



Climate Watch at a Global Level: Experience with the ENSO Alert System

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& Climate Watch Systems
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Outline

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- **NOAA Definitions for ENSO and Alert System**
- **Creation of the ENSO Outlook & ENSO Alert System**
- **Coordination and Dissemination**
- **User Feedback**
- **Looking Forward: Drought?**

Objective

Objectives:

- To succinctly describe the onset and status of ENSO in order to increase understanding among federal and state agencies, academia, the private sector, and general public.
- heighten awareness in the user community that a significant climate anomaly exists or might develop and that preparedness measures should be initiated.

Background

Background:

- The NOAA ENSO Alert System became operational in February 2009.
- Developed at Climate Prediction Center by Dr. Wayne Higgins and Dr. Vernon Kousky (published in *Weather and Forecasting*, 2007).
- The system is based on CPC/IRI's operational ENSO definition, assessment, and prediction activities.
- WMO Executive Council has urged all members to develop and implement Climate Watches.

Types of Alerts

An El Niño or La Niña Watch:

Issued when the environment in the equatorial Pacific basin is favorable for the development of El Niño or La Niña conditions within the next 6 months.

An El Niño or La Niña Advisory:

Issued when El Niño or La Niña conditions in the equatorial Pacific basin are observed and expected to continue.

Final El Niño or La Niña Advisory:

Issued after El Niño or La Niña conditions have ended.

NA:

The ENSO Alert System will not be active when El Niño or La Niña conditions are not observed or expected to develop in the equatorial Pacific basin.

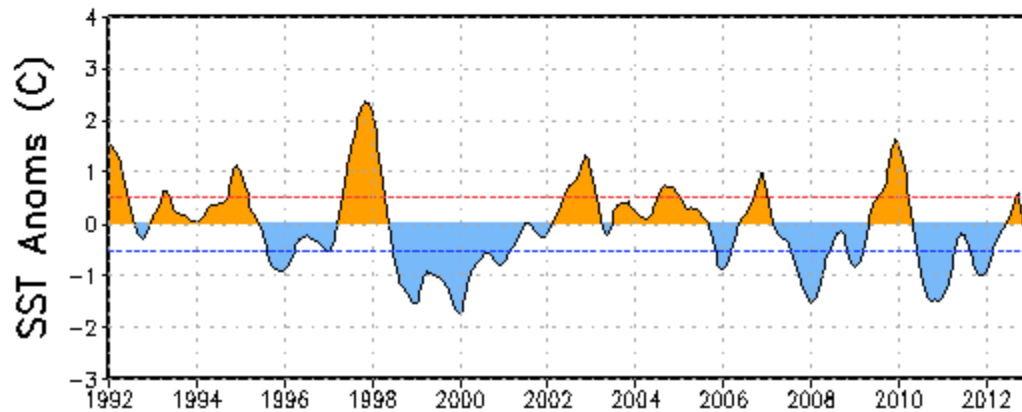
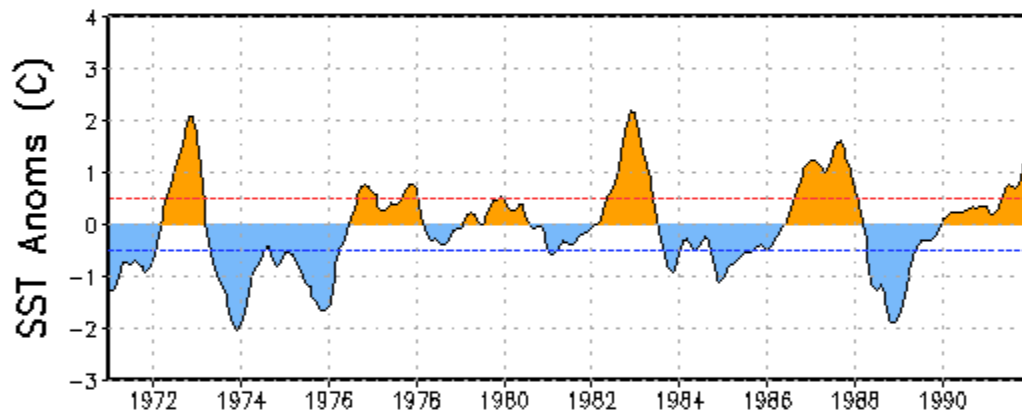
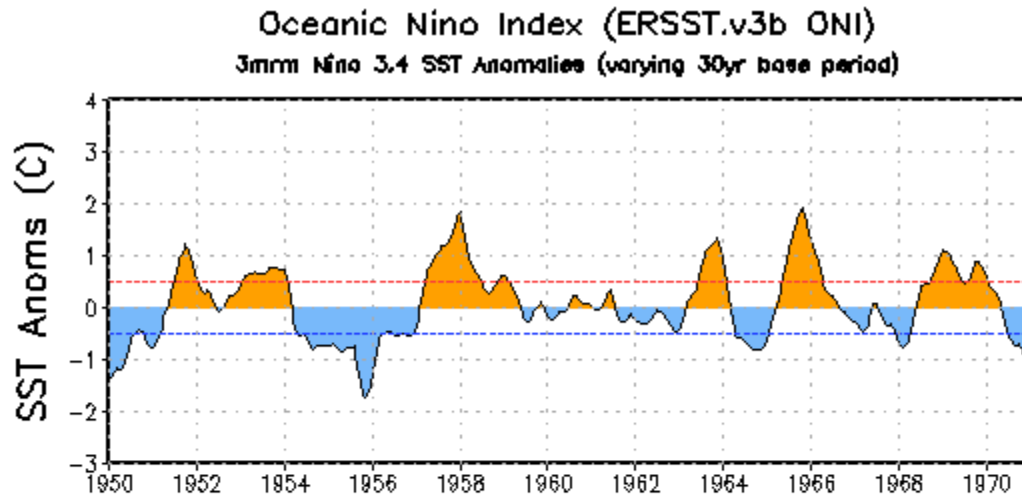
NOAA Operational Definition for ENSO

