



The Impact of the El Niño **Phenomenon on the United States**

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for the Agricultural Outlook Forum

February 20, 2003



Outline



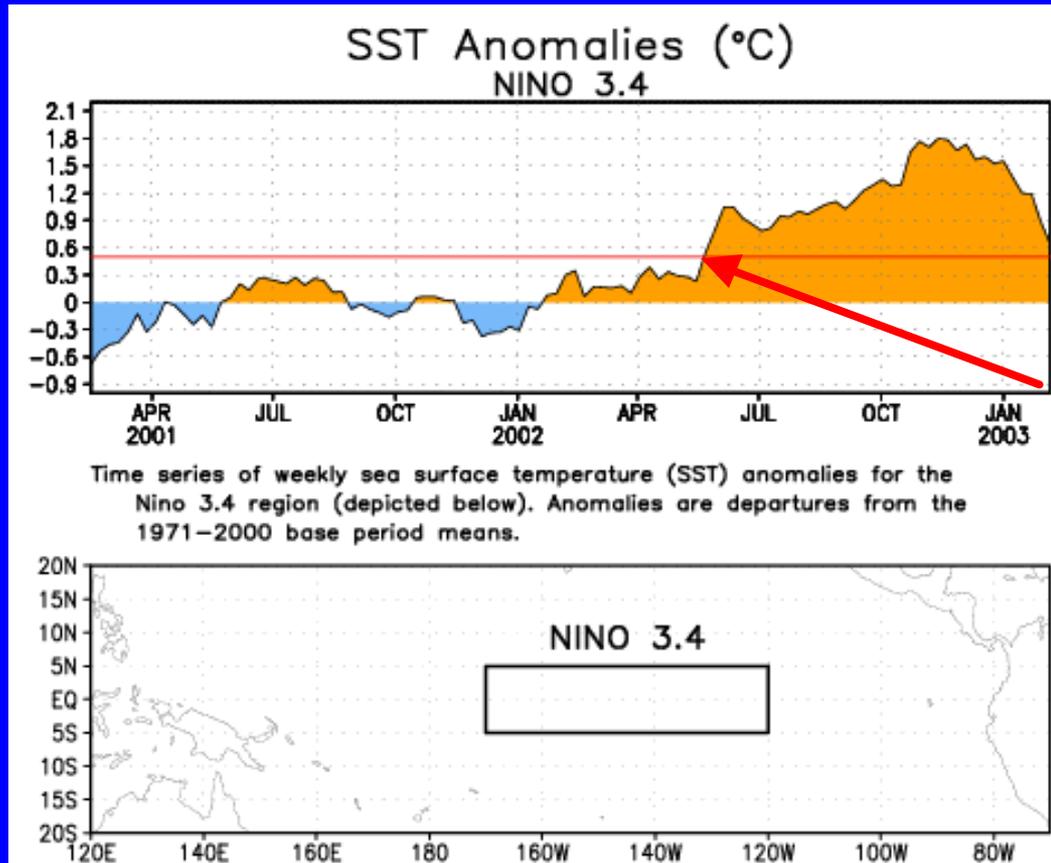
- **How does/should NOAA define El Niño? (ocean temp. atmospheric pressure, winds, impacts, indices?)**
- **Typical impacts on jet stream, temperature, precipitation**
- **Impacts on Rain, Snow, Temperature Extremes ... AG???**
- **Other factor can be “wild cards” – e.g., Arctic Oscillation**
- **2002-03 Event: Nov02-Jan03 results; Feb-Apr Outlooks**
- **Hurricane Season Activity: 2002, 1999, 2003??**
- **Summary**



NOAA Definition of El Niño



- **El Niño:** Sea surface temperatures 0.5C above average or greater, averaged over three consecutive months, in the Niño 3.4 region (120W-170W, 5N-5S).



**El Niño
conditions
established
during
April-June
2002.**



Typical El Niño Impacts on North America



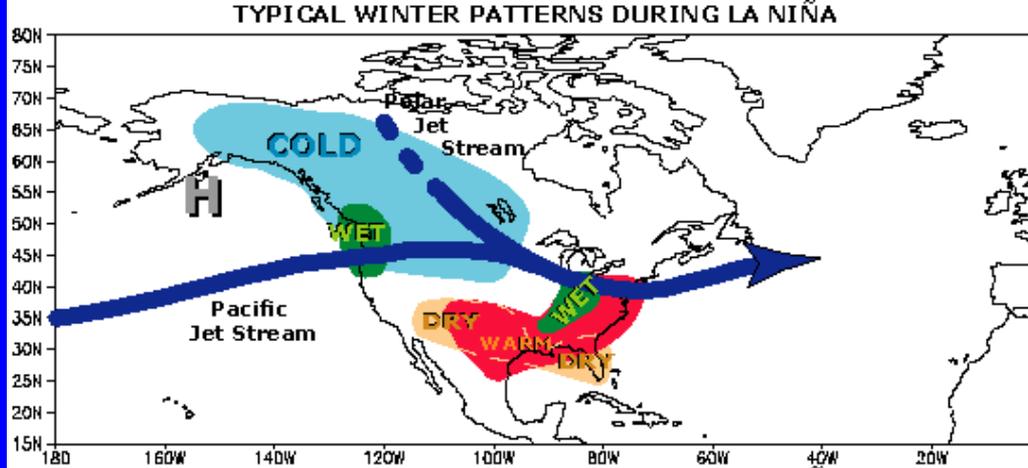
El Niño impacts on North America are typically strongest during the winter and early spring. Impacts include:

Fall

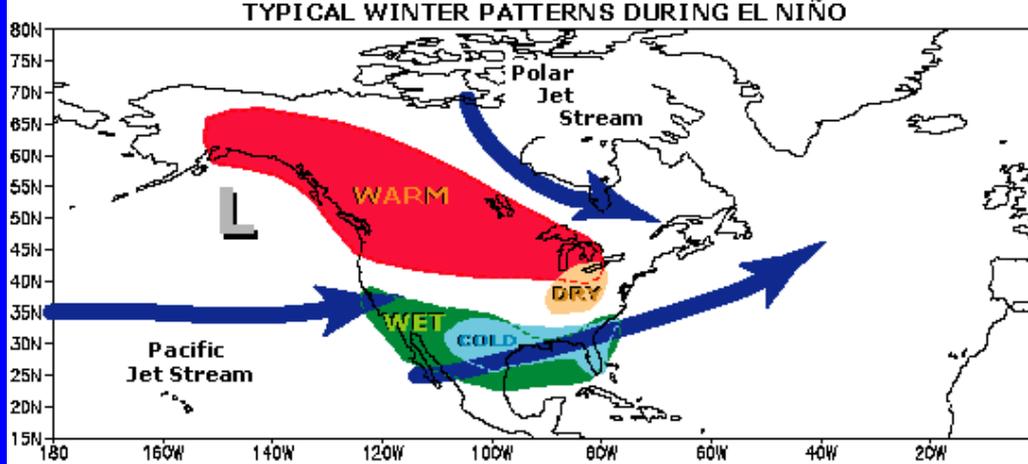
- Pacific Northwest -- **drier than normal**

Winter/Early Spring

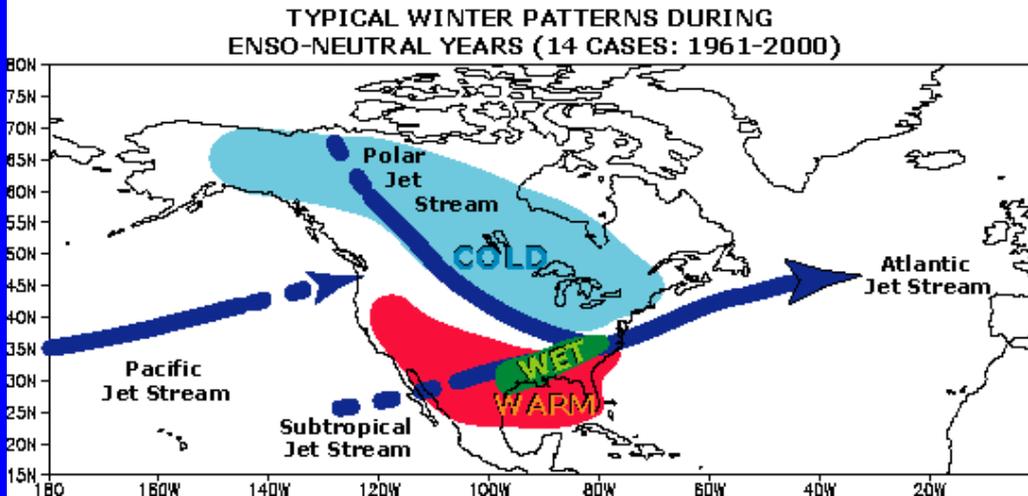
- Northern Tier of States, western and central Canada, southern/southeastern Alaska - **warmer than normal**
- Northern Rockies, Ohio Valley – **drier than normal**
- Southern Tier of States – **wetter than normal**
- Southern Tier of States – **cooler than normal**



