

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

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### **Oil formation in the sea**

As gasoline prices edge above \$4 a gallon and we realize it's going to cost \$50 to fill up the tank, do you ever ask yourself where this stuff is coming from? Most people know that gasoline is derived from oil, which comes from the ground. But there must be some reason why oil is only found in certain places -like Texas and the Middle East --and not under your backyard.

Oil, believe it or not, is a product of the coastal ocean. Trillions of diatoms and related marine plankton sacrificed their microscopic bodies to power your SUV. Massive blooms of these plankton occur in coastal and surface waters of the ocean when conditions are right. We can observe this at times, as we did this last fall, when one particular type of plankton was so abundant that it turned the waters a reddish color. This happens on the Central Coast in late spring, and often into summer and fall, when wind moves surface waters offshore and cooler, nutrient-rich bottom water rises to the surface in a process known as upwelling. The plankton respond like crazy.

These little guys don't live long. Larger plankton or small fish consume many, but massive numbers sink to the sea floor and become part of the accumulating sediment. Their transformation into petroleum involves several steps over a long period of time. First, the organic matter must be covered by sediment or stagnant bottom water to cut it off from oxygen before it can decompose. Next, burial and subsidence beneath additional sediment layers creates a sea floor pressure cooker, where high pressure and temperature slowly cook the preserved organic matter and convert it into petroleum.

These processes have taken place at different locations in the sea throughout the past 600 million years or so. Geologists and geophysicists have developed the tools to find these buried deposits, both on land and beneath the sea floor. Extracting the oil is expensive, and it then has to be transported, refined into gasoline and other by-products, and trucked to your local gas station. It takes a lot to deliver this fossil fuel --solar energy captured and preserved by nature --to your car.

Next time, I'll discuss where our oil comes from and why so much of the planet's oil is found in the Middle East.