TOURMALINE FIELD LAB

EOSC110 – Earth Science

Ray Rector - Instructor

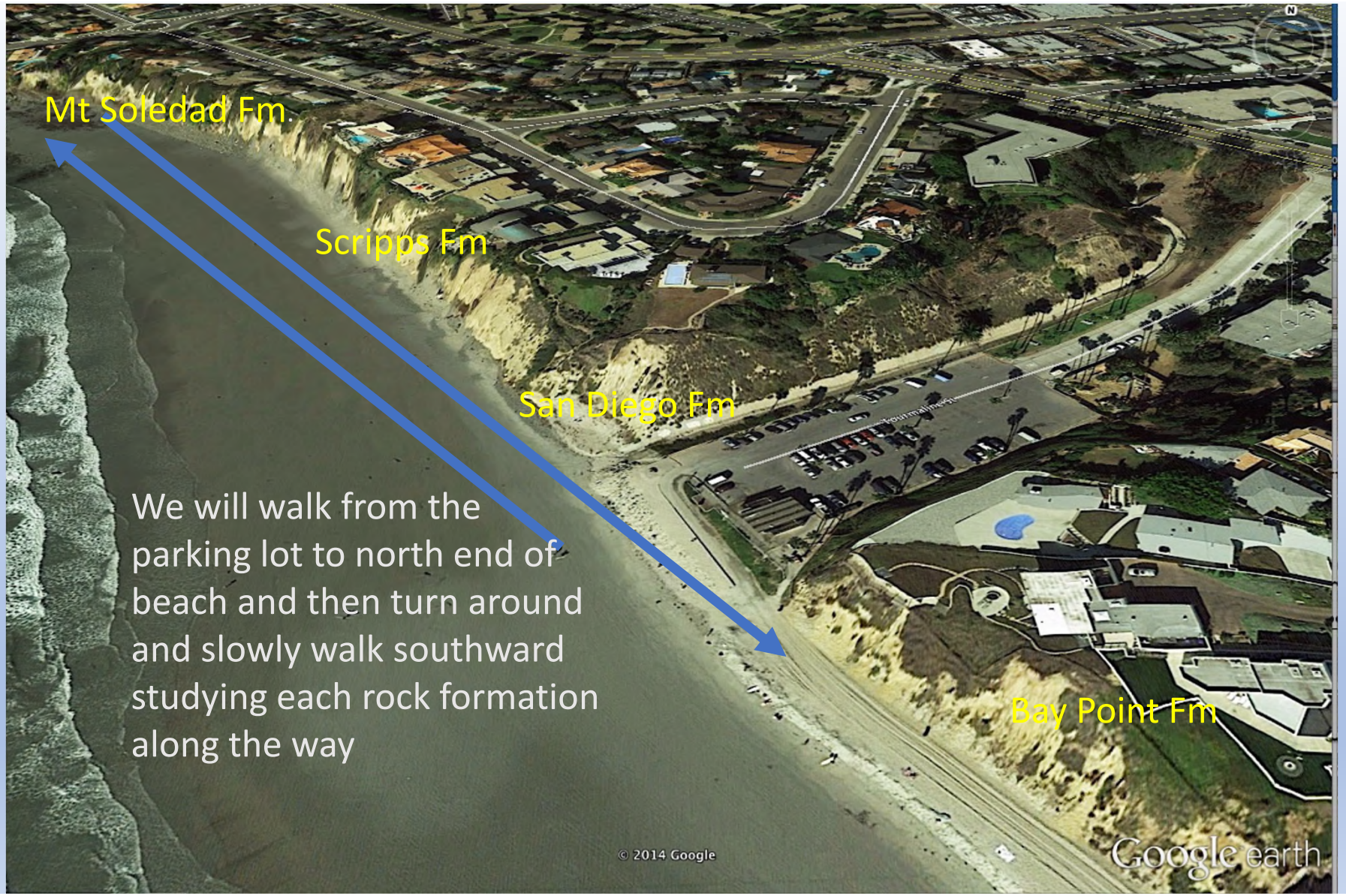
Friday 4/1: Tourmaline Beach Field Trip

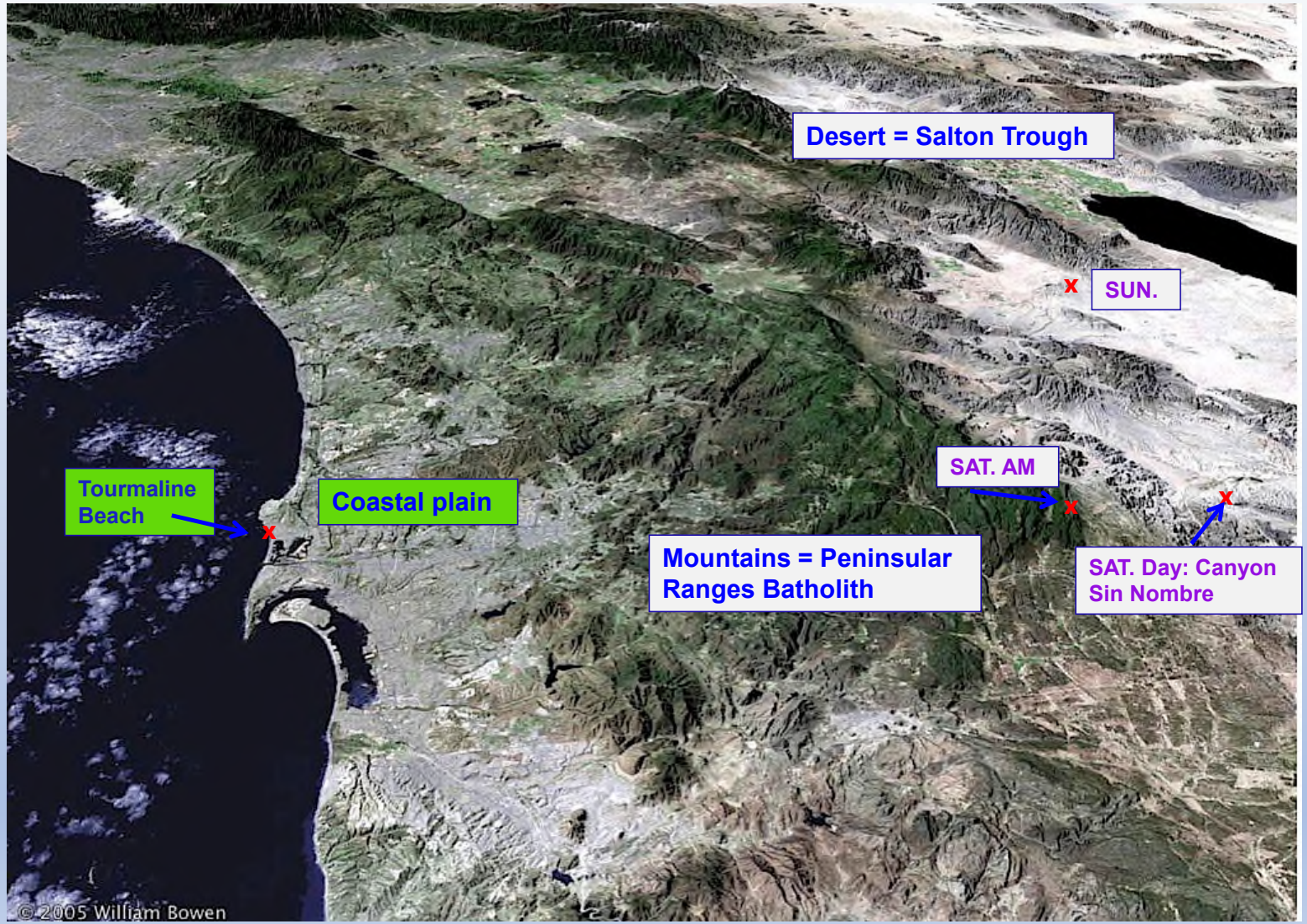
Meeting Location: Meet at 3:00pm in the Tourmaline Beach Parking lot
See directions in the lab reader p. 67 Fieldtrip concludes at 5:00pm