- The **Oceanic Niño Index (“ONI”)** is based on SST departures from average in the Niño 3.4 region, and is a principal measure for monitoring, assessing, and predicting ENSO.
- ONI is defined as the 3-month average SST departures in the Niño-3.4 region. Departures are based on a set of improved homogeneous historical SST analyses (Extended Reconstructed SST – ERSST.v3b).

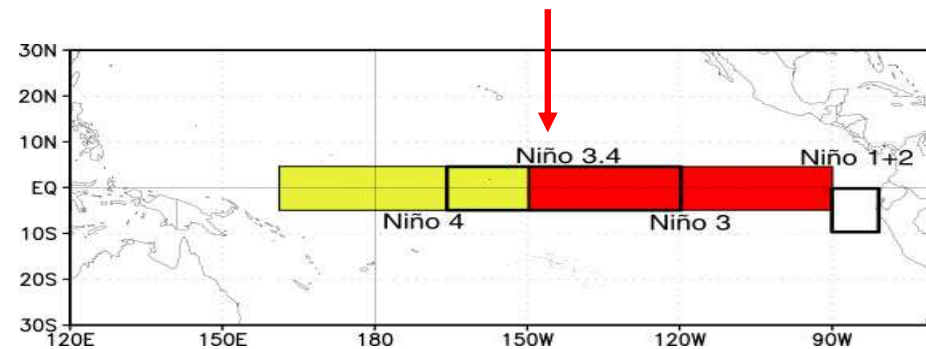
El Niño: characterized by a *positive ONI* greater than or equal to $+0.5^{\circ}$ C.

La Niña: characterized by a *negative ONI* less than or equal to -0.5° C.

Oceanic Niño Index (ONI): Evolution since 1950



ONI is based on 3-month running mean SST departures in Niño-3.4 region



El Niño

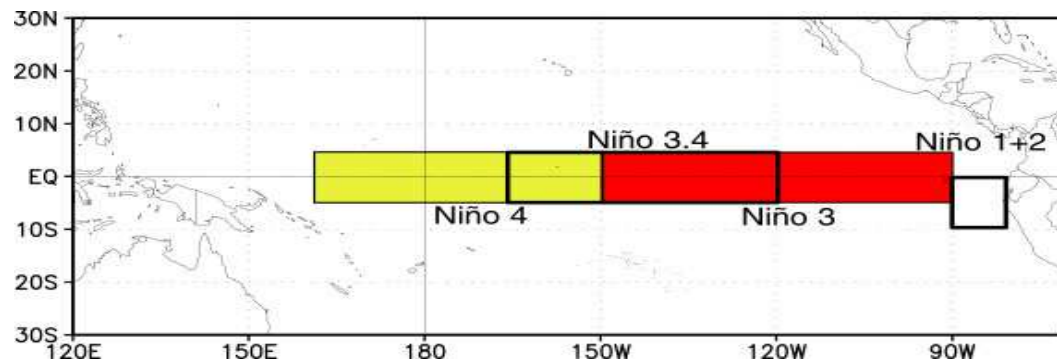
Neutral

La Niña



What triggers an ENSO Advisory?

The ENSO Alert System is based on El Niño and La Niña “conditions” that allows the NOAA Climate Prediction Center to be able to issue watches/advisories in real-time.



