

El Niño

Facts, figures, images, and predictions

by Vincent A. Mariner

The media coverage of the 1997–98 El Niño has placed the term “El Niño” into the American vernacular. This El Niño is often referred to as this century’s major climatic event and El Niño is now appearing in the course curricula at all educational levels. The climate and socioeconomic impacts of El Niño are becoming evident on a global scale and



the interdisciplinary research of such a large and complex phenomenon will be intensifying as researchers investigate the possible links to El Niño within their respective disciplines.

El Niño, or El Niño Southern Oscillation (ENSO), is an anomalous oceanographic and atmospheric event in the equatorial Pacific Ocean that usually occurs every three to seven years and is characterized by an increase in the sea-surface temperature in the eastern equatorial Pacific Ocean. ENSO is thought to be responsible for anomalous climatic conditions spanning most of the globe. Many of the resulting impacts of El Niño are negative,

causing drought, famine, and floods. However, some impacts are beneficial. Research shows that El Niño reduces the intensity and number of Atlantic hurricanes and reduces the number of tornadoes in the central United States.

Resources on the Internet about El Niño have grown tremendously since the emergence of the 1997–98 event. There are a plethora of Internet sites that include El Niño-related information and many online newspapers carry El Niño-specific sections. Newspaper resources provide an effective way to find regional El Niño news. These sites can be located through subject directories and search engines such as Yahoo (Access: <http://www.yahoo.com/>). Yahoo lists over 50 sites on El Niño, but a simple search in Alta Vista (Access: <http://www.altavista.digital.com/>) on “El Niño” (no tilde) produced over 70,000 documents. An avenue for informal discussion of El Niño questions and answers is the newsgroup search engine Dejanews (Access: <http://www.dejanews.com/>). A sample search in Dejanews produced nearly 2,000 documents. The range of information available on El Niño is vast and growing. Highlighted here are important sites focused on El Niño that are useful in a reference setting.

El Niño mega sites

- NOAA/PMEL/TAO—El Niño Theme Page: Accessing Distributed Information Related to El Niño. These pages link widely distributed information and graphical prod-

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ucts describing the status and impact of El Niño events using links from both within NOAA and from external sources. This site also contains links to Spanish, French, Norwegian, and Portuguese-language El Niño sites. A Frequently (and Less Frequently) Asked Questions (FAQ) about El Niño is also available. *Access:* <http://www.pmel.noaa.gov/toga-tao/el-nino/home.html>.

• **Center for Ocean-Atmospheric Prediction Studies Library—El Niño & La Niña Resources On The Internet.** This site maintains a comprehensive index of links to the El Niño and La Niña resources available on the Internet. The resources are organized by the following subjects: theme pages, bibliographies, current news sources, mass media articles online, technical articles online, newsletters, serial reports, and movies and animations. *Access:* <http://www.coaps.fsu.edu/lib/elninolinks/>.

Current status of El Niño

• **TOPEX/Poseidon Jet Propulsion Laboratory (JPL)—El Niño Update.** This site contains a series of El Niño images from the TOPEX/Poseidon satellite data. Every ten days, the TOPEX/Poseidon satellite measures

TOPEX/POSEIDON



global sea level with unparalleled precision. This page also includes the latest El Niño movie. Extensive information is also available on the history and background of El Niño. *Access:*

http://topex-www.jpl.nasa.gov/el_nino/el_nino.html.

• **International Research Institute (IRI) for Climate Prediction—El Niño's, Past, Present, and Future.** The IRI details current El Niño information. This page shows regional precipitation probabilities, compares the current El Niño to previous El Niño events, and has links to other El Niño pages and to wire service and newspaper articles online. Also available are links to Cali-

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fornia newspapers that host El Niño theme pages. *Access:* http://iri.ucsd.edu/hot_nino/.

• **NOAA Office of Global Programs (OGP): El Niño—Southern Oscillation (ENSO) Home Page.** The NOAA-OGP site identifies itself as the one-step source for the latest on El Niño information. This site includes resources for learning more about El Niño and what is being done to learn more about ENSO. *Access:* <http://www.ogp.noaa.gov/enso/>.