Lab Worksheet: Bring pages p.66 – 72 Also bring a clipboard

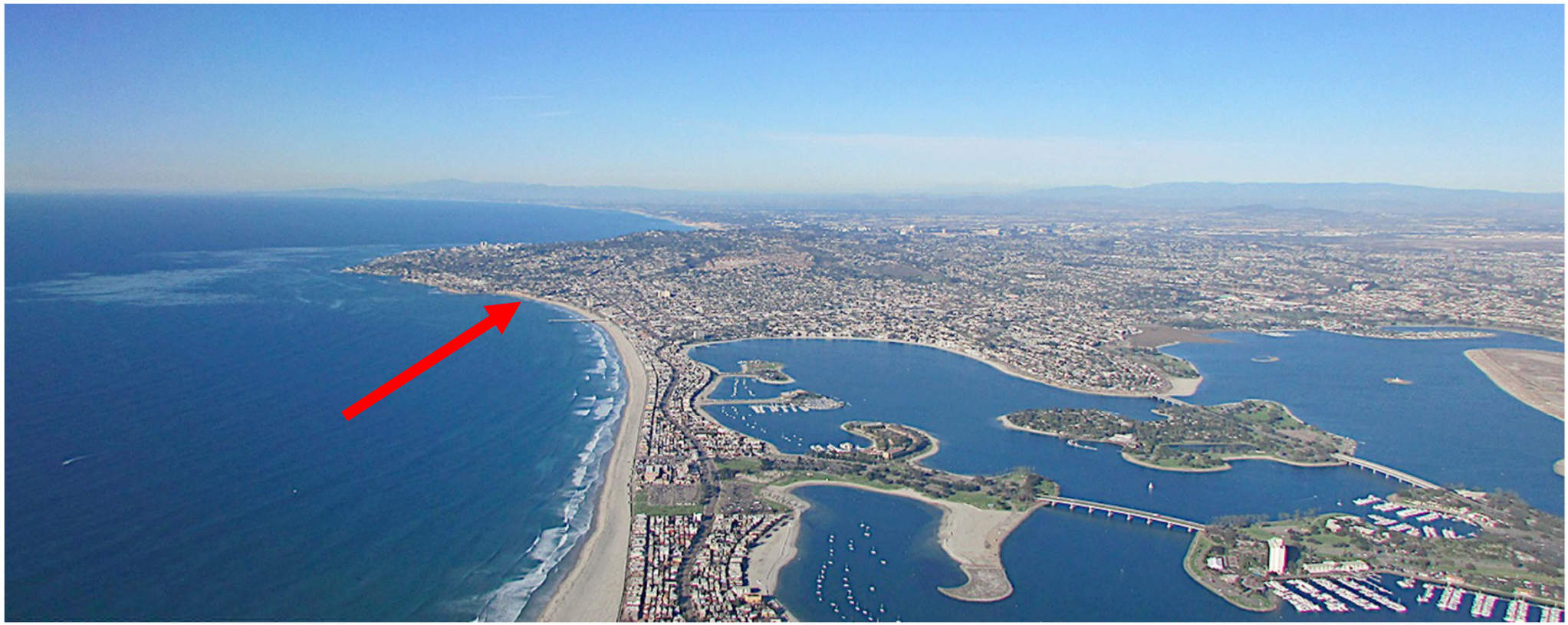
Transportation: Travel by private car. Carpool with fellow students. People without a car find a classmate who does.

Tourmaline Pre-lab Quiz: (p. 66) due day of trip


Mt Soledad Fm.
Scripps Fm
San Diego Fm
Bay Point Fm
We will walk from the parking lot to north end of beach and then turn around and slowly walk southward studying each rock formation along the way
© 2014 Google
Google earth


Desert = Salton Trough
SUN.
SAT. AM
Tourmaline Beach
Coastal plain
Mountains = Peninsular Ranges Batholith
SAT. Day: Canyon Sin Nombre
© 2005 William Bowen

Location of Tourmaline Beach: Where Pacific Beach Meets La Jolla Peninsula and Mt Soledad