El Niño conditions: one-month positive SST anomaly of +0.5 or greater in the Niño-3.4 region and an expectation that the 3-month ONI threshold will be met.

La Niña conditions: one-month negative SST anomaly of −0.5 or less in the Niño-3.4 region and an expectation that the 3-month ONI threshold will be met.

AND

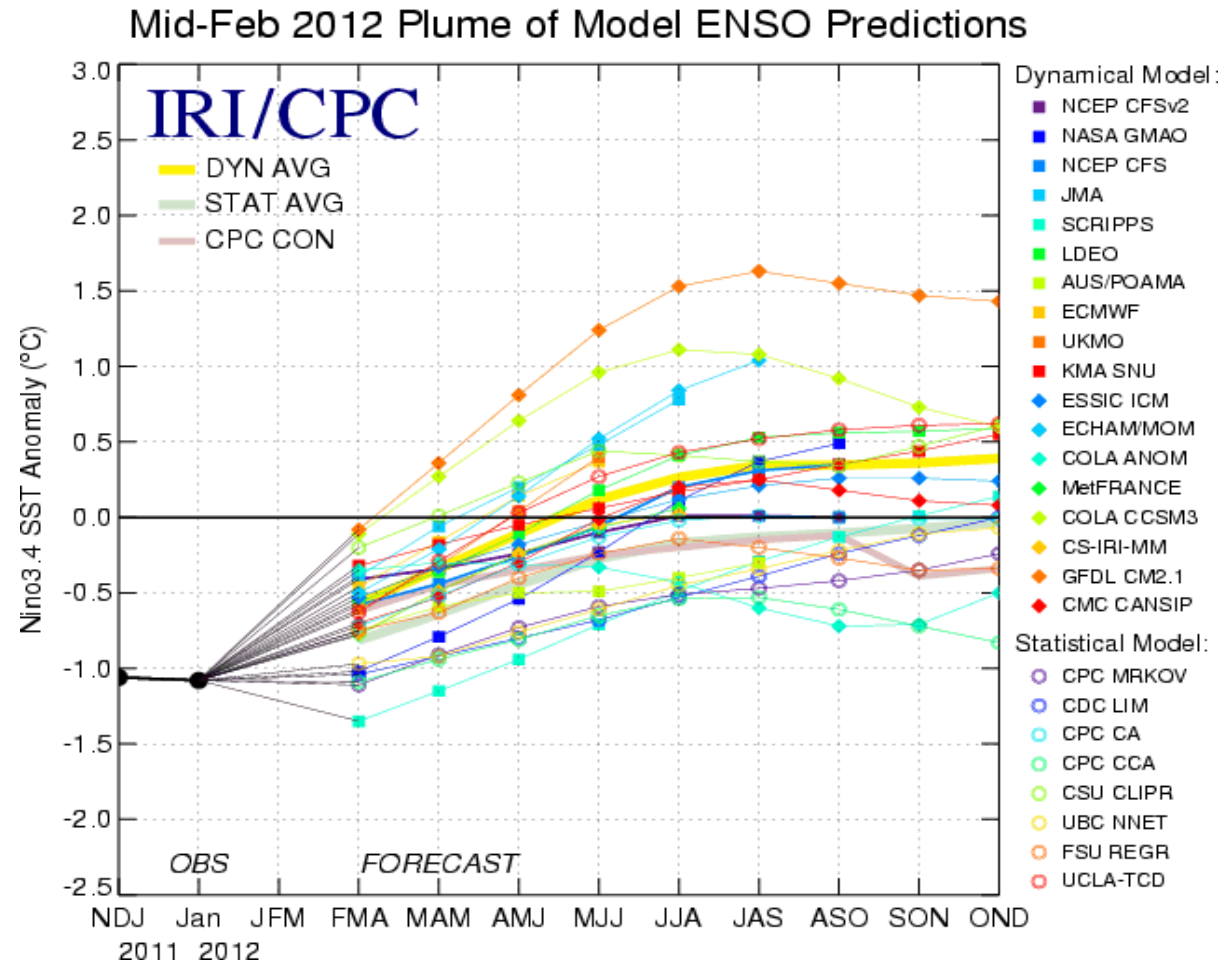
An atmospheric response typically associated with **El Niño/ La Niña** over the equatorial Pacific Ocean.

Creation of the NOAA ENSO Forecast

The ENSO team (CPC forecasters + Tony Barnston at the IRI) determines the probabilities for each ENSO category, which provides the ENSO prediction for the upcoming ~8 seasons.

