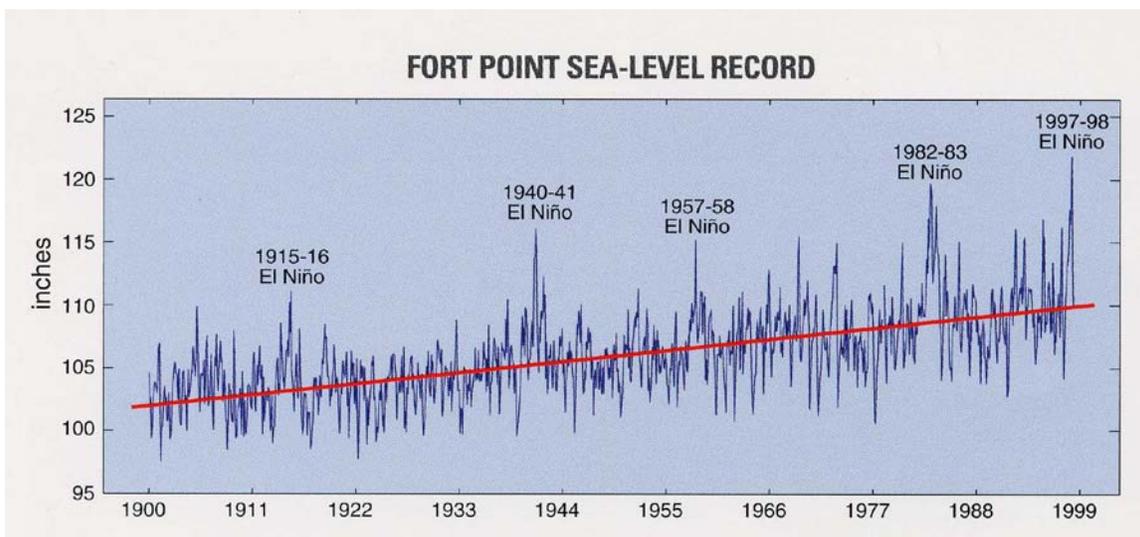


Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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Keeping track of sea levels



Sea level rise history for Golden Gate, San Francisco, showing short-term elevation of sea level during large El Niño events.

The last 50 to 100 years of sea level rise have been well documented by tide gages along the state's coastline from Crescent City to San Diego. The historic change in sea level at any location is due to the combined effects of both how the level of the ocean has changed globally, and what the adjacent land has been doing.

Nationwide (<http://co-ops.nos.noaa.gov/sltrends/sltrends.shtml>), you can see that at least in terms of sea level rise, you are much better off living in Skagway, Alaska than in Grand Isle, Louisiana.

A thick blanket of ice depressed Alaska during the last Ice Age. As the ice gradually melted, Alaska as well as Scandinavia and other high latitude regions have slowly rebounded. Because the land is rebounding faster than sea level is rising, the tide gage at Skagway shows sea level is actually dropping relative to land at 17.1 millimeters each year, equal to 5.6 feet over 100 years. Needless to say, Skagway and much of Alaska aren't worrying much about sea level rise.

In Grand Isle, Louisiana, not far from New Orleans, sea level is rising at 9.2 mm/yr, equivalent to 3.2 feet over a century, the highest rate in the nation. Land is

sinking in the Mississippi delta area, in large part due to the deposition of thousands of feet of sediments from the Mississippi River over millions of years, which is weighing down the crust. Ongoing sinking of the land surface combined with continuing sea level rise is already a problem for New Orleans, and its only going to get worse. It's risky living below sea level protected by old levees, and parts of the Sacramento delta share this concern.

What's been going on with sea level along the California coast? With the exception of Crescent City, near the Oregon border, and Eureka, sea level rise rates from tide gages along the rest of the California coast are equivalent to 3 to 9 inches per century, not a very large range. Remember these values represent the combined effects of sea level increase and the motion of the adjacent land. With a global sea level rise of about 8 inches over the past 100 years, or about 2 mm/yr, California's coast doesn't seem to have been moving up or down much over the past century.

The landscape has been more active along the state's north coast, however, with Eureka sinking and measuring a sea level rise of 18.6 inches/100 years. Crescent City, close to the Oregon border, has actually recorded a slight drop in sea level, equivalent to about 2.5 inches per 100 years, indicating that the land is being uplifted faster than sea level has been rising.

The approximately 2mm/yr rate of global sea level rise over the last century was based on averaging out hundreds of tide gage records. Beginning in 1993, we began to use satellites to measure the rate of sea level rise directly, and over the past 16 years the rate has increased to about 3.2 mm/yr, a rate about 60% larger than the average value over the 20th century. We don't yet know whether or not this represents a long-term increase in the rate of sea level rise.