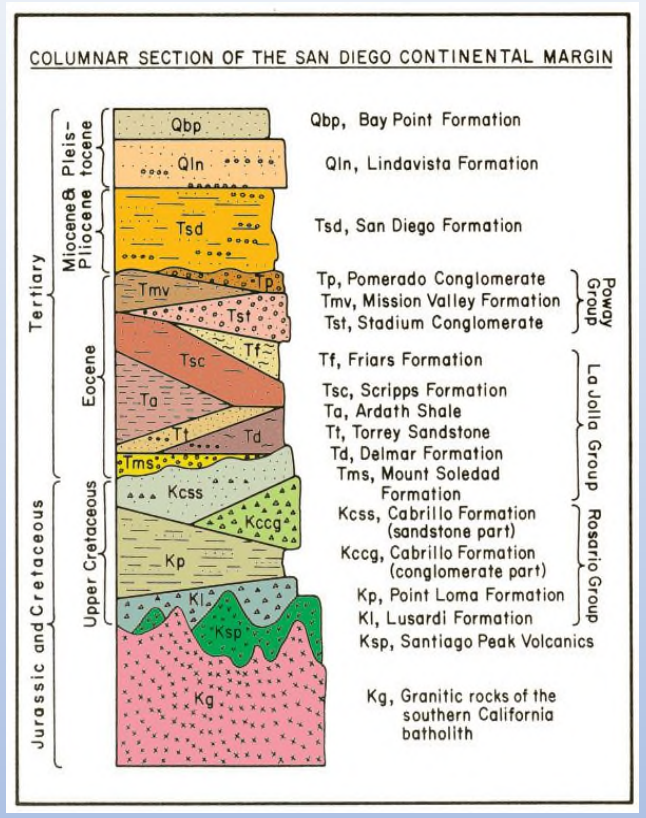


Tourmaline Beach – View from North End

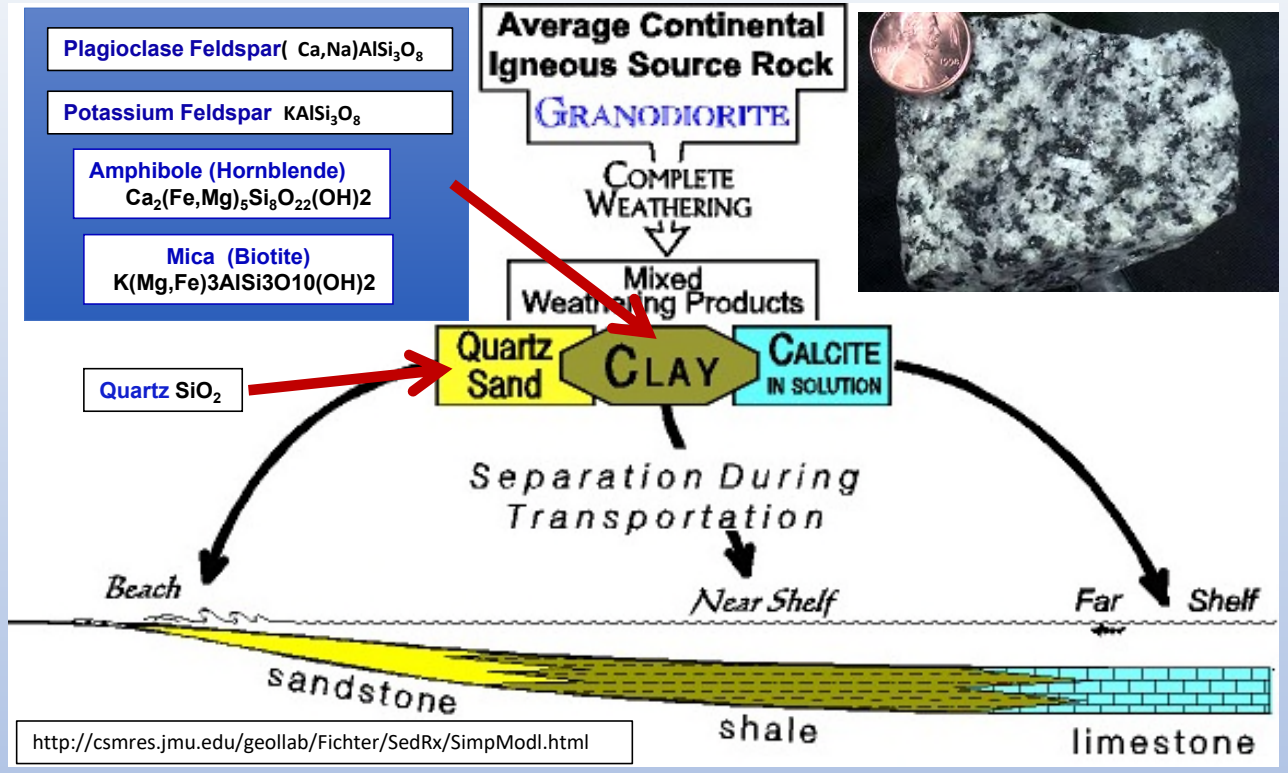
Note the low angle southward dip of the strata

The Western Coastal Plain:

Late-Cretaceous- to Cenozoic-age fluvial-littoral-neritic marine siliciclastic rock sequence deposited atop the Mesozoic-age igneous basement rocks



Igneous Source Rock Weathers to Clay, Quartz & Dissolved Ions



Quartz sandstone

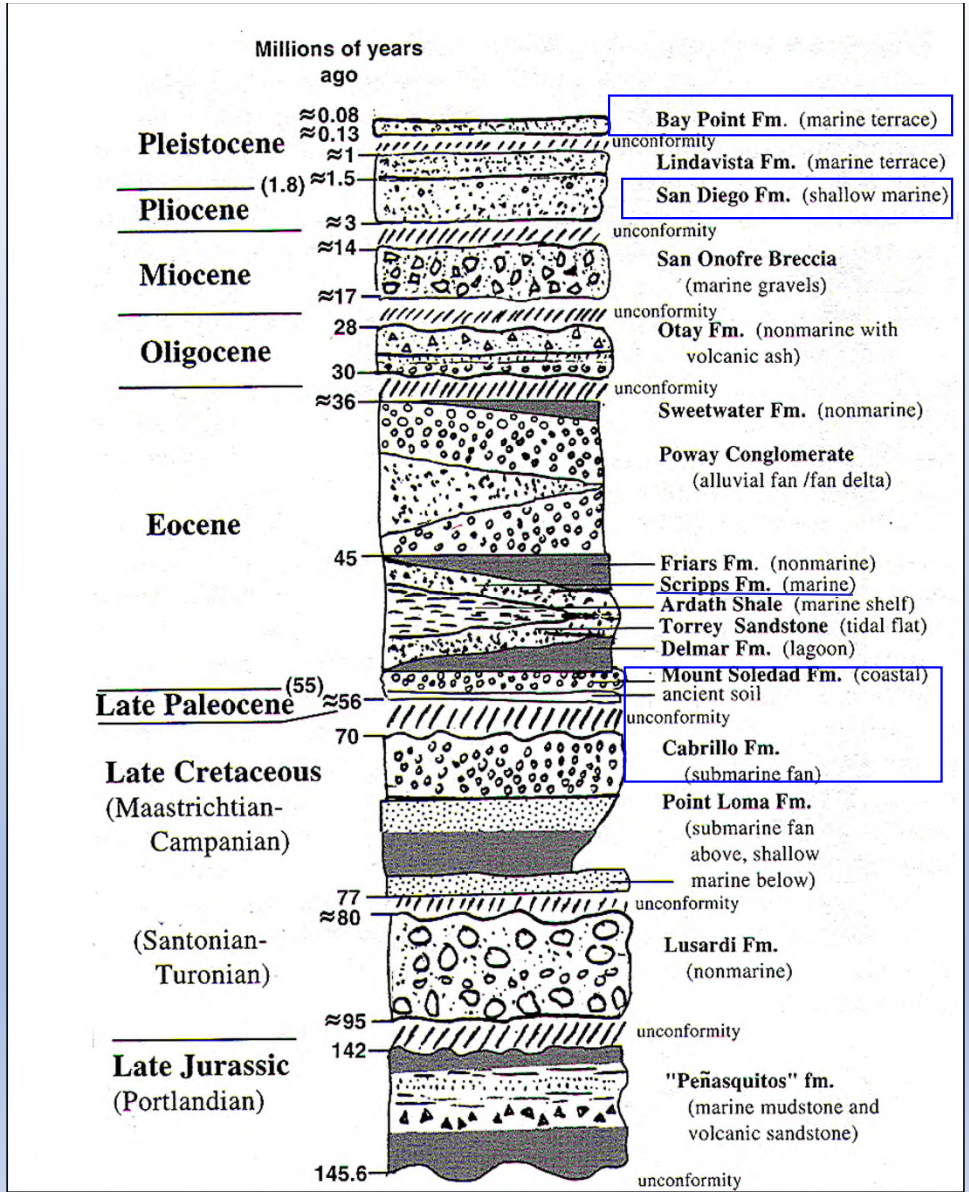
Shale

Limestone

Sedimentary rocks in the San Diego coastal region

Stratigraphic Column: a vertical sequence of rock formations**, oldest on bottom.**