Forecasters consider:

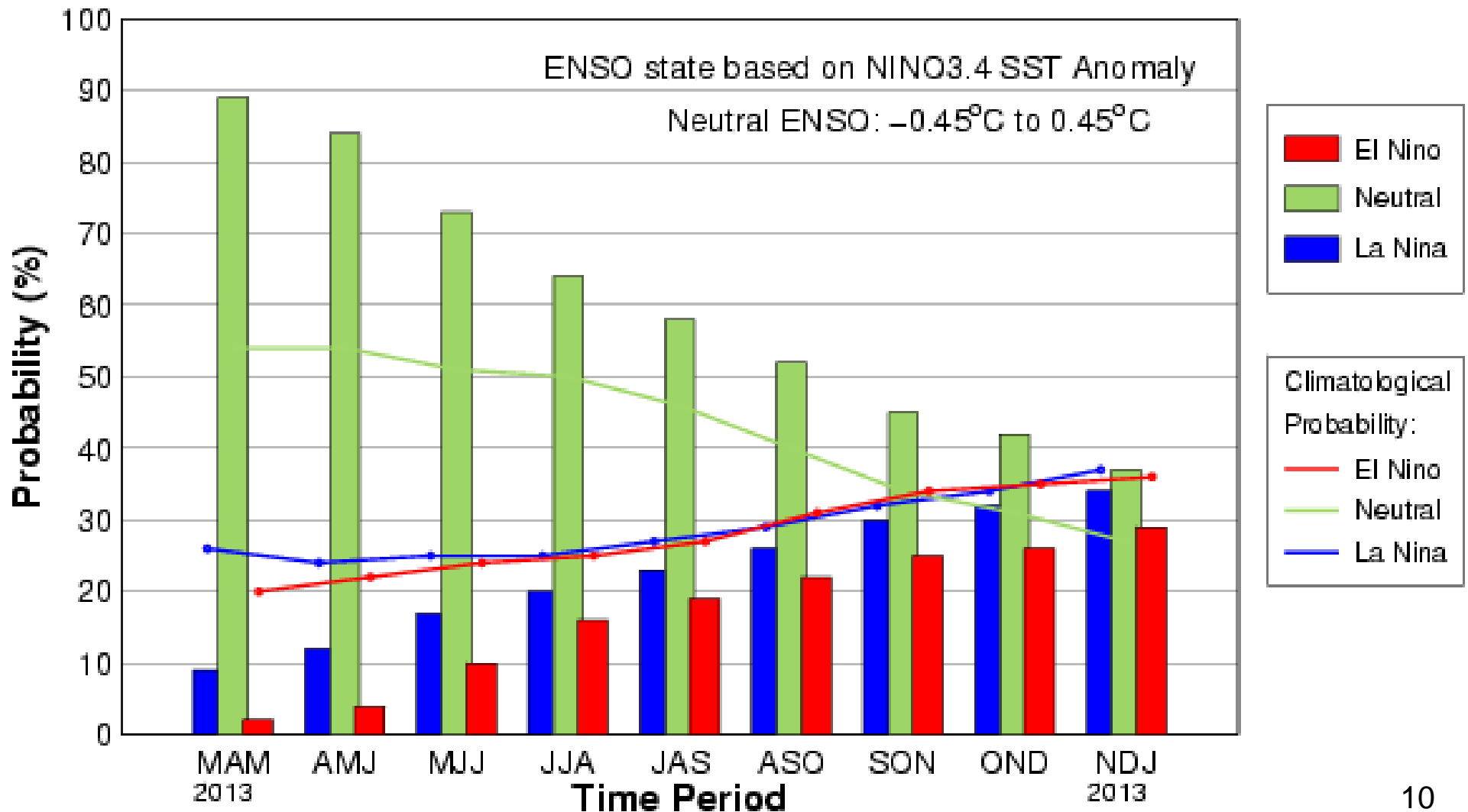
- (1) The observed state of the tropical Pacific
- (2) Dynamical and statistical model output and multi-model (“MME”) combinations
- (3) Knowledge and experience of previous ENSO episodes



How Is the probability of ENSO determined?

Each forecaster individually provides probabilities of three categories (El Niño – Neutral – La Niña). Individual forecasts are averaged to create the “Consensus” probabilities and form the basis for the diagnostics discussion.

Early-Apr CPC/IRI Consensus Probabilistic ENSO Forecast



ENSO Diagnostic Discussion disseminates the ENSO Alert System status to the scientific community and general public.

Issuance date at top.
Updated once a month on Thursday between the 4th and 10th. Date of next month's release at bottom.

