

Thanks for the feedback! [Undo](#)
We'll use your feedback to review ads on this site.



Science News

from research organizations

Print Email Share

NASA examines El Nino's impact on ocean's food source

Date: April 4, 2016

Source: NASA/Goddard Space Flight Center

Summary: El Nino years can have a big impact on the littlest plants in the ocean, and scientists are studying the relationship between the two.

Share: Facebook Twitter Google+ LinkedIn + Email

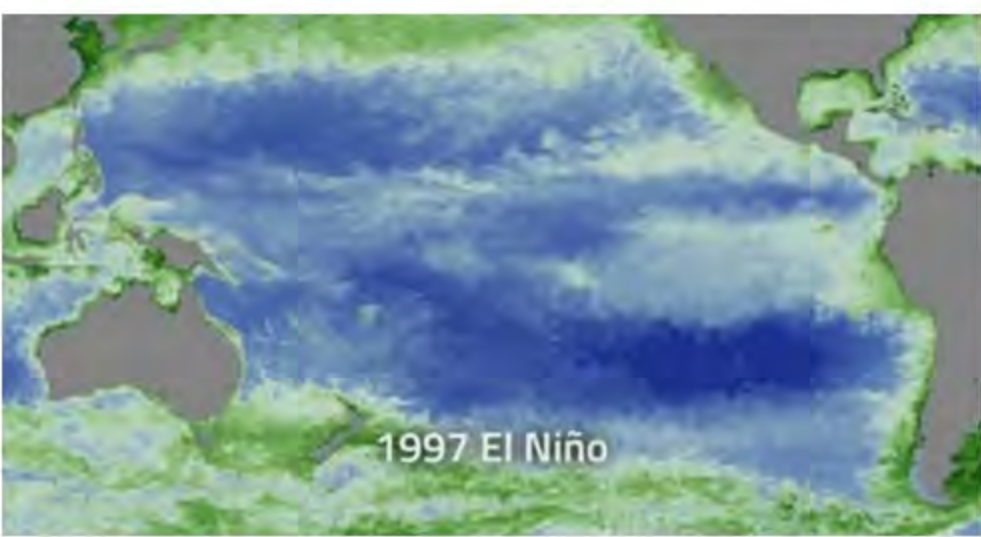
RELATED TOPICS

Earth & Climate

- > El Nino and La Nina
- > Geography
- > Severe Weather
- > Oceanography
- > Ecology
- > Global Warming

RELATED TERMS

- > El Niño-Southern Oscillation
- > Temperature record of the past 1000 years
- > Paleoclimatology
- > Chicxulub Crater
- > Greenland ice sheet
- > Bushfire



Strong El Nino events have a big impact on phytoplankton (in green), especially when the warm water pushes far to the east of the Pacific Ocean, as in 1997.

Credit: Credits: NASA/Goddard

El Nino years can have a big impact on the littlest plants in the ocean, and NASA scientists are studying the relationship between the two.

In El Nino years, huge masses of warm water -- equivalent to about half of the volume of the Mediterranean Sea -- slosh east across the Pacific Ocean towards South America. While this warm water changes storm systems in the atmosphere, it also has an impact below the ocean's surface. These impacts, which researchers can visualize with satellite data, can ripple up the food chain to fisheries and the livelihoods of fishermen.

El Nino's mass of warm water puts a lid on the normal currents of cold, deep water that typically rise to the surface along the equator and off the coast of Chile and Peru, said Stephanie Uz, ocean scientist at Goddard Space Flight Center in Greenbelt, Maryland. In a process called upwelling, those cold waters normally bring up the nutrients that feed the tiny organisms, which form the base of the food chain.

"An El Nino basically stops the normal upwelling," Uz said. "There's a lot of starvation that happens to the marine food web." These tiny plants, called phytoplankton, are fish food -- without them, fish populations drop, and the fishing industries that many coastal regions depend on can collapse.

With NASA satellite data, and ocean color software called SeaDAS, developed at the Ocean Biology Processing Group at Goddard, Uz has been mapping where these important phytoplankton appear. Orbiting instruments like the Moderate Resolution Imaging Spectrometer on the Aqua satellite, and the Visible Infrared Imaging Radiometer Suite on the Suomi NPP satellite collect data on the color of the ocean. From shades of blue and green, scientists can calculate the amount of green chlorophyll -- and therefore the amount of phytoplankton present.

The ocean color maps, based on a month's worth of satellite data, can show that El Nino impact on phytoplankton. In December 2015, at the peak of the current El Nino event, there was more blue -- and less green chlorophyll -- in the Pacific Ocean off of Peru and Chile, compared to the previous year. Uz and her colleagues are also watching as the El Nino weakens this spring, to see when and where the phytoplankton reappear as the upwelling cold water brings nutrients back to the region.