Shows: Name of rock layer (formation), age, description, and thickness**.**

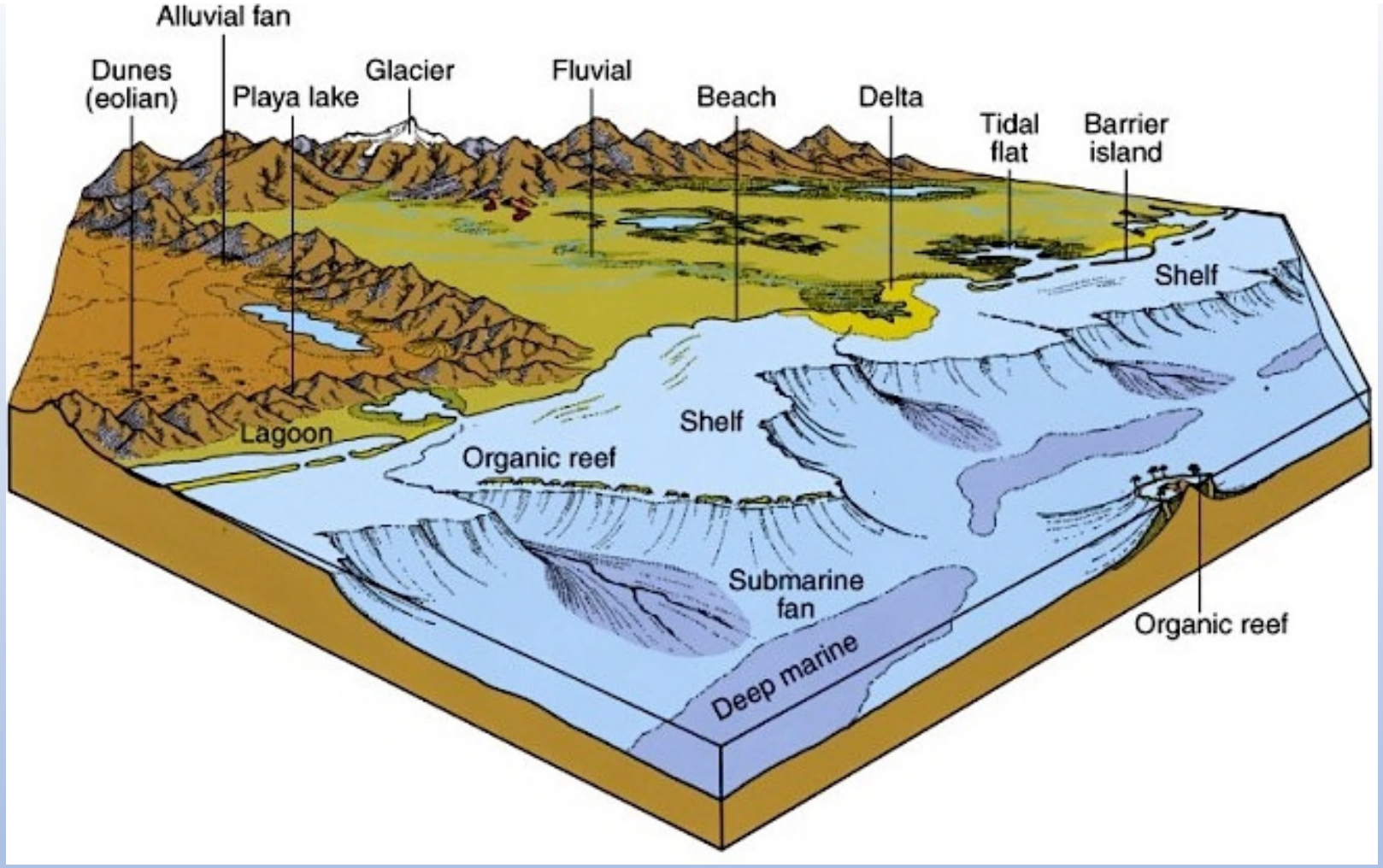


From Abbott, 1999

Formation:

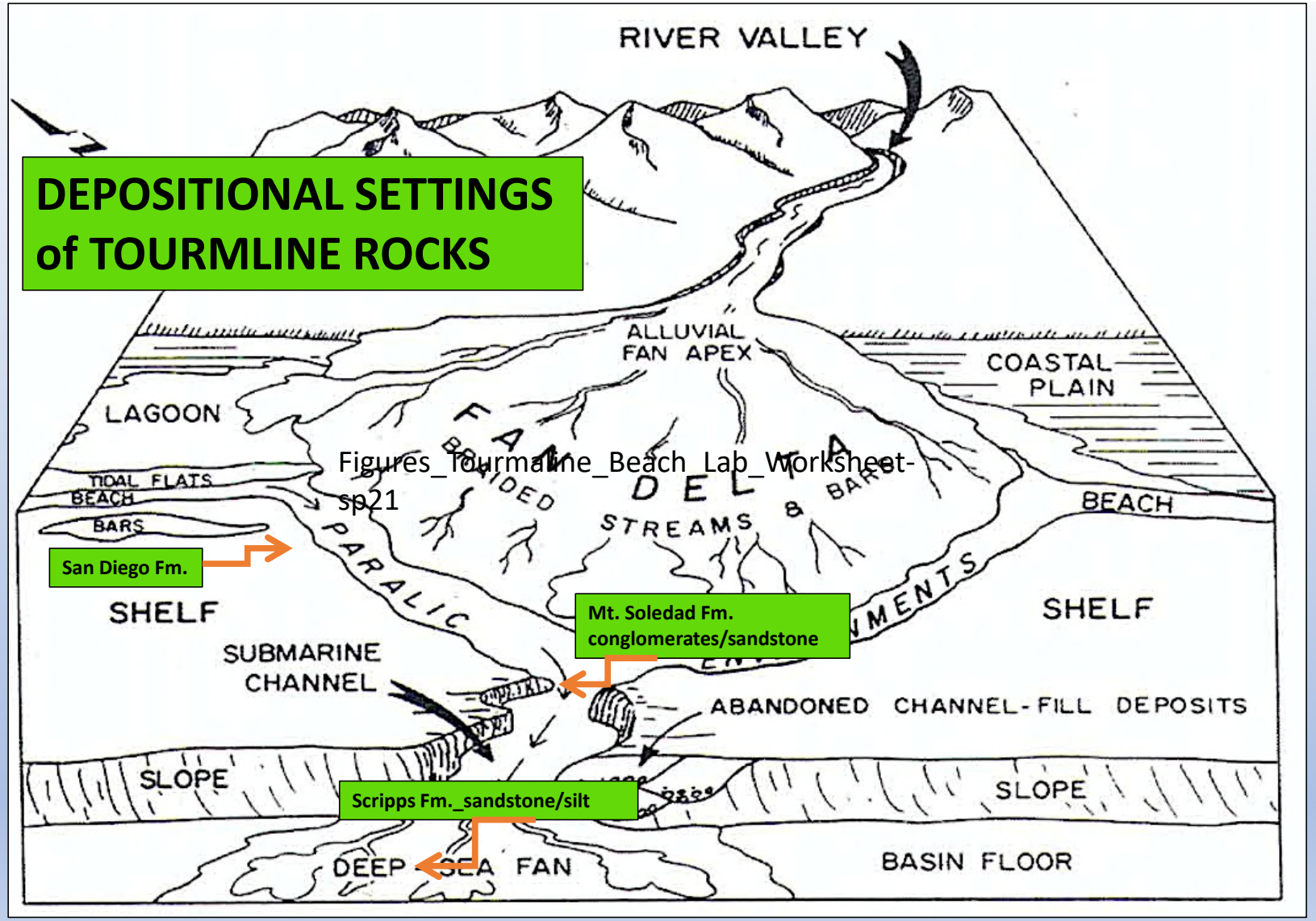
- Lithologically homogeneous (**all beds are the same rock** type **or** a distinctive set of **interbedded rock types**). Depositional Environment
- **Traceable from exposure to exposure**, and of sufficient thickness to be mappable (formations are commonly hundreds of feet thick, but may be thinner or thicker).
- Formations are usually named for some geographic locality where they are particularly well exposed. (This locality is referred to as the type section.)