La Niña



El Niño

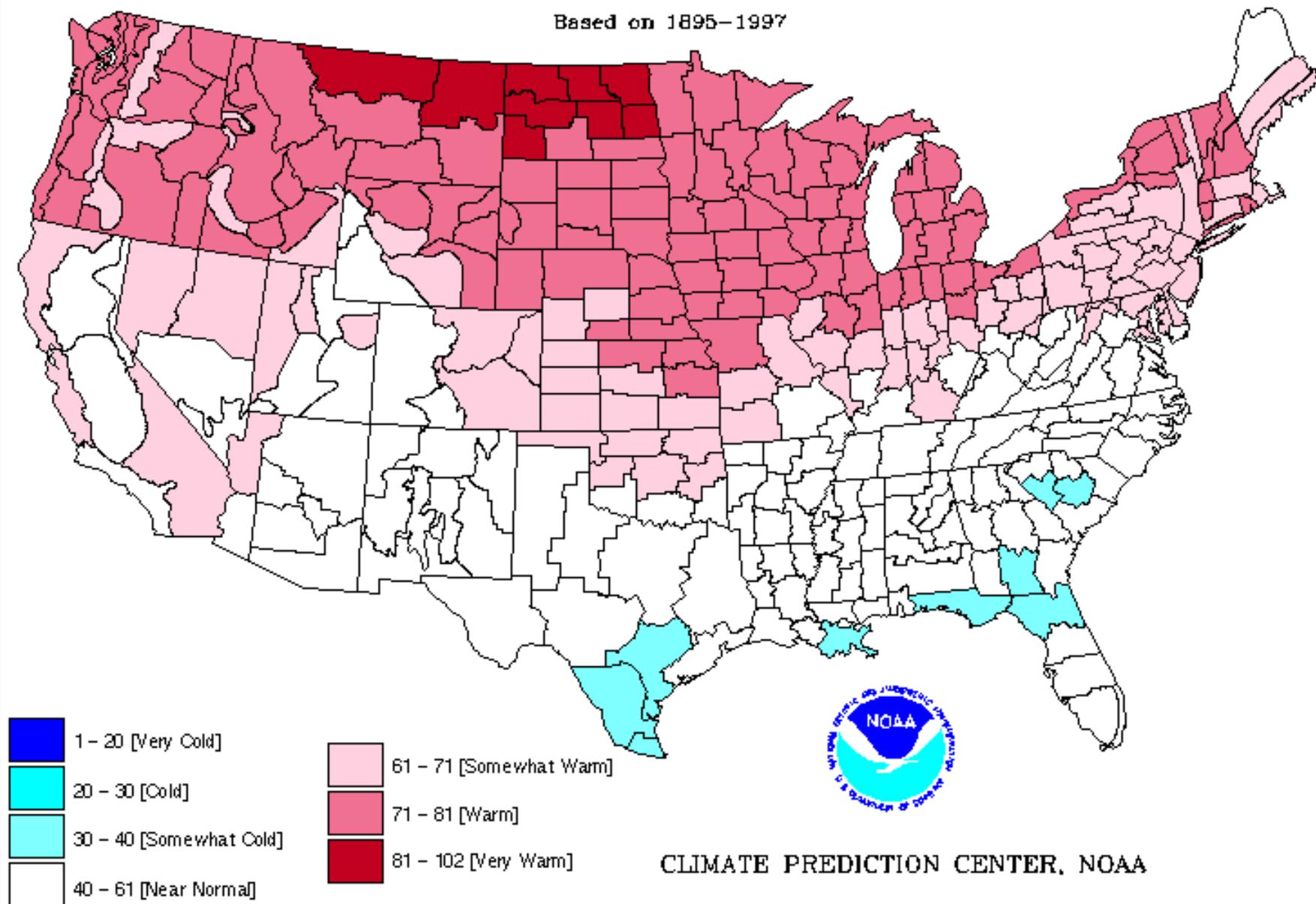


Neutral

AVERAGE DECEMBER - FEBRUARY [3-month] TEMPERATURE RANKINGS DURING ENSO EVENTS

1941 1968 1966 1973 1983 1987 1988 1992 1995

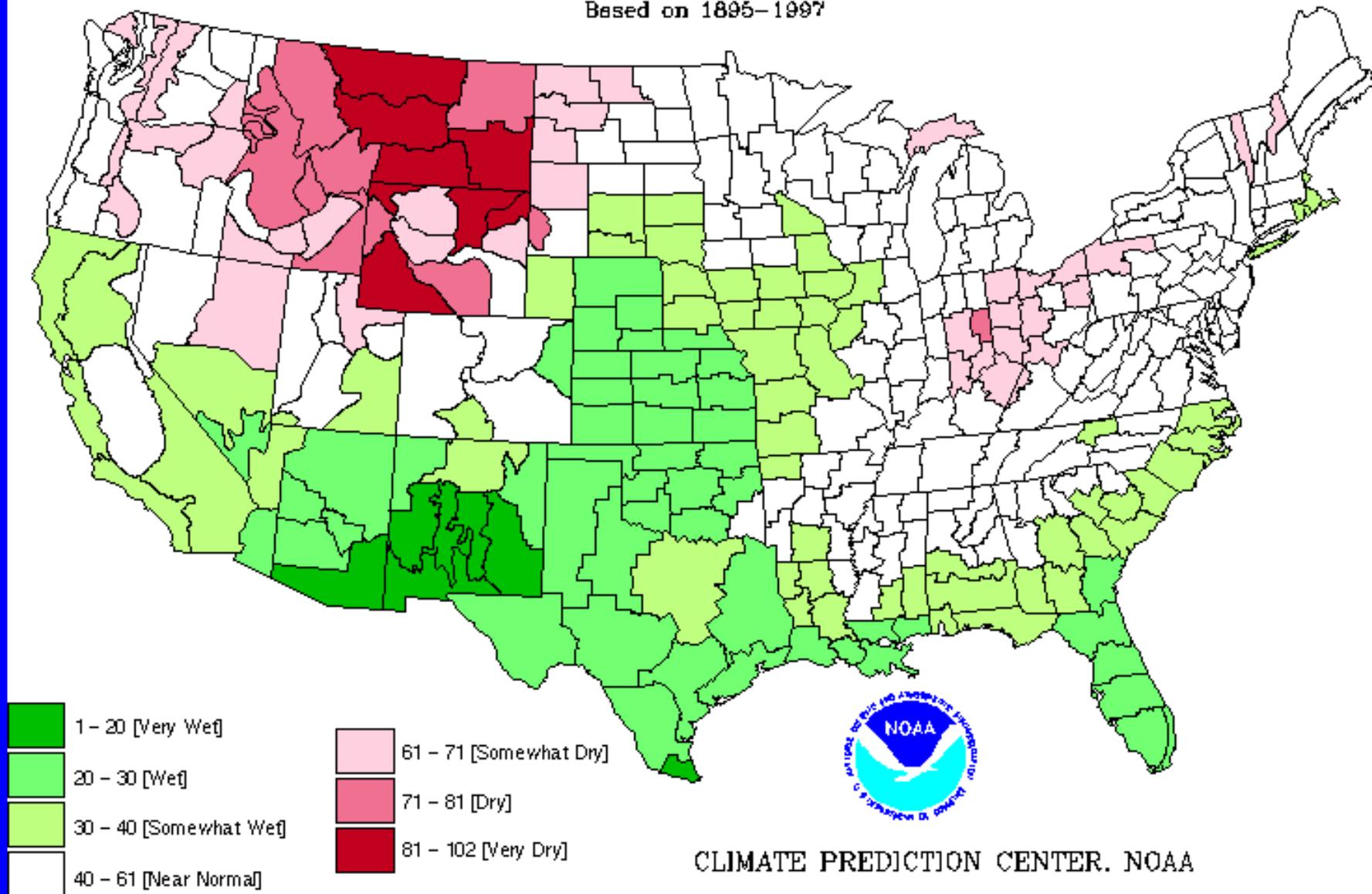
Based on 1895-1997



AVERAGE DECEMBER - FEBRUARY [3-month] PRECIPITATION RANKINGS DURING ENSO EVENTS

1915 1919 1941 1958 1966 1973 1983 1987 1988 1992 1995

Based on 1895-1997

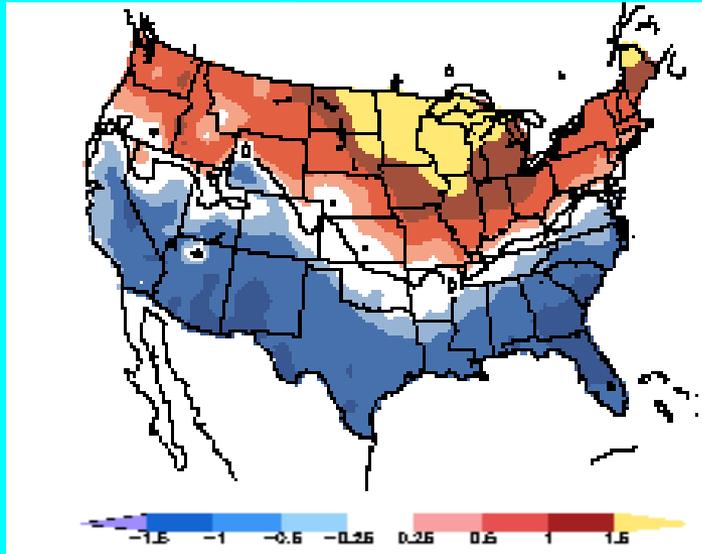




U.S. Impacts and El Niño Intensity

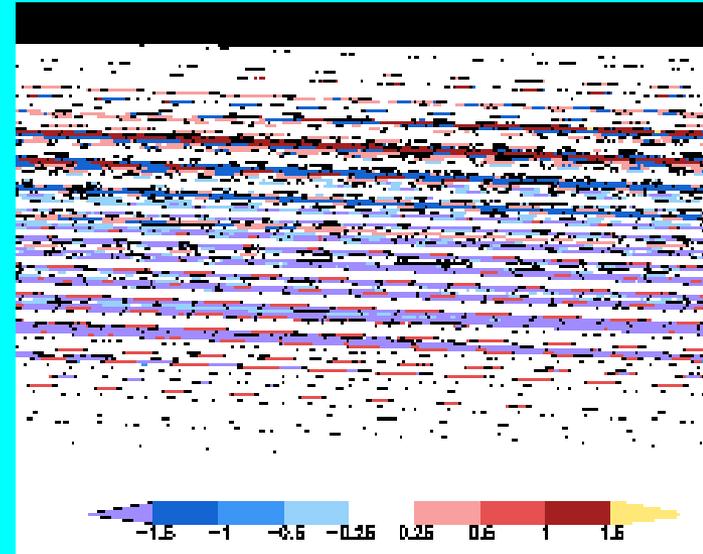
Strong El Niño

JFM Temp Anom (°C) (8 events)



Moderate El Niño

JFM Temp Anom (°C) (8 events)



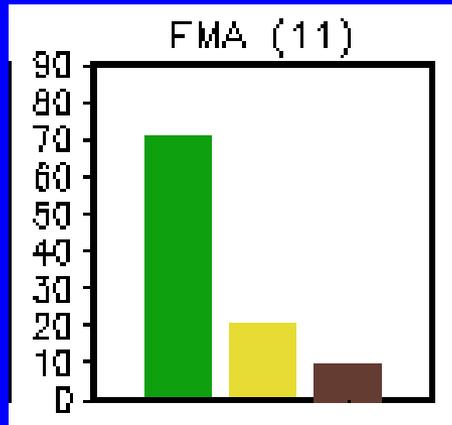