"They can pop back up pretty quickly, once they have a source of nutrients," Uz said.

Researchers can also examine the differences in ocean color between two different El Nino events. During the large 1997-1998 El Nino event, the green chlorophyll virtually disappeared from the coast of Chile. This year's event, while it caused a drop in chlorophyll primarily along the equator, was much less severe for the coastal phytoplankton population. The reason -- the warmer-than-normal waters associated with the two El Nino events were centered in different geographical locations. In 1997-1998, the biggest ocean temperature abnormalities were in the eastern Pacific Ocean; this year the focus was in the central ocean. This difference impacts where the phytoplankton can feed on nutrients, and where the fish can feed on phytoplankton.

"When you have an East Pacific El Nino, like 1997-1998, it has a much bigger impact on the fisheries off of South America," Uz said. But Central Pacific El Nino events, like this year's, still have an impact on ocean ecosystems, just with a shift in location. Researchers are noting reduced food available along the food chain around the Galapagos Islands, for example. And there has been a drop in phytoplankton off the coast of South America, just not as dramatically as before.

Scientists have more tools on hand to study this El Nino, and can study more elements of the event, Uz said. They're putting these tools to use to ask questions not just about ocean ecology, but about the carbon cycle as well.

"We know how important phytoplankton are for the marine food web, and we're trying to understand their role as a carbon pump," Uz said. The carbon pump refers to one of the ways the Earth system removes carbon dioxide from the atmosphere. When phytoplankton die, their carbon-based bodies sink to the ocean floor, where they can remain for millions of years. El Nino is a naturally occurring disruption to the typical ocean currents, she said -- so it's important to understand the phenomenon to better attribute what occurs naturally, and what occurs due to human-caused disruptions to the system.

Other scientists at Goddard are investigating ways to forecast the ebbs and flows of nutrients using the center's supercomputers, incorporating data like winds, sea surface temperatures, air pressures and more.

"It's like weather forecasts, but for bionutrients and phytoplankton in the ocean," said Cecile Rousseaux, an ocean modeler with Goddard's Global Modeling and Assimilation Office. The forecasts could help fisheries managers estimate how good the catch could be in a particular year, she said, since fish populations depend on phytoplankton populations. The 1997-1998 El Nino led to a major collapse in the anchovy fishery off of Chile, which caused economic hardships for fishermen along the coast.

So far, Rousseaux said, the phytoplankton forecast models haven't shown any collapses for the 2015-2016 El Nino, possibly because the warm water isn't reaching as far east in the Pacific this time around. The forecast of phytoplankton populations effort is a relatively new effort, she said, so it's too soon to make definite forecasts. But the data so far, from the modeling group and others, show conditions returning to a more normal state this spring.

The next step for the model, she said, is to try to determine which individual species of phytoplankton will bloom where, based on nutrient amounts, temperatures and other factors -- using satellites and other tools to determine which kind of microscopic plant is where.

"We rely on satellite data, but this will go one step further and give us even more information," Rousseaux said.

Story Source:

The above post is reprinted from materials provided by **NASA/Goddard Space Flight Center**. *Note: Materials may be edited for content and length.*

Cite This Page:

MLA APA Chicago

NASA/Goddard Space Flight Center. "NASA examines El Nino's impact on ocean's food source." ScienceDaily. ScienceDaily, 4 April 2016. <www.sciencedaily.com/releases/2016/04/160404181022.htm>.

Share This Page:

Facebook Twitter Google+ LinkedIn + Email

Earth & Climate News

April 5, 2016



Earth's Internal Heat Drives Subglacial Melting



Vibrations Make Large Landslides Flow Like Fluid



Hybrid System Could Cut Coal-Plant Emissions



Shocking Collapse of Gorilla Subspecies

Latest Headlines

updated 12:56 pm ET



Increased Flooding, Accelerated Sea-Level Rise in Miami Over Last Decade, New Study Shows

Apr. 4, 2016 — Miami Beach flood events have significantly increased over the last decade due to an acceleration of sea-level rise in South ... [read more »](#)

- > Accelerated Sea-Level Rise in Miami Over Decade
- > Water Cycle Instability Here to Stay
- > El Nino's Impact On Ocean's Food Source
- > Fishing for the Future of Coral Reefs
- > Coral Reefs, Biodiversity and Climate Change
- > Common Pesticides Kill Amphibian Parasites
- > Western Lifestyle Spells End of Biodiversity
- > Climate Tipping Point: North Atlantic Pivotal
- > Acid Oceans from CO2: Severe Damage
- > Sex Reversal in Amphibians Due to the Pill

Latest Videos

from news services



Mexico's Popocatepetl Volcano Bursts Into Life



Raw: Pakistani Floods Displace Thousands



Kenya Prepares for a Record-High Ivory Burn



Droughts Create Acute Severe Malnutrition in Southern Madagascar

more videos >

Thanks for the feedback! [Undo](#)
We'll use your feedback to review ads on this site.