Pt. Loma Fm. at Cabrillo National Monument

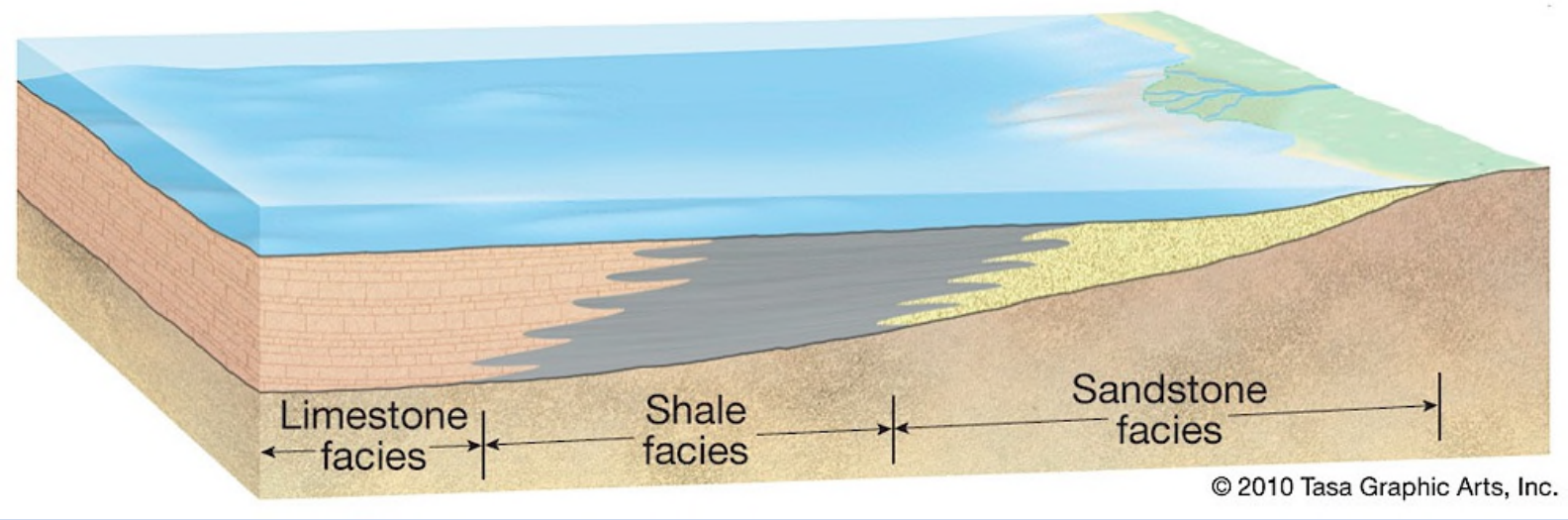


Depositional Environments

DEPOSITIONAL SETTINGS of TOURMLINE ROCKS

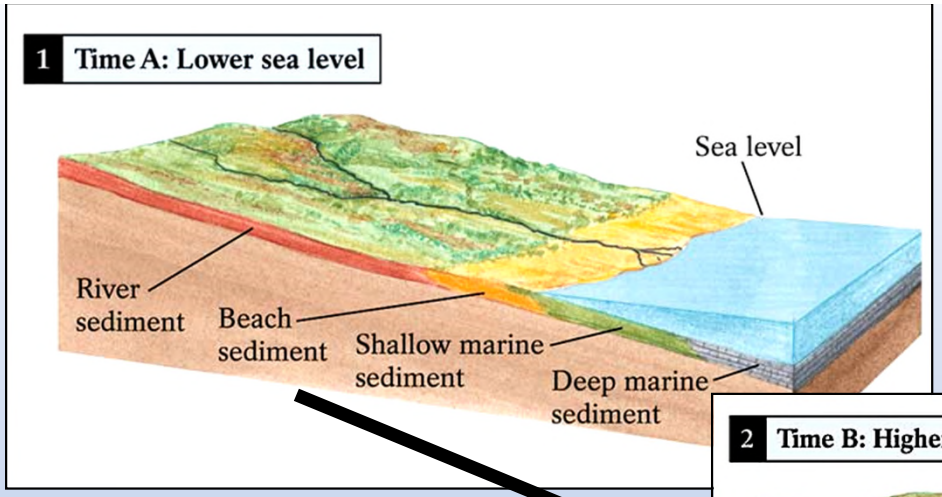


Figures_Tourmaline_Beach_Lab_Worksheet-sp21



Sedimentary Facies

- **Different sediments often accumulate adjacent to one another at the same time**
- ***Facies:*** **possesses a distinctive set of characteristics reflecting the conditions in a particular environment**



RISE IN SEA LEVEL = Transgression

FALL IN SEA LEVEL = Regression

Walther's Law: Sedimentary environments that started out side-by-side will end up overlapping one another over time due to transgressions and regressions.

