Title
Establishing an Historic Baseline of Diatom Diversity in Southern California

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Establishing an Historic Baseline of Diatom Diversity in Southern California

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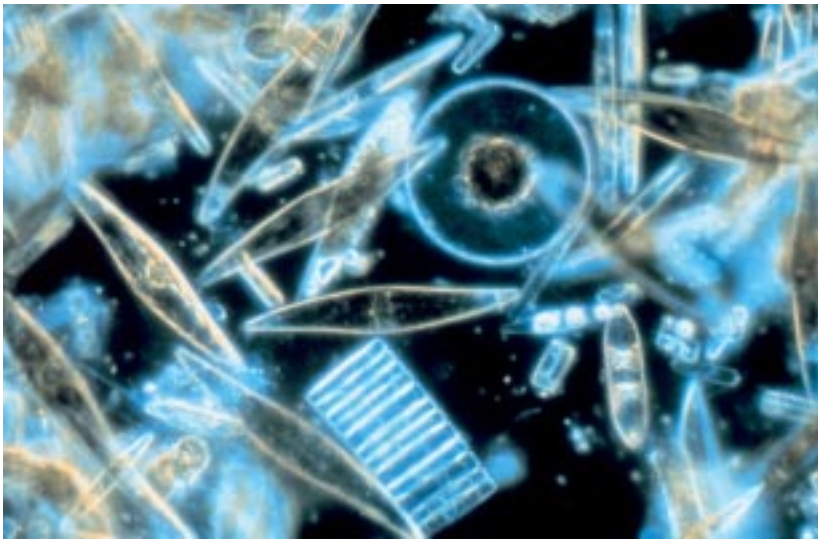
Background

Diatoms are single-celled, microscopic algae with intricately built, often beautiful, silicon shells. As the sea's primary producers, they provide food directly or indirectly for nearly all the sea's fishes and marine mammals. They are the base of the marine food chain, and as such their abundance is a good indicator of the ocean's productivity—the more diatoms, the greater the ocean's productivity.

Ocean productivity has profound implications for marine biodiversity and for commercial fisheries, particularly the wet fish fishery in California: squid, anchovy and sardine.



Beautiful marine diatoms as seen through a microscope. These tiny creatures have silica exoskeletons. Photo: Dr. Neil Sullivan, NOAA digital archives

Project

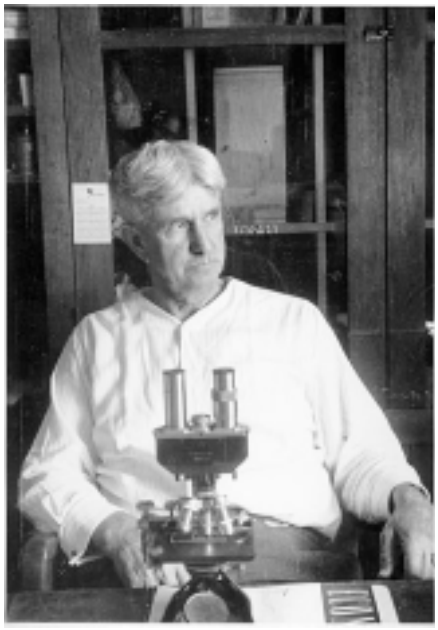
Dr. Carina Lange, formerly at Scripps Institution of Oceanography and now at the Universidad de Concepción in Chile, examined the ability to use historic diatom records as indicators of how marine life responded to ocean climate shifts in the past. The diatom records she analyzed were from a high-quality collection of water samples drawn at the Scripps and Port Hueneme piers by biologists at Scripps in the 1920s and 1930s.

For her project, Lange compared diatom abundance and species composition to measurements of sea surface temperature and salinity collected during the same period. Diatom counts were also compared to historic records of the Southern Oscillation Index—a proxy measure of the strength of El Niño and La Niña events in the tropical Pacific Ocean.

Mackerel being loaded onto boat in Peruvian waters. Photo: Teobaldo Dioses

Findings

Lange's research confirms the coupling between ocean climate and biological productivity. Her comparisons showed a direct correlation between diatom abundance, water temperature and the Southern Oscillation Index, consistent with contemporary observations. El Niño events were associated with higher water temperatures and low diatom



Biologist Winfred Allen (1873–1947) collected one of the longest running records of diatom abundance in California. He and his students took water samples weekly, sometimes daily. While peering through a microscope, they then went through the tedious task of counting and speciating these microscopic organisms. Photo: University of California archives—for more information contact Chris Hewes chewes@ucsd.edu

counts. In other words, ocean productivity was low during El Niño events. Similarly, diatom abundances were high when cold La Niña conditions predominated, implying that ocean productivity was high at these times.

Implications

Lange's research illustrates that high-quality diatom records from select stations are good indicators of climate change on a Pacific-wide scale. Scientists in many disciplines are today trying to predict if, how, and where global climate change will affect the world's biodiversity. Lange's research provides a baseline for comparing change in the future.

Publication

Lange, C.B., A.L. Weinheimer, F.M.H. Reid, E. Tappa, and R.C. Thunell. 2000. Response of siliceous microplankton from the Santa Barbara basin to the 1997–98 El Niño event. *Calif. Coop. Oceanic Fish. Invest. Rep.* 41:186–193.

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