ENSO Alert System Status:
User can click on status to get detailed information on Alert System definitions

Body of discussion offers more detailed information:
(1) Current observations
(2) Model forecasts and our interpretation
(3) Potential related impacts (if an event is impending/ongoing)

http://www.cpc.noaa.gov/products/analysis_monitoring/enso_advisory/index.shtml

Can also receive the ENSO discussion update through email: ncep.list.enso-update@noaa.gov

The screenshot shows the website for the ENSO Diagnostic Discussion. At the top, it says "National Weather Service Climate Prediction Center". The main heading is "EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION", issued by the "CLIMATE PREDICTION CENTER/NCEP and the International Research Institute for Climate and Society" on "8 March 2012". Below this, the "ENSO Alert System Status" is listed as "La Niña Advisory". A link for the "Spanish Version" is provided. The synopsis states: "La Niña is expected to transition to ENSO-neutral conditions by the end of April 2012." The main body of text describes the weakening of La Niña during February 2012, with near-average sea surface temperatures in the eastern equatorial Pacific and below-average temperatures in the central Pacific. It also mentions that a majority of models predict ENSO-neutral conditions to return during March-May 2012. The page footer notes that impacts often lag the demise of an ENSO episode, with La Niña-like impacts expected to persist into the upcoming season.

Coordination of the System within NOAA

- Advance notice is provided to NOAA leadership when the ENSO Alert System status changes.
- A Question and Answer (Q&A) sheet is available to increase awareness and understanding of the ENSO Alert System, including potential impacts around the globe and recommended actions.
- Briefings and training given to regional Weather Forecast Offices so they understand the meaning and consequences of an ENSO Alert.

How is the ENSO Discussion & Alert distributed to the Public?

- Posted to CPC and IRI websites. There is also a CPC email listserv which has 11,000+ subscribers (includes technical experts, media, general public, etc.).
- Within hours, NOAA posts a press release (if a noteworthy change in ENSO) and articles will appear on media outlets (Reuters, Bloomberg, AP, etc.)
- NOAA/NWS has several public affairs officials who are available to arrange interviews radio, TV, newspapers, blogs....



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NOAA Unveils New Alert System for La Niña and El Niño

La Niña Likely to Continue into Spring

February 5, 2009

NOAA's Climate Prediction Center today issued the first La Niña advisory under its new El Niño Southern Oscillation (ENSO) Alert System. Forecasters expect La Niña to influence weather patterns across the United States during the remainder of the winter and into the early spring.



Pacific Sea Surface Temperature Animation (Nov. 12, 2008 to Jan. 28, 2009)
High resolution (Credit: NOAA)

Defined as cooler than normal sea surface temperatures in the central and eastern equatorial Pacific Ocean, La Niña impacts the weather globally. La Niña's opposite is El Niño, or warmer than normal ocean temperatures. These changes in ocean temperatures alter the tropical wind and rainfall patterns with far reaching implications.

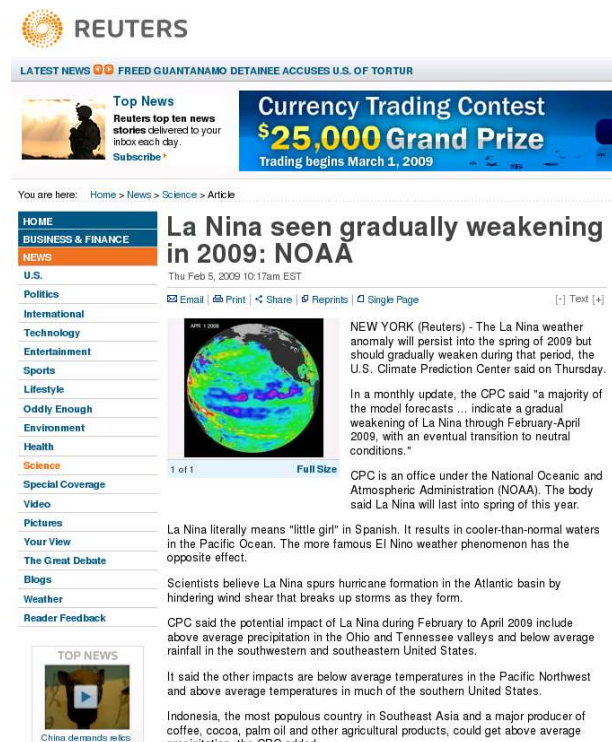
"The typical weather patterns associated with La Niña and El Niño affect many industries including agriculture, transportation, energy, shipping and construction," said Michael S. Halpert, deputy director of the Climate Prediction Center. "The ENSO Alert System will succinctly inform industry, government agencies, academia and the public about the onset and status of La Niña and El Niño. This system will also help decision makers plan for the potential effects presented by these conditions."