- In some regions (e.g. the upper midwest) the El Niño impacts tend to scale with El Niño intensity. In these regions, the stronger the El Niño, the greater the confidence in our seasonal outlooks (especially winter).



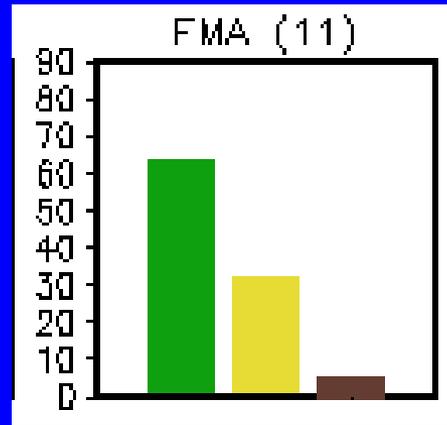
Typical U.S El Niño Impacts: Feb-Apr



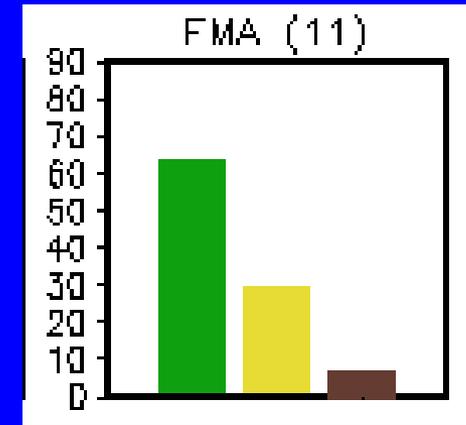
Los Angeles area



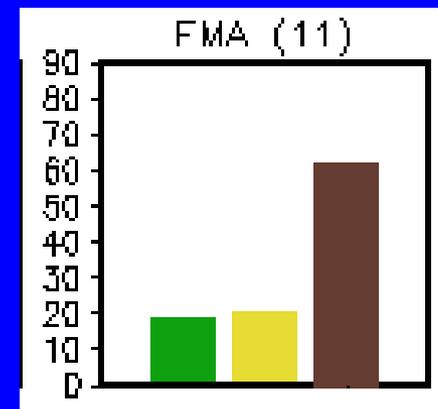
Texas coast



Central Florida



Northern Indiana



Percent of 11 El Niño events with precipitation:
above-normal (**green**),
near-normal (**yellow**),
below-normal (**brown**)

of days/season when daily Precip. > 0.50"
(1948-1993 base period)

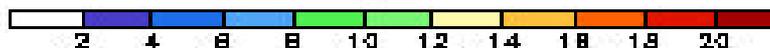
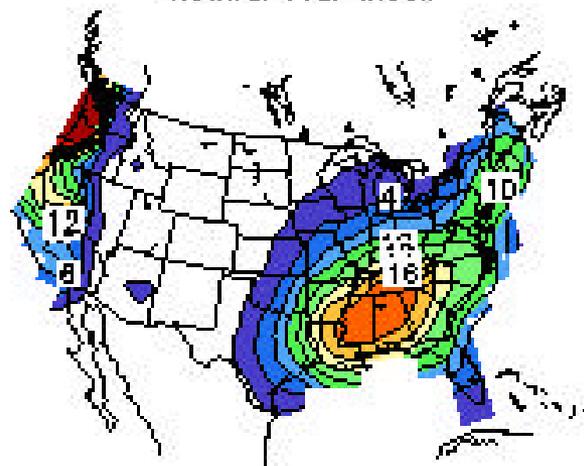


November thru March

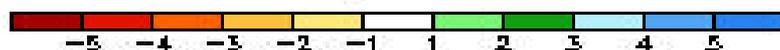
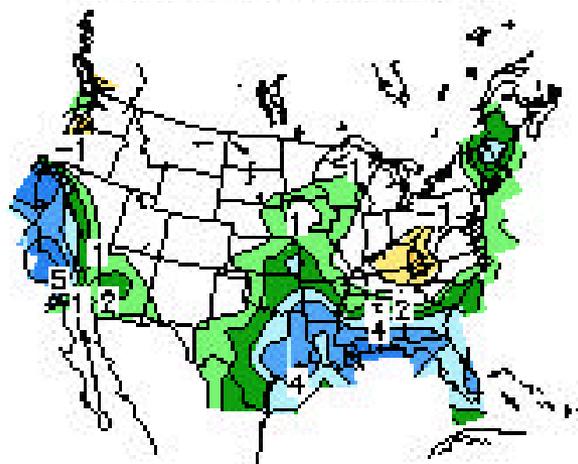
- 7 El Niño Years *
- 8 La Niña Years *
- 19 Neutral Years

