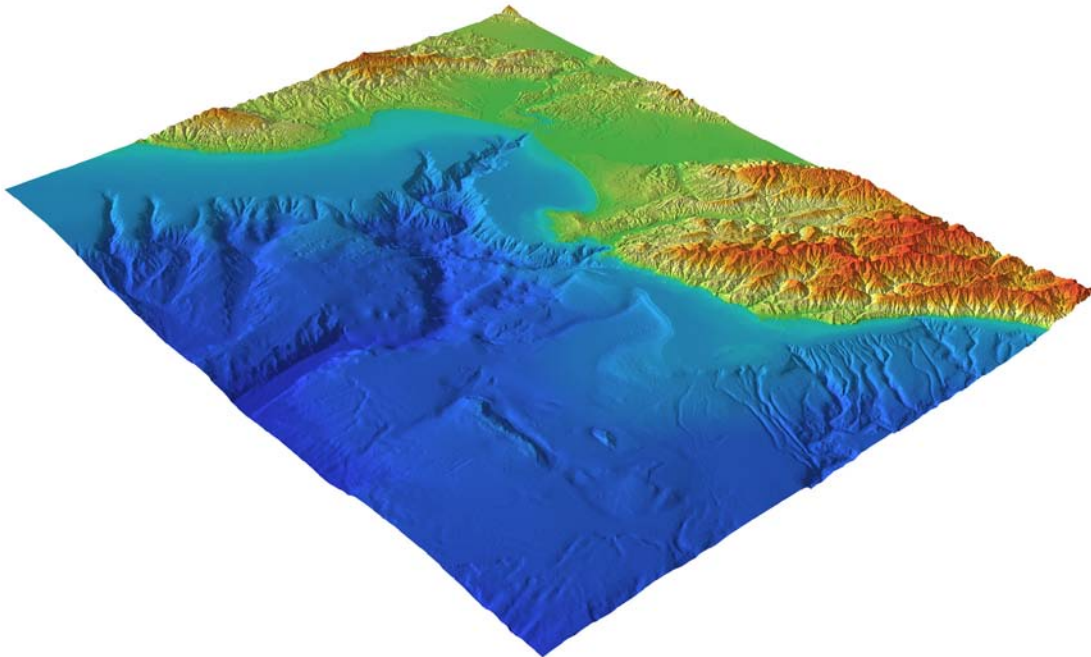


Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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Why Monterey Submarine Canyon?



Monterey Submarine Canyon forms a deep gash beneath the waters of Monterey Bay.

At the risk of beating submarine canyons to death, I'm going to try to wrap up this discussion with some final thoughts on why we have one of the world's largest submarine canyons in our backyard. Monterey Submarine Canyon has been known for over a century, and as with other offshore drainage systems, there has been considerable speculation over the years as to why we have this huge chasm cutting across the seafloor. Most submarine canyons align with river systems, but Elkhorn Slough hardly provides an adequate onshore source for such a massive feature. We do know that prior to 1910 the Salinas River discharged six miles north of its present mouth into Elkhorn Slough, closer to the head of Monterey Submarine Canyons. But even the Salinas River is not of the scale we would expect for an offshore feature as large as the Grand Canyon.

Over 50 years ago, two geologists discovered the presence of a deep buried inland canyon beneath the Santa Cruz Mountains from oil company drill holes. This combined with other geological and geophysical observations strongly suggested that this canyon was eroded by an ancient river drainage system that played a critical role in the initial formation of the Monterey Submarine Canyon. This buried canyon, named Pajaro Gorge by some, was the route that the drainage from California's vast Central Valley followed to the ocean for million of years. The large Sacramento and San Joaquin river systems, which drain the Sierra Nevada and most of the interior of California, have only discharged through the Golden Gate for about the last 600,000 years. Prior to that time they worked their way to the ocean much farther to the south, with Pajaro Gorge being their path for millions of years.

Further complicating the history of this interconnected terrestrial and submarine drainage system is the San Andreas Fault, which cuts through the Santa Cruz Mountains just behind Watsonville. All of us living in Santa Cruz County are heading northwest towards Alaska at about an inch and a half a year as the Pacific Plate slowly grinds its way past the North American Plate to the east. Every million years or so, we move another 25 miles away from the location on the opposite side of the fault in our northwesterly journey, ultimately to become a Madagascar of the Pacific. Monterey Submarine Canyon is moving along with us, which over time has taken it farther and farther from the original inland drainage system that initiated this offshore canyon. Ten million years ago, ancestral Monterey Bay and the canyon's sediment sources were 250 miles to the south. Cores taken from the deep-sea fan that has formed where Monterey Submarine Canyon ultimately deposits its sediment reflect the changes in the geology of the source areas where the sediments have come from over time.

What we see today is an old submarine canyon, formed millions of year ago under very different geographic conditions that those we see now. The sand moving into the canyon head at present comes from littoral drift from both northern and southern Monterey Bay beaches, rather than through a deep gorge from the Central Valley as it did in the past.