La Niña conditions have been present since late December, but it is too early to say exactly how strong the event will be and precisely how long it will last. However, for the next few months La Niña is expected to bring milder and drier than average conditions to the southeastern and southwestern states. It is also expected to bring wetter-than-average conditions to the Ohio and Tennessee valleys, and cooler than average temperatures to the Pacific Northwest.

The new ENSO alert system includes La Niña and El Niño watches and advisories which the Climate Prediction Center will issue when specific conditions exist.

- **La Niña or El Niño Watch:** conditions in the equatorial Pacific are favorable for the development of La Niña or El Niño conditions in the next three months.
- **La Niña or El Niño Advisory:** La Niña or El Niño conditions have developed and are expected to continue.

These watches and advisories are now part of the ENSO Diagnostic Discussion, which is issued by the Climate Prediction Center on the Thursday falling between the 5th and 11th of every month. It is available



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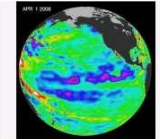
Currency Trading Contest
\$25,000 Grand Prize
Trading begins March 1, 2009

You are here: Home > News > Science > Article

La Nina seen gradually weakening in 2009: NOAA

Thu Feb 5, 2009 10:17am EST

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1 of 1 Full Size

NEW YORK (Reuters) - The La Niña weather anomaly will persist into the spring of 2009 but should gradually weaken during that period, the U.S. Climate Prediction Center said on Thursday.

In a monthly update, the CPC said "a majority of the model forecasts ... indicate a gradual weakening of La Niña through February-April 2009, with an eventual transition to neutral conditions."

CPC is an office under the National Oceanic and Atmospheric Administration (NOAA). The body said La Niña will last into spring of this year.

La Niña literally means "little girl" in Spanish. It results in cooler-than-normal waters in the Pacific Ocean. The more famous El Niño weather phenomenon has the opposite effect.

Scientists believe La Niña spurs hurricane formation in the Atlantic basin by hindering wind shear that breaks up storms as they form.

CPC said the potential impact of La Niña during February to April 2009 include above average precipitation in the Ohio and Tennessee valleys and below average rainfall in the southwestern and southeastern United States.

It said the other impacts are below average temperatures in the Pacific Northwest and above average temperatures in much of the southern United States.

Indonesia, the most populous country in Southeast Asia and a major producer of coffee, cocoa, palm oil and other agricultural products, could get above average precipitation, the CPC added.