* Moderate & Strong events only

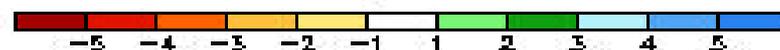
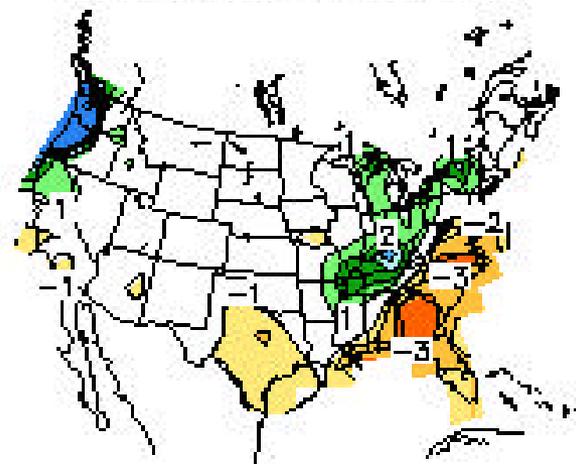
Neutral Year mean



El Niño mean - Neutral mean



La Niña mean - Neutral mean



Snowfall (Inches; 1948–1993)

November thru March

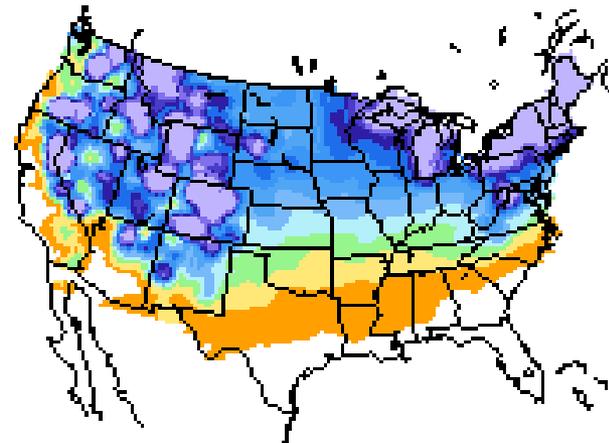
7 El Niño Years *

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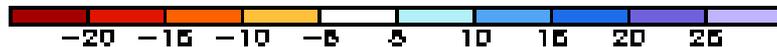
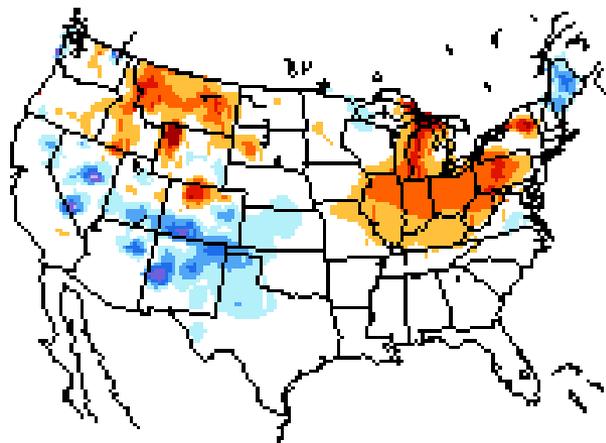
19 Neutral Years

* Moderate & Strong events only

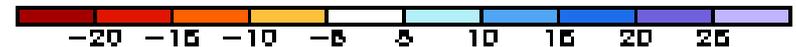
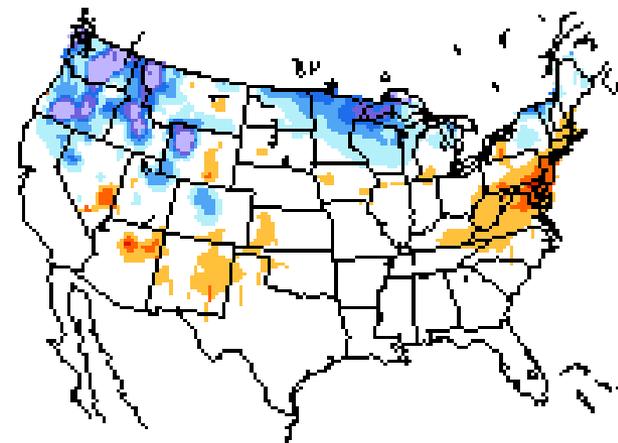
Neutral Year Mean



El Niño mean – Neutral mean



La Niña mean – Neutral mean





Northeast: Increased Chance of Heavy Snows during EL Niño



ENSO Phase	Number of NE Heavy Snows (>4") in JFM between 1950-1999
12 El Niños	30 2.5 per season
12 La Niñas	16 1.3 per season
26 ENSO-neutral	46 1.75 per season

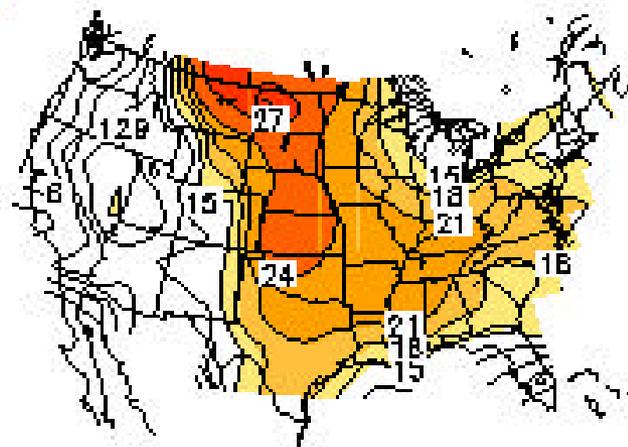
of days/season when daily Tmax is > 5C **above** Normal
 (1949-1993 base period; 7-day smoothed)

December thru February

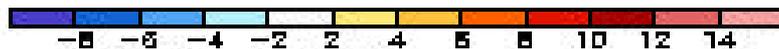
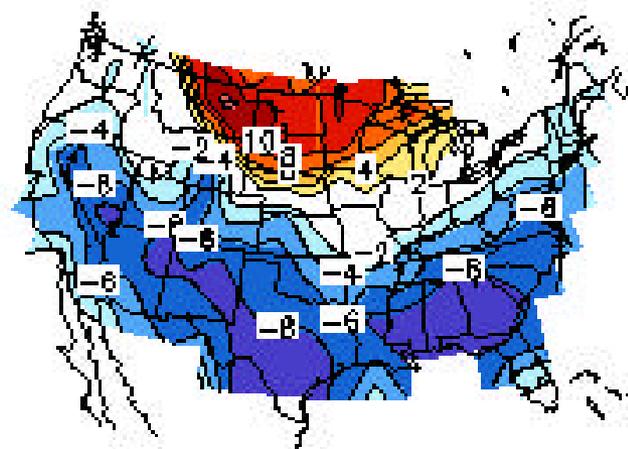
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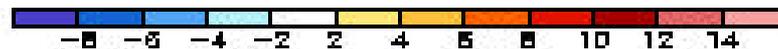
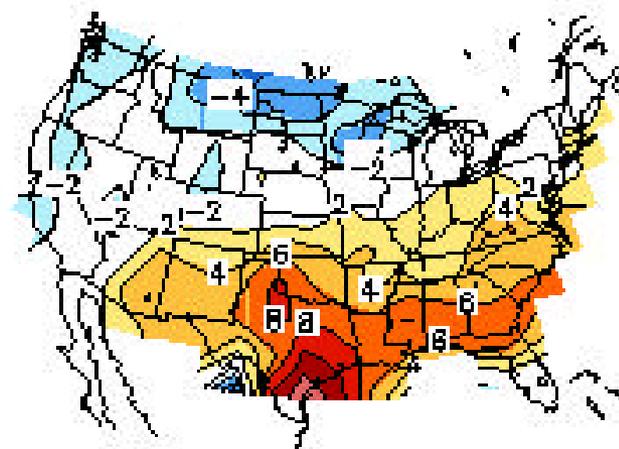
Neutral Year Mean