• **NOAA Climate Prediction Center—El Niño/Southern Oscillation Main Page.** This NOAA site includes the current status of El Niño, impacts of El Niño on the United States (state by state), and U.S. seasonal forecasts. Regional analyses for Asia, Australia, South America, Mexico, the Caribbean, and South Africa are also included. A link to “Canadian Perspective on El Niño” is included in this site. *Access:* http://nic.fb4.noaa.gov/products/analysis_monitoring/ensostuff/index.html.

• **Federal Emergency Management Agency (FEMA): El Niño Loss Reduction Center.** The FEMA site focuses on disaster preparedness. Six to ten day weather forecasts, information on flood insurance, storm watches, press coverage of the El Niño summit, and audio of recent FEMA radio network El Niño interviews can be found at this FEMA site. *Access:* http://www.fema.gov/nwz97/el_nino.htm.

Forecasting El Niño

• **Scripps Institution of Oceanography: Experimental Climate Prediction Center—Experimental El Niño Forecast.** The forecasts on these pages show the results of ongoing research into forecasting El Niño. This site offers pictures of the forecast, which is updated the first week of every month. Other information available includes a three dimen-

sional look at the developing El Niño of 1997, a definition of El Niño, information on previous El Niño events, and their current research efforts in the field. *Access:* <http://>

meteora.ucsd.edu/~pierce/el_nino/el_nino.html.

- **The Center for Ocean-Atmospheric Prediction Studies (COAPS), Florida State University–The North American Climate Patterns Associated With The El Niño Southern Oscillation.** This report, written for the general public, shows the effects of the El Niño Southern Oscillation on North America. There are colorful maps that show how El Niño and La Niña (the other phase of the Southern Oscillation) seasonally affect North America. Another feature of this report shows the years in which El Niño, La Niña or neutral conditions existed back to 1944. *Access:* <http://www.coaps.fsu.edu/lib/booklet/>.

- **National Center for Environmental Prediction Climate Prediction Center.** The Climate Prediction Center El Niño Web page includes special reports, sea surface temperature forecasts, regional analyses, temperature and precipitation forecasts, and a historical features of El Niño section. This site is updated on Mondays. *Access:* http://nic.fb4.noaa.gov/products/analysis_monitoring/ensostuff/index.html.

Historical and educational information

- **Glossary of El Niño Terminology.** This site defines terminology related to the El Niño phenomena. *Access:* http://www.dir.ucar.edu/esig/el_nino/glossary.html.

- **Department of Atmospheric Sciences (DAS) at the University of Illinois at Urbana-Champaign: WW2010 El Niño Instructional Module.** This site introduces El Niño and discusses the conditions responsible for the occurrence of El Niño and how El Niño influences climatic conditions worldwide. This module also has a section on the economic impacts of El Niño and discusses the conditions when no El Niño is present. *Access:* [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/el_n/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/el_n/home.rxml).

- **Reports to the Nation on our Changing Planet, El Niño and Climate Prediction.** This report covers most aspects of El Niño. A nice feature shows how El



Niño predictions are used with a real-life example. Other sections are dedicated to a description of El Niño, a case study of El Niño, global consequences of El Niño, El Niño prediction, looking ahead, and more. This report is also available as a color brochure from NOAA. *Access:* <http://www.atmos.washington.edu/gcg/RTN/rtnt.html>.

- **Earth System Science at the University of Florida: El Niño–Southern Oscillation (ENSO) Educational Module.** This site discusses the impacts of ENSO, the history of ENSO research, and the understanding of the mechanisms of ENSO. This page also includes some teaching and learning resources. *Access:* http://ess.geology.ufl.edu/usra_esse/el_nino.html.

El Niño from mass media

- **CNN–El Niño Returns: An Online Companion To CNN's Special Series.** The featured information of the CNN El Niño page is an interactive map that allows the user to take a region by region look at the impact of El Niño, the economic impacts of El Niño, streaming video reports and links to dozens of CNN El Niño articles. *Access:* http://www.cnn.com/SPECIALS/el_nino/.

