15 NP18 E14 37 37 ProM A-1 38 38 -**NP17** E13 39 39 -Bartonian **CP14** MECO 40 -40 E12 41 -41 -LLTM E11 NP16 42 42 -E10 43 43 E9 44 -44 -CP13 Lutetian A-2 45 Eccene 45 -NP15 E8 46 -46 47 47 -NP14 CP12 48 48 -B-1 E7 49 49 -B-2 / B-3 NP13 CP11 50 50 -(EECO) B-4 E6 51 51 -E5 NP12 CP10 Penutian 52 52 -Ypresian **Keyent** (ETM-3) C 53 -53 ELMO (ETM-2) E4 NP11 CP9 b 54 -54 Bulitian D E3 55 -NP10 55 -E2 PETM E1 56 CP8 56 -NP9 P5 57 57 -NP8 CP7 Thanetian 58 -58 -NP7 CP6 P4 59 -59 -Ynezian NP6 CP5 E 60 -60 -NP5 CP4 Selandian 61 -Paleocene 61 -P3 LDE 62 62 -NP4 CP3 P2 63 63 PI Danian NP3 CP2 54 -PO 65 NP2 CP1 Dan-G2 Plummerita hantkeninoides NP1 66 -66 Pseudoguembelin Late Maastrichtian