El Niño mean - Neutral mean



La Niña mean - Neutral mean



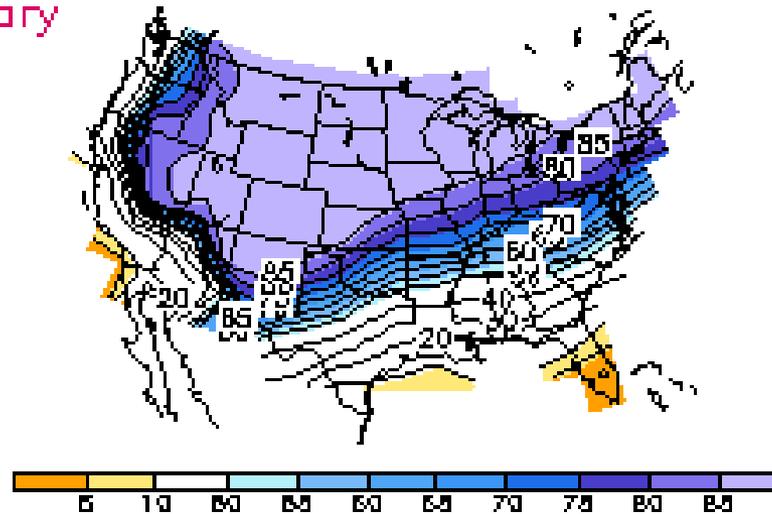
of days/season (1948-1993) when daily T_{min} is Below Freezing

December thru February

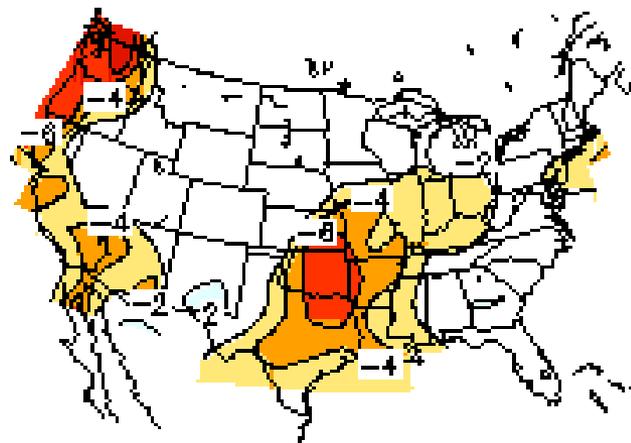
7 El Niño Years *
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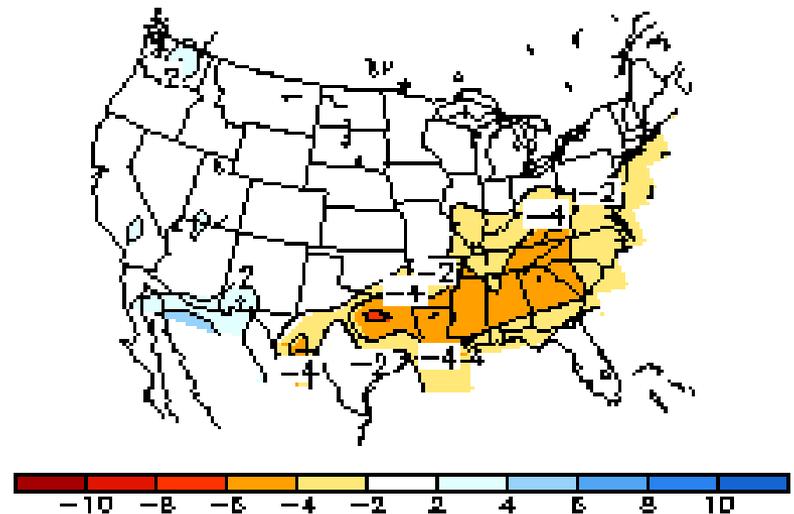
Neutral Year Mean



El Niño mean - NEUTRAL mean



La Niña mean - Neutral mean

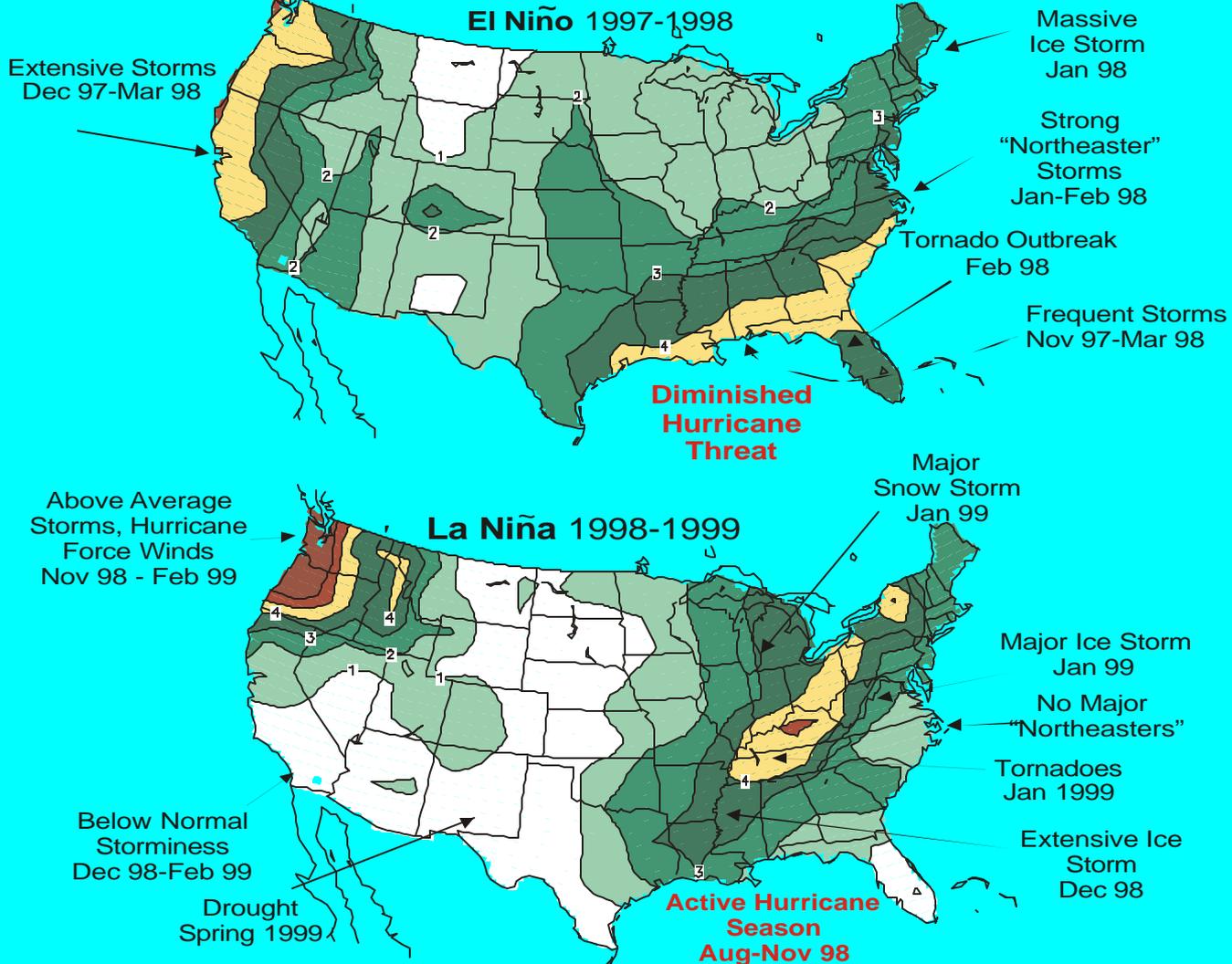




Examples of Climate Control Over Weather Patterns. The Basis of Linking Climate and Weather



Locations For Major Storms
(Days Per Winter Season)