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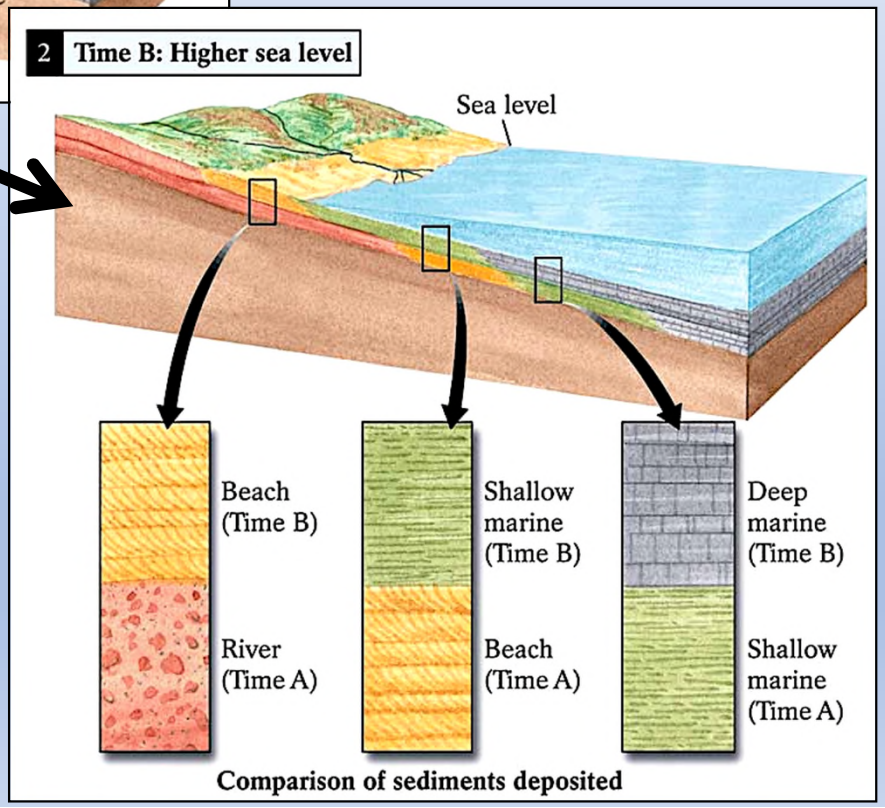
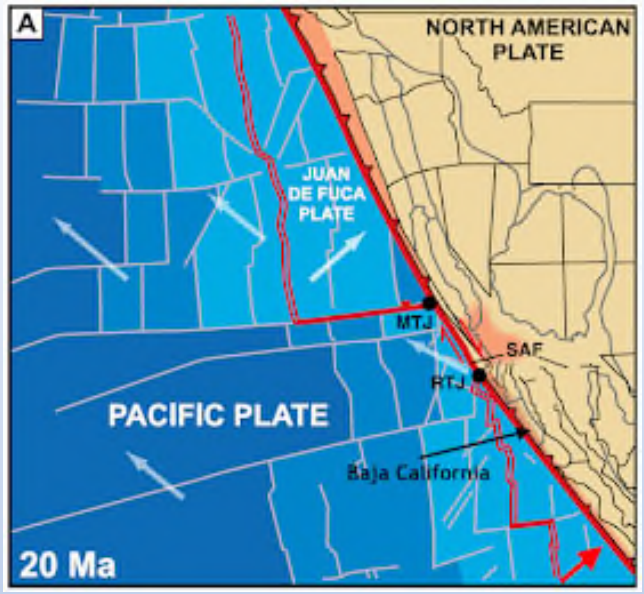
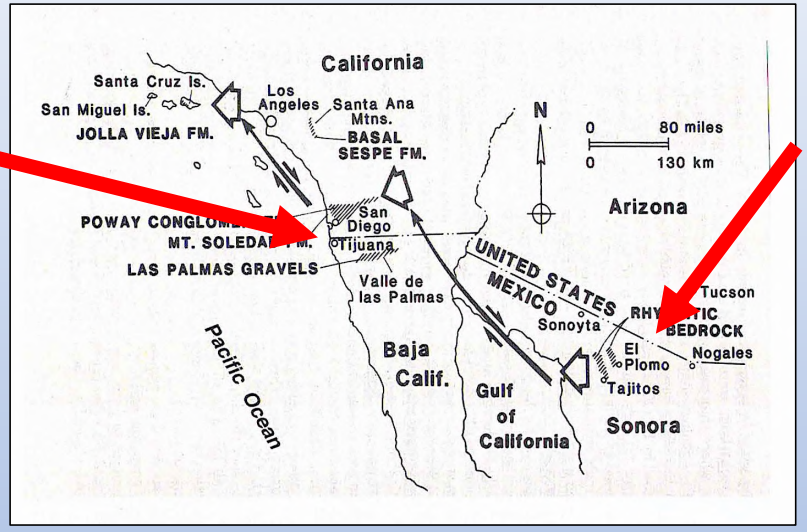


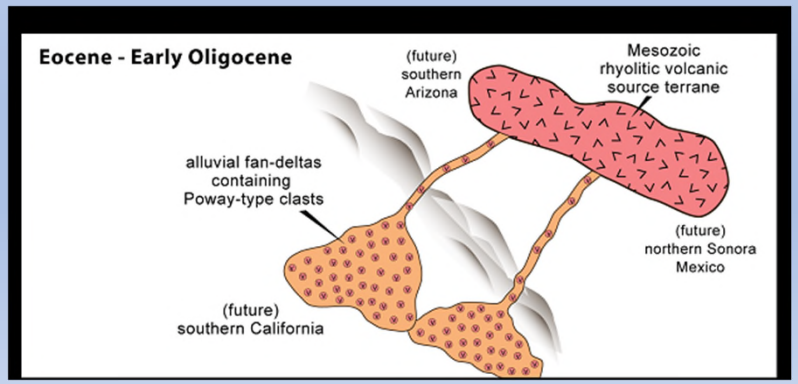
The POWAY CLAST Story
The San Diego – Sonora Mex Connection