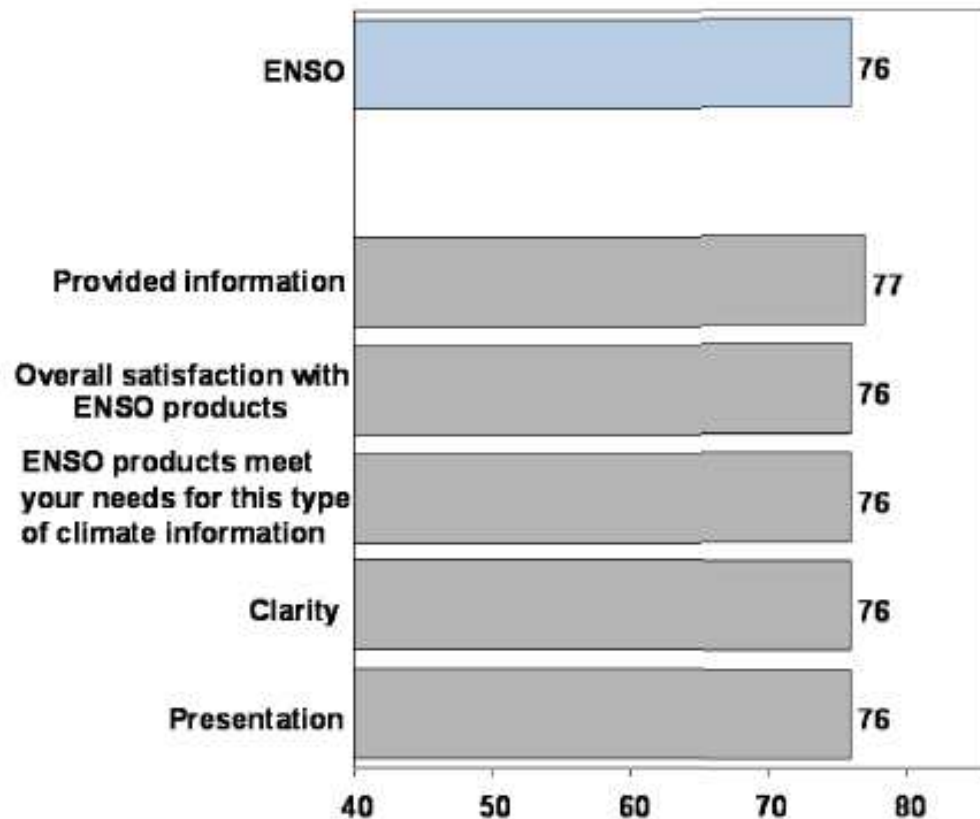
TOP NEWS
China demands HK return

External User Feedback

- User feedback is continuous and ongoing.
- ENSO Diagnostics Discussion drafts are reviewed by NOAA scientists outside of CPC/IRI prior to release.
- We receive website comments through CPC's webpage: www.cpc.ncep.noaa.gov
- Periodic surveys given by National Weather Service Climate Services Division (CSD)

2009 survey of ENSO products

Provided information was the highest scoring attribute for ENSO. In 2004 Clarity scored 75 and Provided Information scored 76. The majority of ENSO product users have used Monthly ENSO discussions.



Frequency of Use: n=733
 Infrequently, but I have used it: 15%
 Occasionally: 32%
 Frequently: 25%
 Very Frequently, but not always: 9%
 Nearly every time it is released: 19%

Frequency of Use/ENSO Score
 Infrequently, but I have used it: 66
 Occasionally: 73
 Frequently: 78
 Very Frequently, but not always: 81
 Nearly every time it is released: 85

ENSO Products Used*: n=733
 Monthly ENSO discussion: 89%
 Weekly Update: 48%

Likelihood to make or change a decision based on the information in ENSO Products: 59

n = total number of respondents for question/*Multiple Responses Allowed

Questions 2.6.1-2.6.6

Looking Forward

- Other global-scale products that eventually could be tied into a climate watch system:

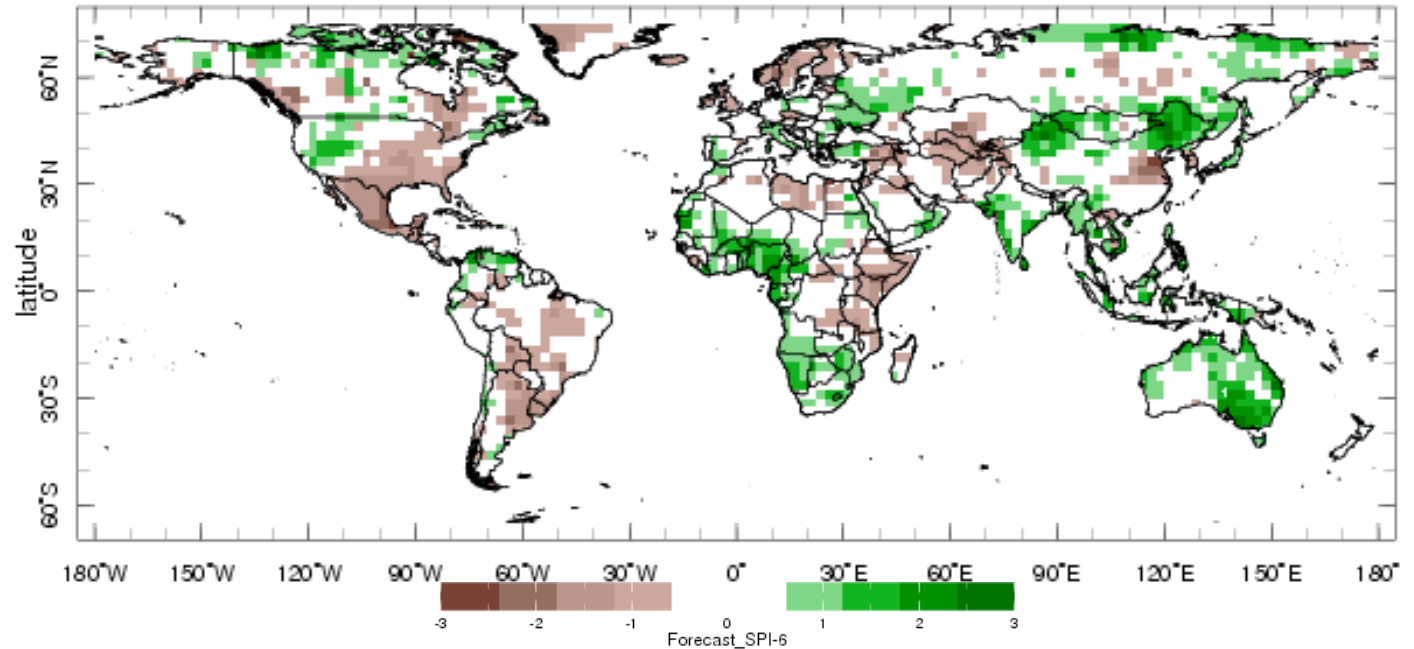
Experimental Global Drought Information System
(GDIS):