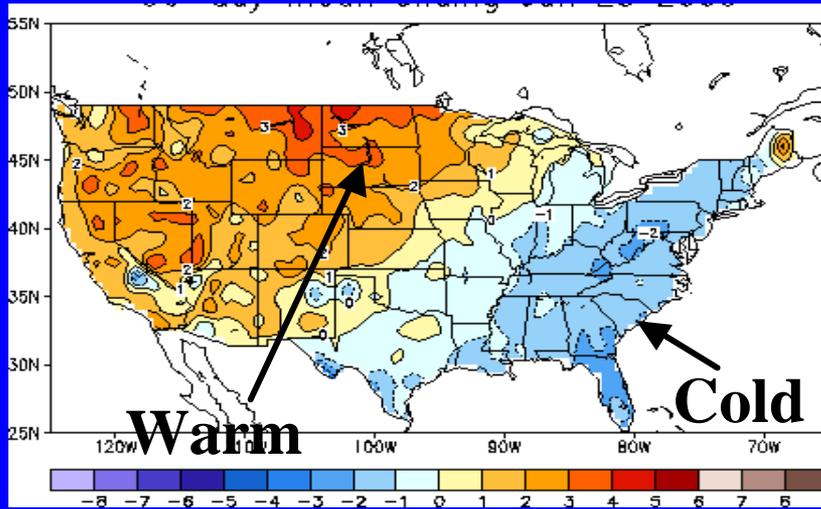




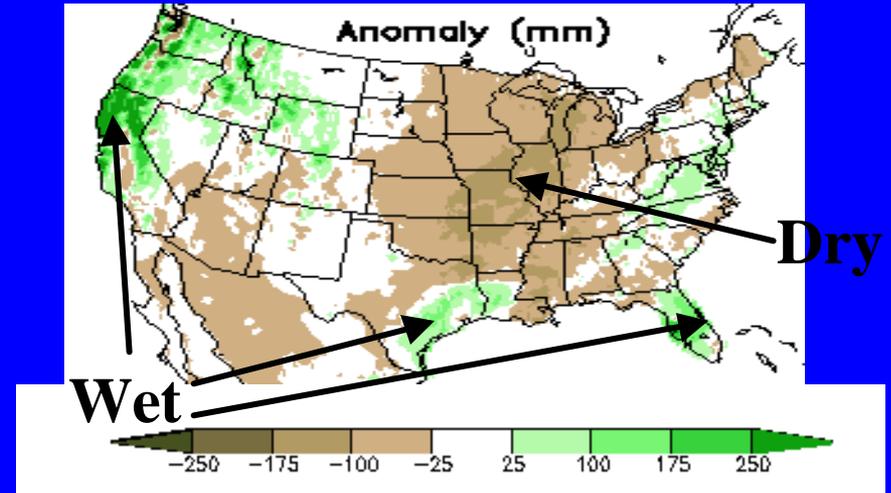
U.S. Impacts: Nov 2002-Jan 2003



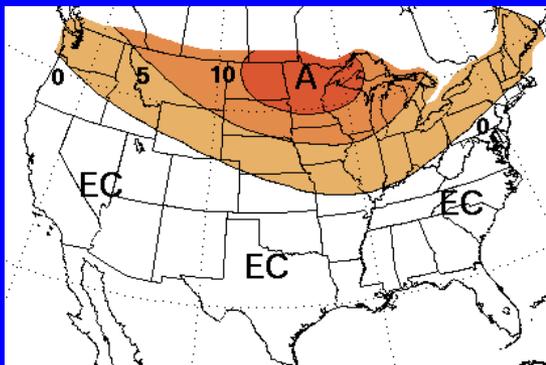
Temperature Departures



Precipitation Departures

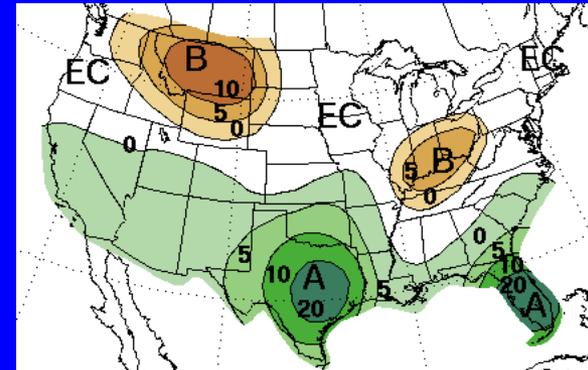


Temperature



Forecasts
Nov 02-
Jan 03
Issued
10/17/02

Precipitation

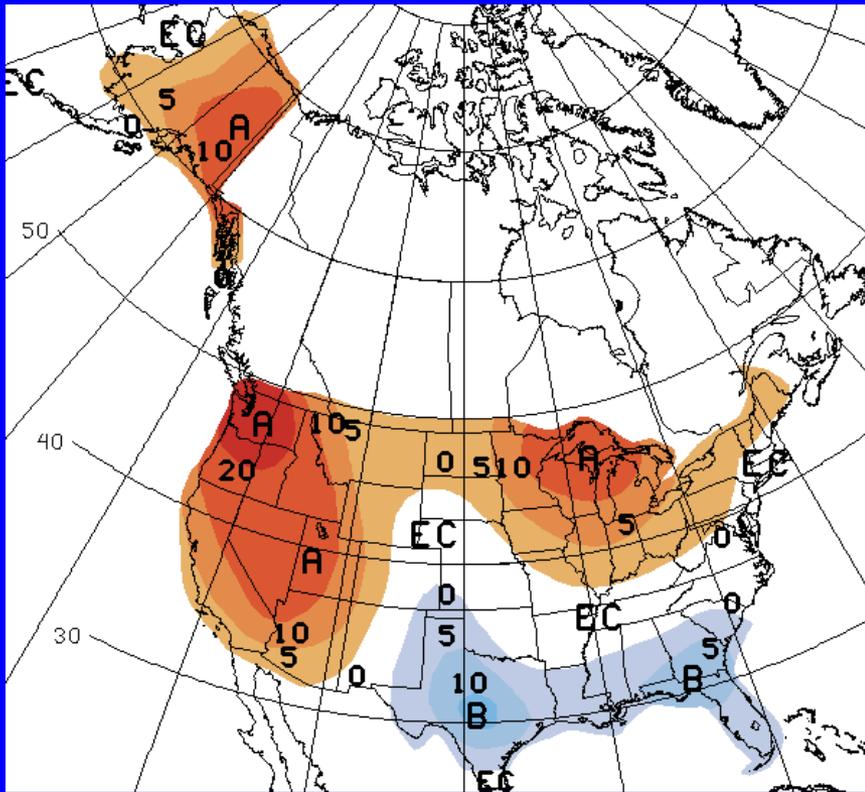




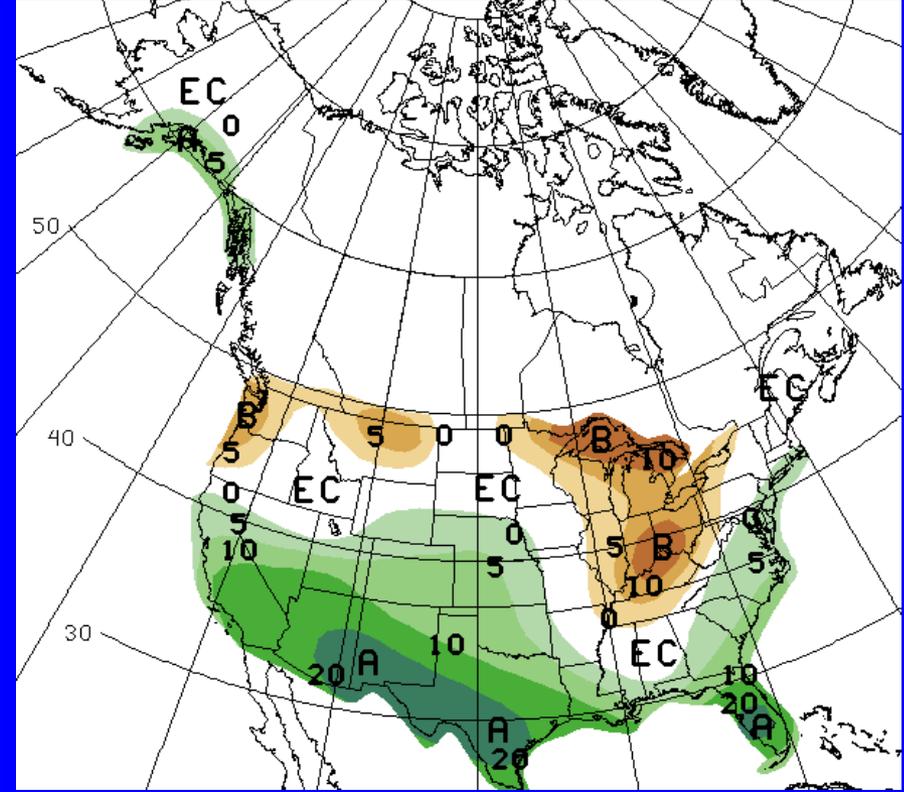
U. S. Seasonal Outlooks Feb-Apr 2003



Temperature



Precipitation



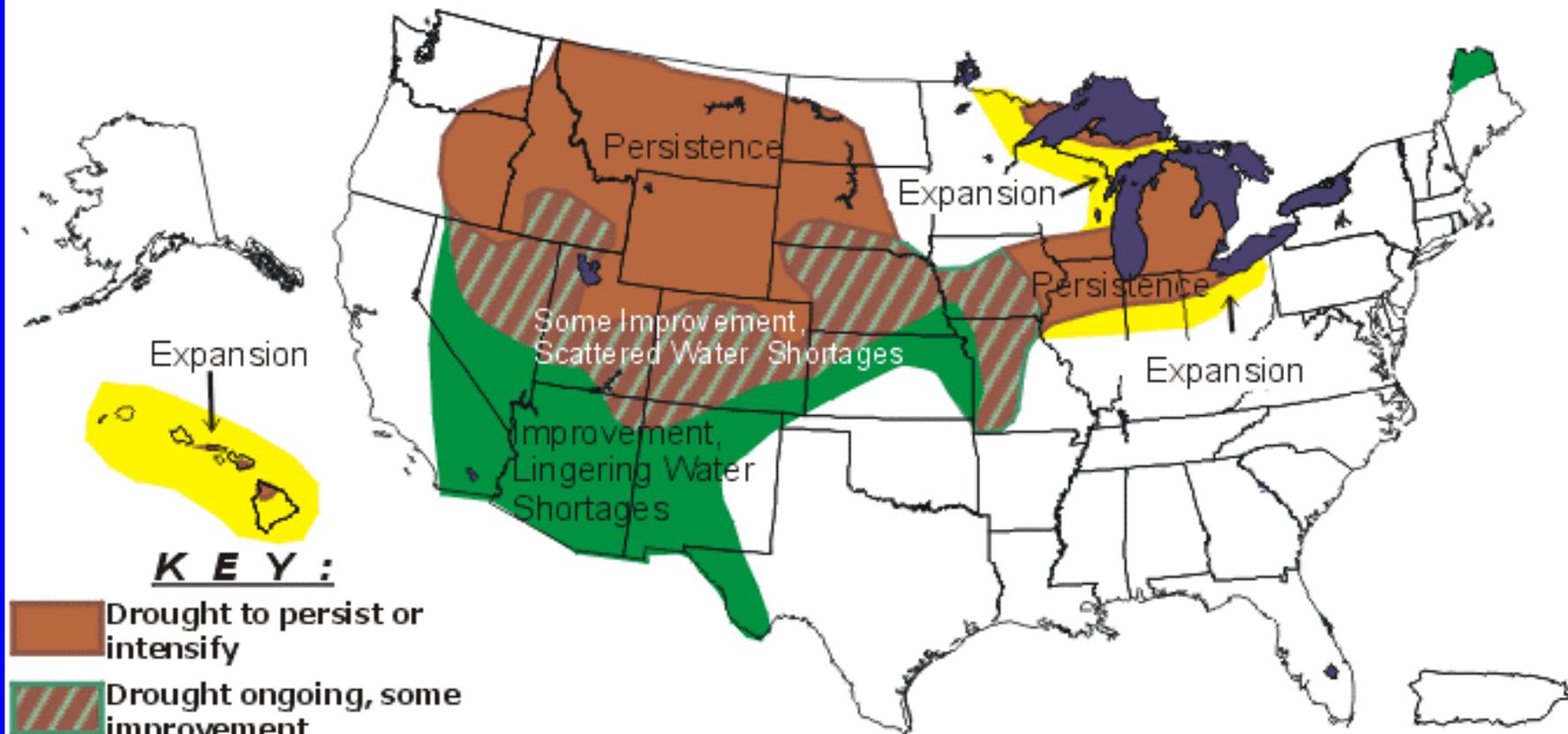
Outlooks combine typical El Niño impacts and long-term trends.



U. S. Seasonal Drought Outlook

Through April 2003

Released January 16, 2003



KEY:

-  Drought to persist or intensify