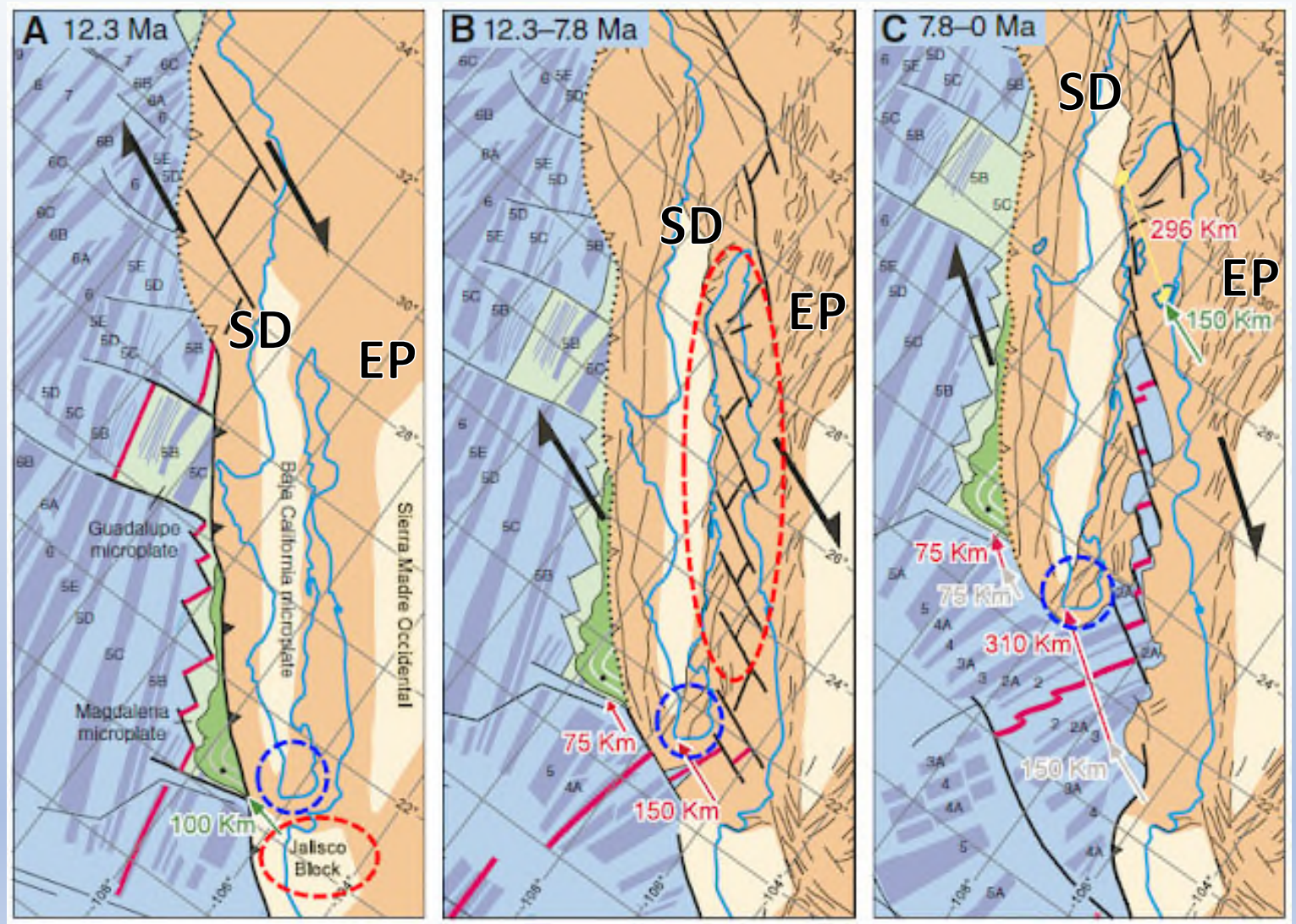


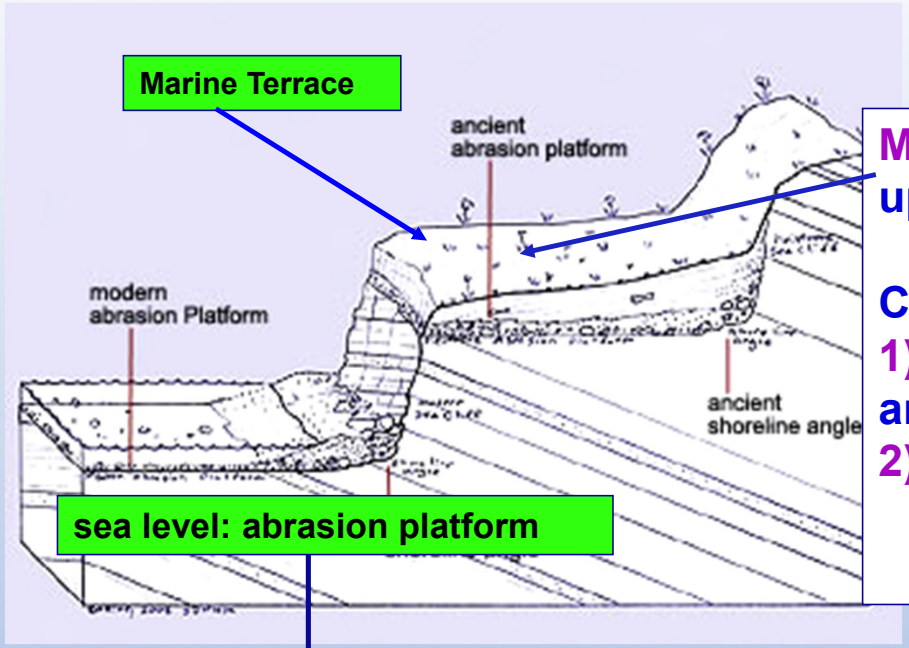
San Diego, CA: Site of Poway Clast Deposition



El Plumo, Sonora Mex: Poway Clast Source Rock




A 12.3 Ma
SD
EP
Guadalupe microplate
Baja California microplate
Sierra Madre Occidental
Magdalena microplate
100 Km
Jalisco Block
B 12.3–7.8 Ma
SD
EP
75 Km
150 Km
C 7.8–0 Ma
SD
296 Km
EP
150 Km
75 Km
75 Km
310 Km
150 Km



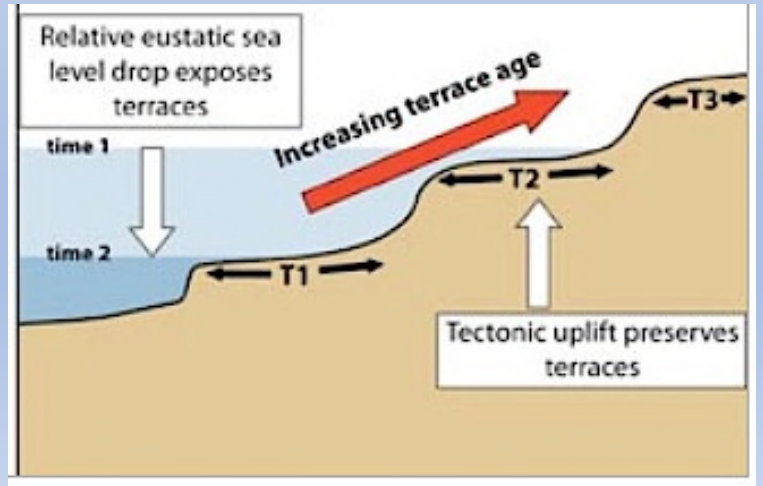
Marine terrace is an uplifted abrasion platform.

Change in elevation:

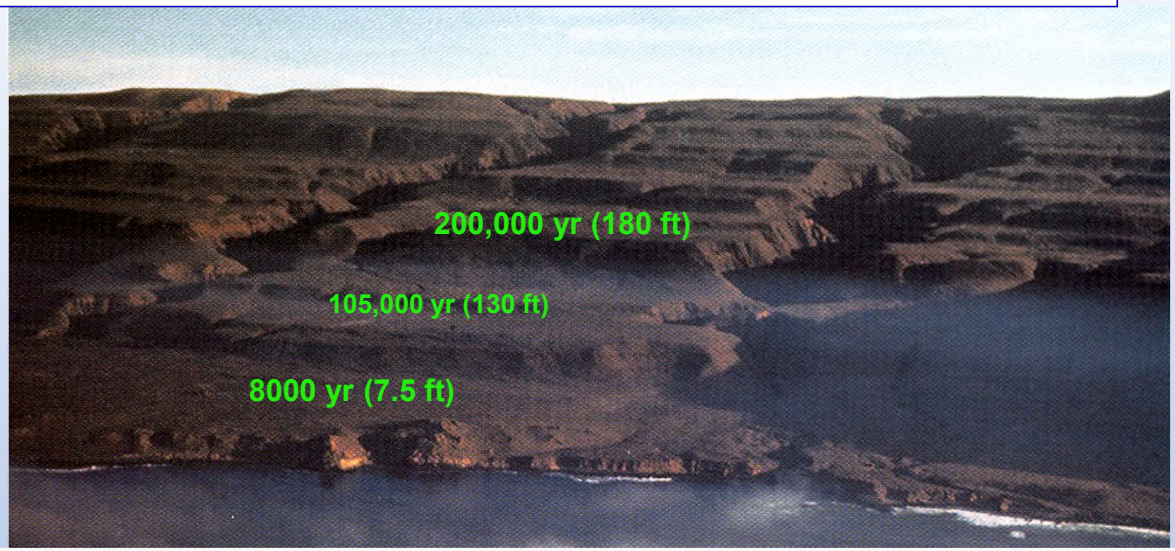
1) Tectonic uplift (faulting) and/or

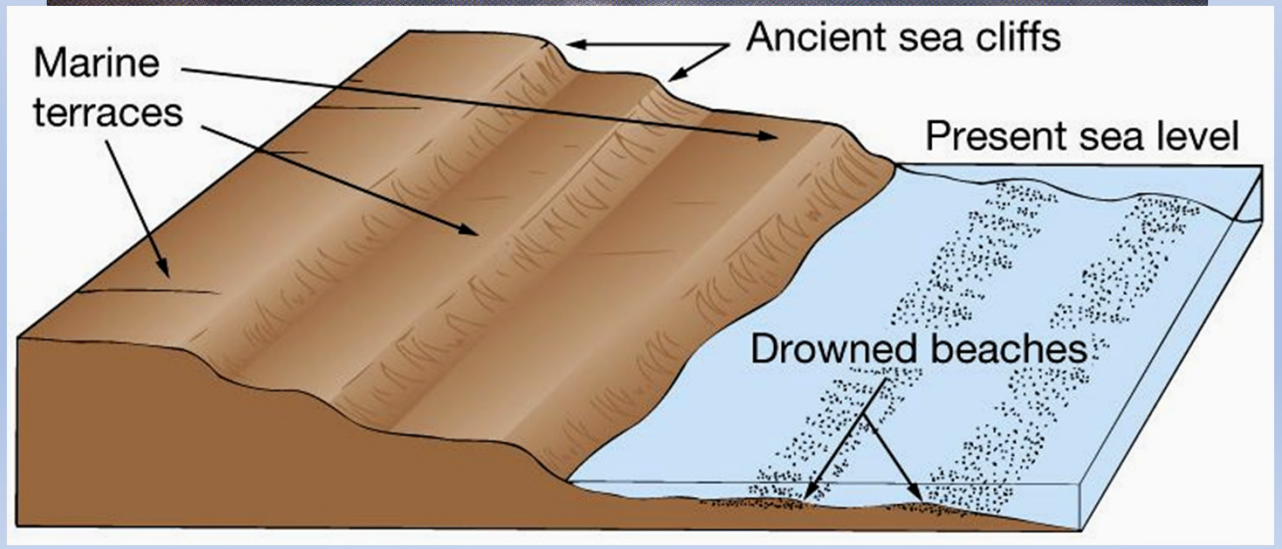
2) Change in sea level:

Eustatic change = global change



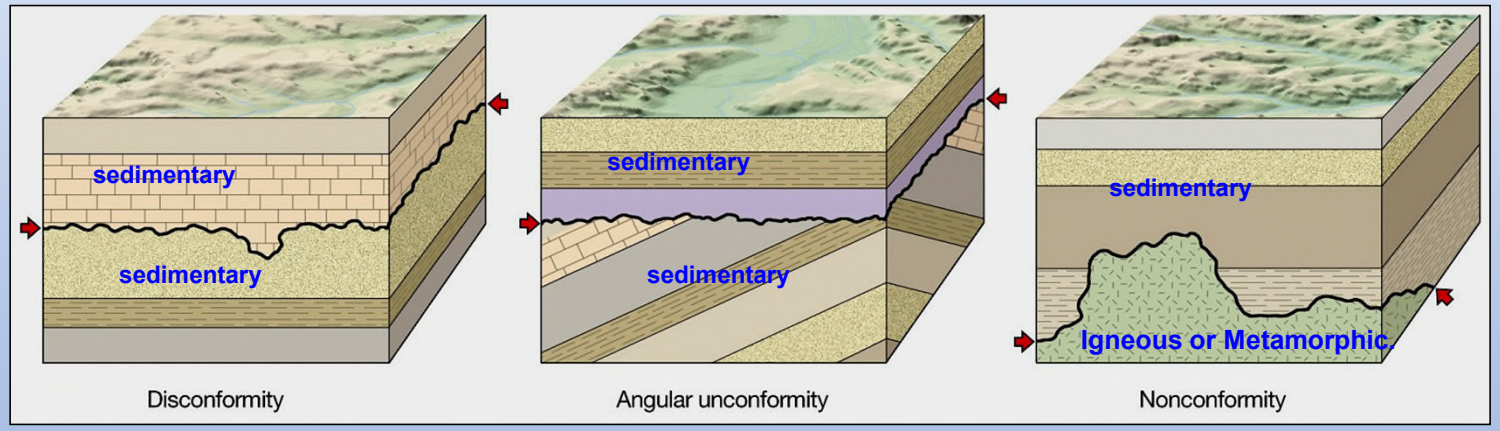
Marine Terraces: San Clemente Island



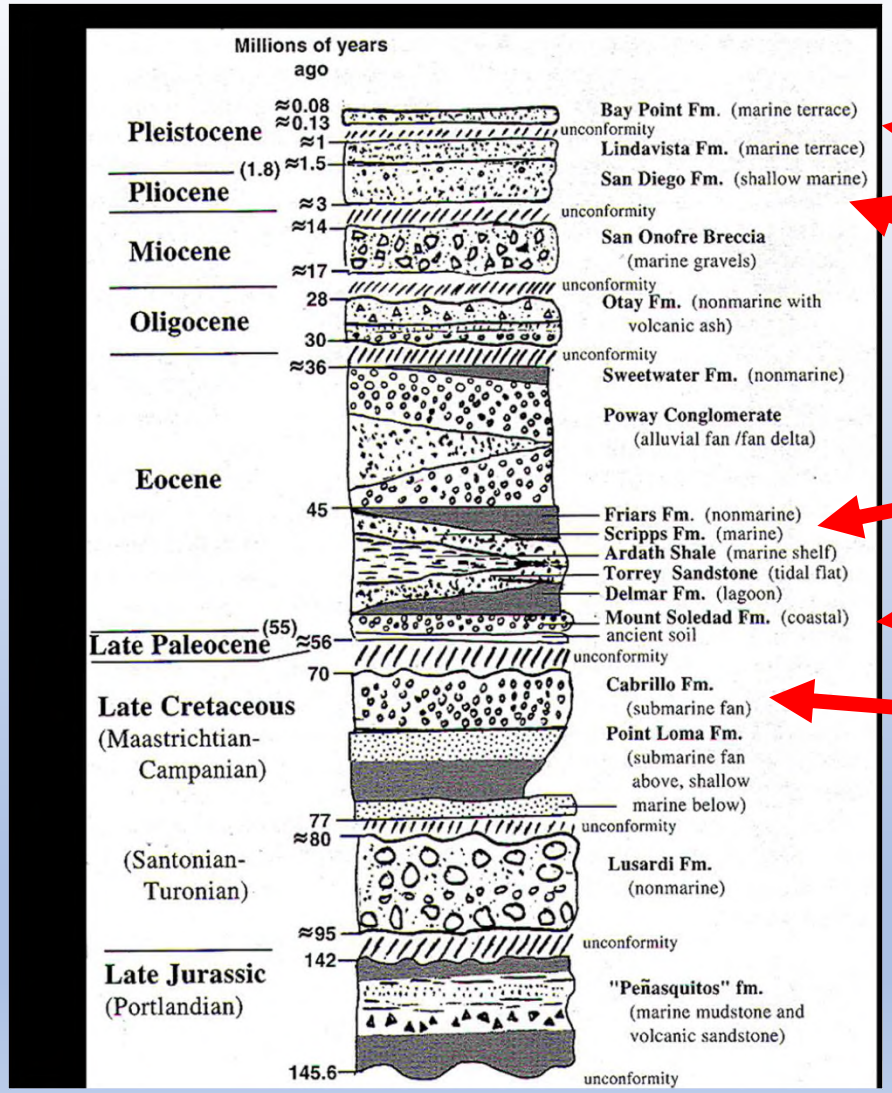


Unconformity: An erosional surface

- An unconformity is a break in the rock record (not time) produced by erosion and/or non deposition of rock units
- 3 types of unconformities



See page 15 in lab manual



Stratigraphic Column of Coastal San Diego

Tourmaline Beach Rock Formations

Bay Point Formation

San Diego Formation

Scripps Formation

Mount Soledad Formation

Cabrillo Formation

All of the geologic rock formations at Tourmaline Beach are sedimentary and formed in various coastal geographic setting – from river delta to shorelines to submarine canyon

Rock Formations Observed in the Bluff Face

Sandstone and conglomerate cut-and-fill channel deposits of the 52 mya Mount Soledad Formation

Siltstone turbidite deposits of the 46 mya Scripps Formation

Complete Stratigraphic Column: a vertical sequence of rock formations**, oldest on bottom.**

Shows: Name of rock layer (formation), age, description, and thickness**.**

Tourmaline Beach, San Diego – North end of Pacific Beach