- **USA TODAY–El Niño Information.** This site includes details on the current conditions and forecasts, how El Niño affects hurricanes, how El Niño works, and graphics on how El Niño begins and affects weather. The *USA Today* site also includes over two dozen news stories posted since August 1997. *Access:* <http://www.usatoday.com/weather/nino/winfo0.htm>.

- **Environmental News Network–El Niño Special Report.** ENN describes in text, images, audio, and links what El Niño is, past El Niño events, measuring El Niño, El Niño's impact, and the current forecast. *Access:* http://www.enn.com/el_nino/.

- **NOVA Online–Tracking El Niño.** This site includes news dispatches, anatomy of El Niño, El Niño Now, El Niño's Reach, and links to other El Niño resources on the Internet. *Access:* http://www.pbs.org/wgbh/nova/el_nino/.

Sites with a regional focus

- **Africa–U.S. Agency For International Development: Famine Early Warning System–El Niño.** This page in-

cludes an overview of the impact on weather in Africa with special emphasis on the effects of the El Niño Southern Oscillation on Zimbabwe and Zambia. Famine Early Warning System is monitoring this year's El Niño development with links to satellite imagery and explanations of the images. *Access:* <http://www.info.usaid.gov/fews/imagery/ninodef.htm>.

• **Australia—John L. Daly—The El Niño Southern Oscillation (ENSO).** This resource answers the basics of El Niño. The emphasis of this page is the impact of El Niño on Australia. This page uses images to show what the Southern Oscillation Index is and includes links to other El Niño and Australia resources. *Access:* http://www.vision.net.au/~daly/el_nino.htm.

• **Canada—Environment Canada—El Niño.** This site has the specific impact of the El Niño phenomenon on Canadian provinces and territories. Also included is a definition of El Niño, forecasts and cur-



rent El Niño status, local and global effects, and further reading. This site is also offered in French. *Access:* http://www.tor.ec.gc.ca/el_nino/english/el_nino.html.

• **United States—Midwestern Climate Center—El Niño and the Midwest.** This resource defines El Niño and provides precipitation information with an emphasis on snowfall. This page includes mapped summer precipitation totals for the midwest for three major El Niño years, summary of El Niño events through 1982, and the energy impact of El Niño on the midwest. *Access:* http://mcc.sws.uiuc.edu/el_nino.html.

• **United States—National Weather Service, San Francisco Bay Area—El Niño Southern Oscillation Page.** This site contains vast amounts of El Niño information with an emphasis on California. There is also information pertaining to the global impact of El Niño. Links and information are listed under these categories: impact of El Niño, ENSO advisories and forecasts, long-range weather forecasts, El Niño background information, and other

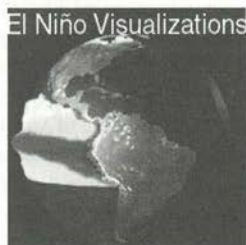
El Niño or related links. *Access:* http://www.nws.mbay.net/el_nino.html.

• **United States—Pacific ENSO Applications Center (PEAC), University of Hawaii at Manoa—Pacific ENSO Applications Center.** This site focuses on the impact of El Niño on the U.S. Pacific Islands. Featured information is ENSO and climate variations, island information and maps, and the climatology in the Pacific Islands. PEAC produces a newsletter called the "Pacific ENSO Update," which is available on the Web. The newsletter is produced quarterly, with additional special reports on important changes in ENSO conditions. *Access:* <http://nauulu.soest.hawaii.edu/Enso/index.html>.

• **United States—Western Regional Climate Center: El Niño and the Western U.S., Alaska and Hawaii.** This resource emphasizes western U.S. relationships to ENSO. This page includes Frequently Asked Questions (FAQ) about El Niño. *Access:* <http://www.wrcc.sage.dri.edu/enso/enso.html>.

Images, animations, and graphics of El Niño

• **El Niño Visualizations from the NASA-Goddard Space Flight Center.** Animation and images showing a combined perspective of the El Niño-induced change in the sea surface topography and sea surface temperature. Many



of the views are in 3D. *Access:* <http://nsipp.gsfc.nasa.gov/enso/nino/>.