-  Drought ongoing, some improvement
-  Drought likely to improve, impacts ease
-  Drought development likely

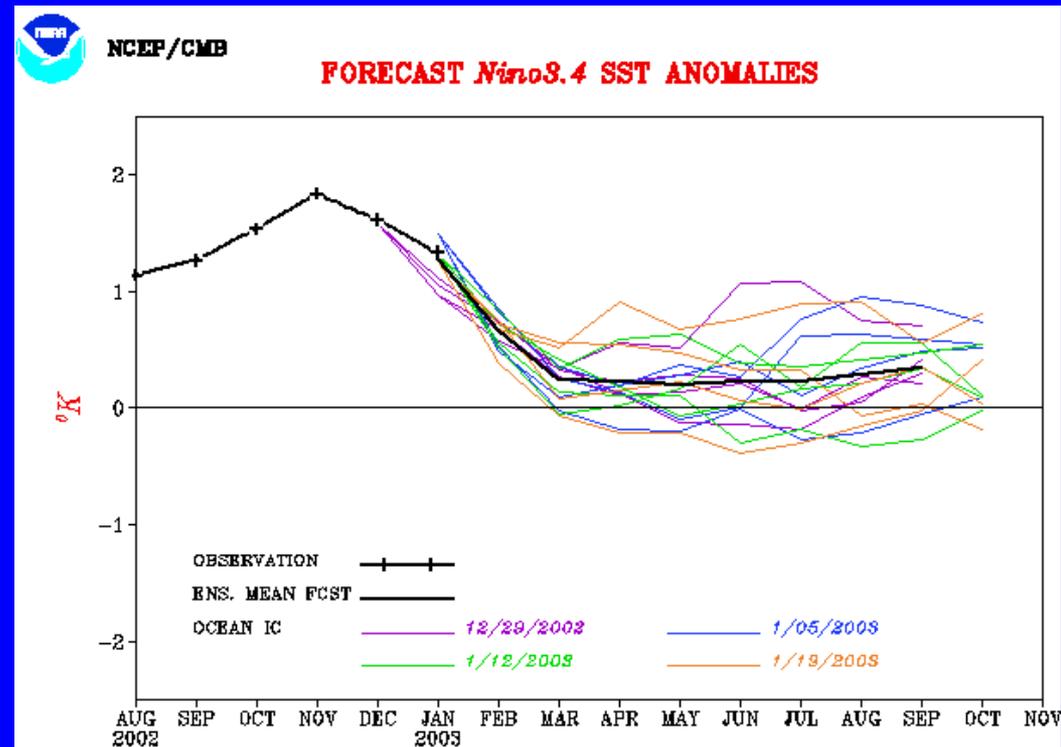
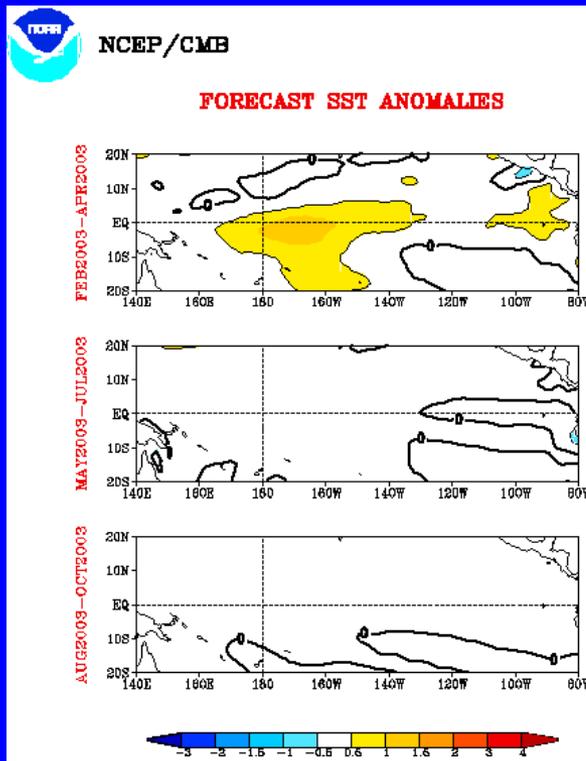
Depicts general, large-scale trends based on subjectively derived probabilities guided by numerous indicators, including short and long-range statistical and dynamical forecasts. Short-term events-- such as individual storms -- cannot be accurately forecast more than a few days in advance, so use caution if using this outlook for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are schematically approximated from the Drought Monitor (D1 to D4). For weekly drought updates, see the latest Drought Monitor map and text.