Related Stories

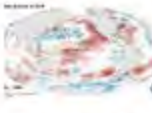
California 2100: More Frequent and More Severe Droughts and Floods Likely

Oct. 21, 2015 — A new study suggests that the weather patterns known as El Nino and La Nina could lead to at least a doubling of extreme droughts and floods in California later this ... [read more »](#)



Ocean Changes Are Affecting Salmon Biodiversity, Survival

Aug. 3, 2015 — What happens at the Equator, doesn't stay at the Equator. El Nino-associated changes in the ocean may be putting the biodiversity of two Northern Pacific salmon species at risk, according to a ... [read more »](#)



Elusive El Niño Arrives: Forecasters Predict It Will Stay Weak, Have Little Influence on Weather and Climate

Mar. 5, 2015 — The long-anticipated El Niño has finally arrived, according to forecasters with NOAA's Climate Prediction Center. In their updated monthly outlook released today, forecasters issued an El Niño ... [read more »](#)



Modeling the Past to Understand the Future of a Stronger El Niño

Nov. 26, 2014 — El Nino is not a contemporary phenomenon; it's long been the Earth's dominant source of year-to-year climate fluctuation. But as the climate warms and the feedbacks that drive the cycle change, ... [read more »](#)

See fewer ads and support this site.

Contributor works on millions of sites and all of your devices.



Strange & Offbeat

PLANTS & ANIMALS



Scientists Find Surprise Lurking in Crocodilian Jaw



Recent Evolutionary Change Allows a Fruit Fly to Dine on a Toxic Fruit



World's Smallest Diode Created



Programming Language for Novel Biological Circuits

EARTH & CLIMATE



Laser Cloaking Device Could Help Us Hide from Aliens



City Birds Are Smarter Than Country Birds



Could Ireland's Ecosystems Cope If We Introduced St. Patrick's Scaly Foes?

First Successful Extraction of Ancient DNA from a Southern African Mummy

FOSSILS & RUINS



Fossil of 'Early Spider' Discovered; 305 Million Years Old



A World Map of Neanderthal and Denisovan Ancestry in Modern Humans

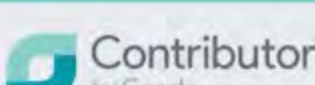
Human Ancestors Explored 'out of Africa' Despite Impaired Nasal Faculties



More Ancient Viruses Lurk in Our DNA Than We Thought

See fewer ads and support this site.

Contributor works on millions of sites and all of your devices.



In Other News

from NewsDaily

SCIENCE

Orbital presses U.S. lawmakers to end ban on retired missiles

Bezos praises third Blue Origin launch-and-land rocket test as 'perfect'

Pentagon awards \$75 million for advanced textiles institute

Europe gives green light to first gene therapy for children

HEALTH

FDA staff finds Intercept's liver drug effective as monotherapy

Exclusive: Makers took big price increases on widely used U.S. drugs

India steps up fight against cigarette firms over health warnings

Europeans spend 24 billion euros on narcotics each year: report

ENVIRONMENT

Lead EU carbon policymaker calls for end to UK price floor to help steel

At least 55 killed in flash floods in northern Pakistan

U.S. judge approves BP settlement for 2010 Gulf of Mexico oil spill

Judge orders U.S. to address climate threat to wolverines

TECHNOLOGY

Twitter to stream Thursday night NFL games in 2016 season

China's ZTE names new management in wake of U.S. export restrictions

Chipmaker Marvell's CEO, president stepping down

Yen for animation inspired Hong Kong designer's robot

Print Email Share

Free Subscriptions

Get the latest science news with ScienceDaily's free email newsletters, updated daily and weekly. Or view hourly updated newfeeds in your RSS reader:

- Email Newsletters
- RSS Feeds

Follow Us

Keep up to date with the latest news from ScienceDaily via social networks:

- Facebook
- Twitter
- Google+
- LinkedIn

Mobile Apps

Get the latest news from ScienceDaily via our free mobile apps, available for download on the following platforms:

- iPhone/iPad
- Android

Have Feedback?

Tell us what you think of ScienceDaily -- we welcome both positive and negative comments. Have any problems using the site? Questions?

- Leave Feedback
- Contact Us