• **NOAA Climate Diagnostics Center.** Animation of the current El Niño Event as well as animation comparing two big El Niño events (1982 and 1997) and comparing the 1982, 1991, 1994, and 1997–98 El Niño events. Animation shows the rise in Pacific Ocean water temperature along the equator and off the coasts of Central and South America. *Access:* http://www.cdc.noaa.gov/~map/maproom/text/climate_pages/sst_olr/el_nino_anim.shtml.

• **Media Graphics.** Graphics available for presentation and publication. *Access:* http://nic.fb4.noaa.gov:80/products/analysis_

monitoring/ensostuff/media/media.html.



La Niña resources

- **La Niña Home Page.** Univ. Corporation for Atmospheric Research (UCAR)—this site includes forecasts, data sources, impacts and links to other La Niña sites. *Access:* http://www.dir.ucar.edu/esig/la_nina_home/.

- **NOAA Public Affairs La Niña Information.** Includes the basics of La Niña and links to more La Niña resources. *Access:* <http://www.publicaffairs.noaa.gov/lanina.html>.

- **Western Disaster Center La Niña Page.** This resource includes data and analyses, advisories and forecasts, background information, and links to other La Niña sites. *Access:* <http://www.wdc.ndin.net/lanina.html>.



- **NOAA La Niña Page.** Includes general information and La Niña impact. *Access:* <http://www.elnino.noaa.gov/lanina.html>.

- **What is La Niña?** This site defines La Niña, discusses the origin of the name, and compares La Niña to El Niño. *Access:* <http://www.pmel.noaa.gov/toga-tao/la-nina-story.html>.

Newsletters

(Note that these are not El Niño-specific newsletters, but they do regularly include El Niño and La Niña news and information.)

- **World Climate News.** Issued by the World Meteorological Organization and available both in HTML and PDF formats. This link goes directly to an issue on "El Niño and Climate Change." *Access:* <http://www.wmo.ch/web/catalogue/New%20HTML/frame/frame.html>. Use the following link to enter the World Climate News front page. *Access:* <http://www.wmo.ch/web/catalogue/New%20HTML/frame/engfil/wcn/wcn13.html>.

- **WMO El Niño Update.** A summary of

reports provided by WMO members and affiliated institutions, which includes forecasts and impacts of the 1997–1998 El Niño. *Access:* <http://www.wmo.ch/nino/updat.html>.

- **Global Change.** *Access:* <http://www.globalchange.org/gc.htm>.

- **Exchanges.** Exchanges is the newsletter of the Climate Variability and Predictability Programme. *Access:* <http://www.dkrz.de/clivar/publications.html>.

- **El Niño Southern Oscillation Diagnostic Advisory.** Reports on the latest model predictions of El Niño and La Niña. *Access:* http://nic.fb4.noaa.gov/products/analysis_monitoring/enso_advisory/index.html.

Experimental Long-Lead FORECAST BULLETIN

- **Experimental Long-Lead Forecast Bulletins.** This bulletin is issued quarterly by the Center for Ocean-Land-Atmosphere Studies (COLA) and is intended to present experimental forecasts with a long-lead time. *Access:* <http://grads.iges.org/ellfb/>.

- **Drought Network News.** This newsletter is published by the National Drought Mitigation Center and regularly covers El Niño. *Access:* <http://enso.unl.edu/ndmc/center/dnn/dnnarch.htm>.

Newsgroups

- sci.geo.meteorology
- sci.geo.oceanography
- ne.weather
- talk.environment

Newspaper, wire service, and magazine articles

- **Full Coverage of El Niño from Yahoo.** This site has links to the latest articles online, links to related Web sites, links to other news sources and multimedia. *Access:* http://headlines.yahoo.com/Full_Coverage/Tech/El_Nino/.

- **The 1997/98 El Niño and 1998/99 La Niña events.** This site includes links to the latest articles available online and it also has a very nice archive of links to articles organized by month. The archive begins with June 1997. *Access:* <http://www.iphc.washington.edu/PAGES/IPHC/Staff/hare/html/1997ENSO/1997ENSO.html>. ■



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