[http://www.clivar.org/organization/extremes/activities/
GDIS-workshop](http://www.clivar.org/organization/extremes/activities/GDIS-workshop)

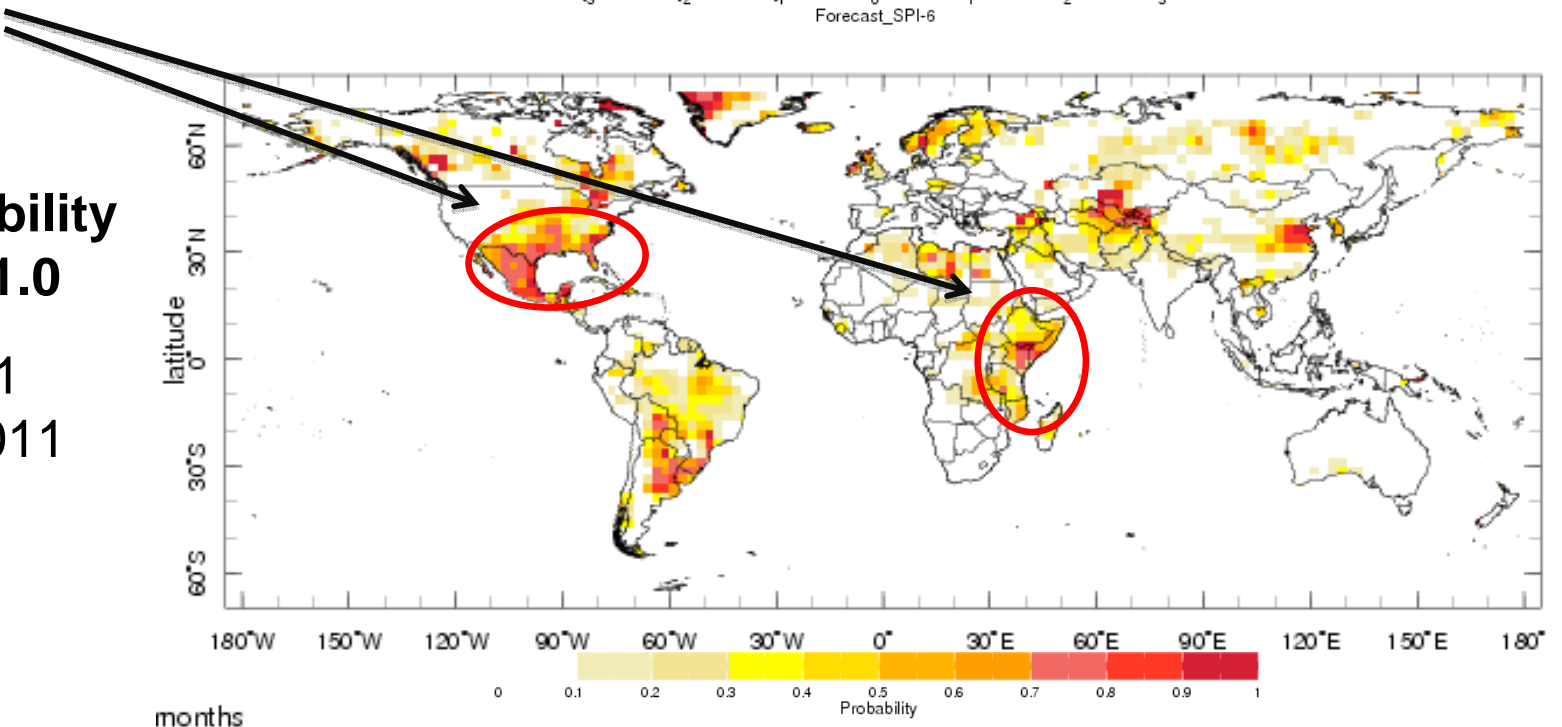
Example of IRI Multi-Model, Probabilistic Global Forecasts of SPI-6 (courtesy of Bradfield Lyon, IRI)

Best Estimate Forecast of SPI-6

I.C. Jan 2011
Fcst for Apr 2011



Climate Watch
candidates?



Forecast Probability that SPI-6 < -1.0

I.C. Jan 2011
Fcst for Apr 2011

months



Questions/ Comments?

Please feel free to contact me at any time:
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