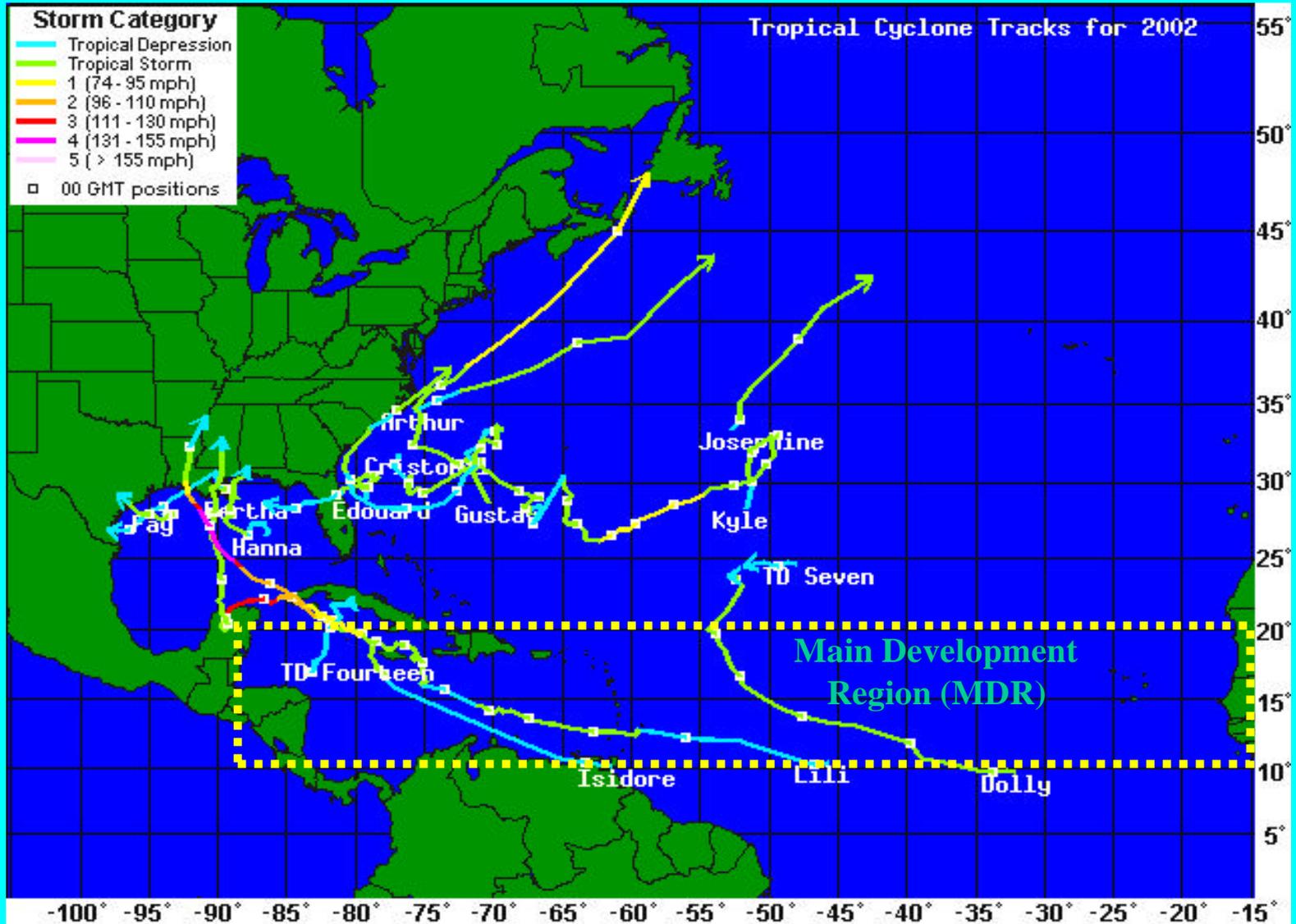
El Niño Outlook



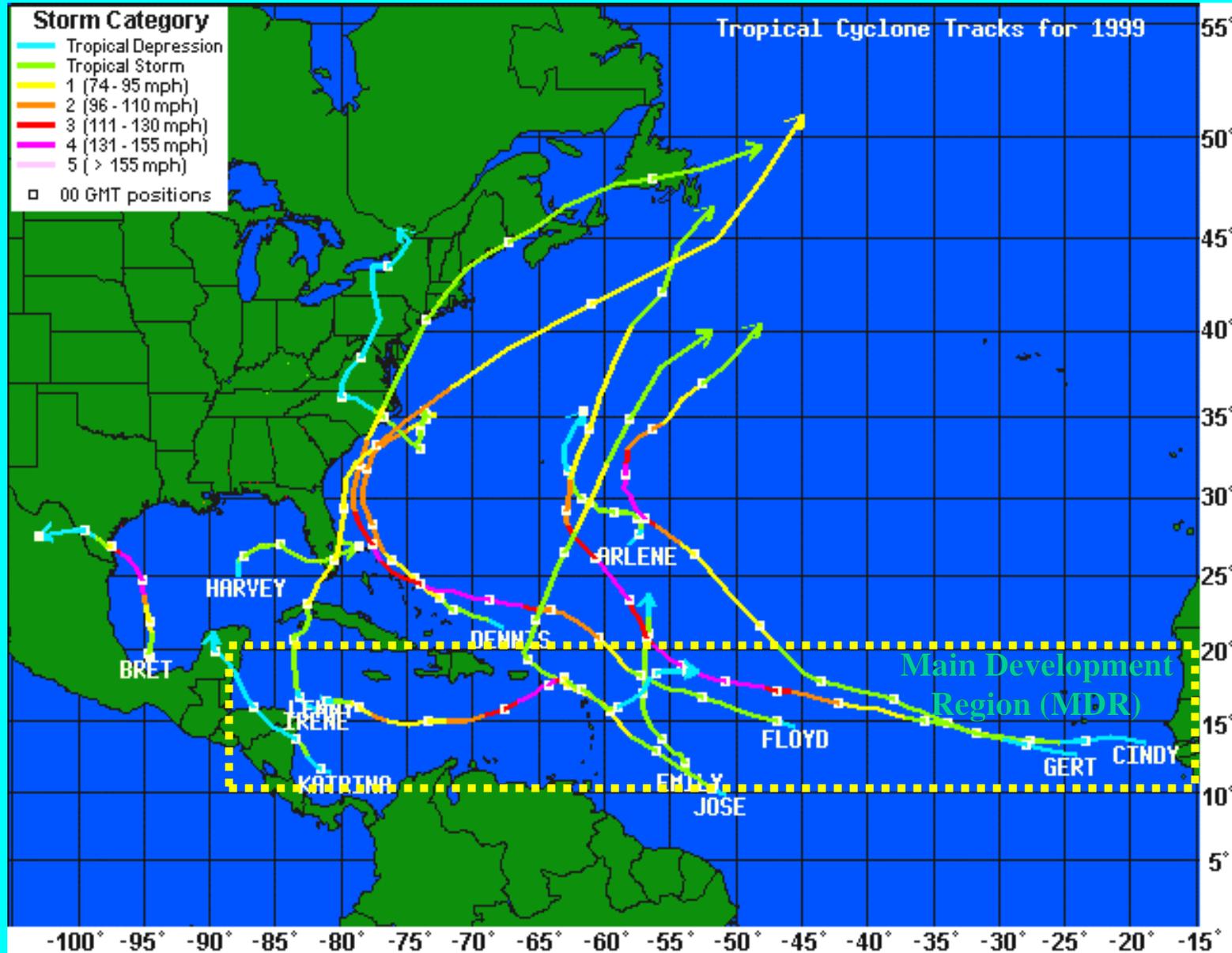
- Statistical and coupled model forecasts indicate:
 - El Niño conditions will continue to weaken through April 2003, and
 - Near normal conditions will prevail in the tropical Pacific during the northern summer and fall seasons



Tropical Cyclone Tracks: 2002



Tropical Cyclone Tracks: Active 1999





Accumulated Cyclone Energy (ACE) Index

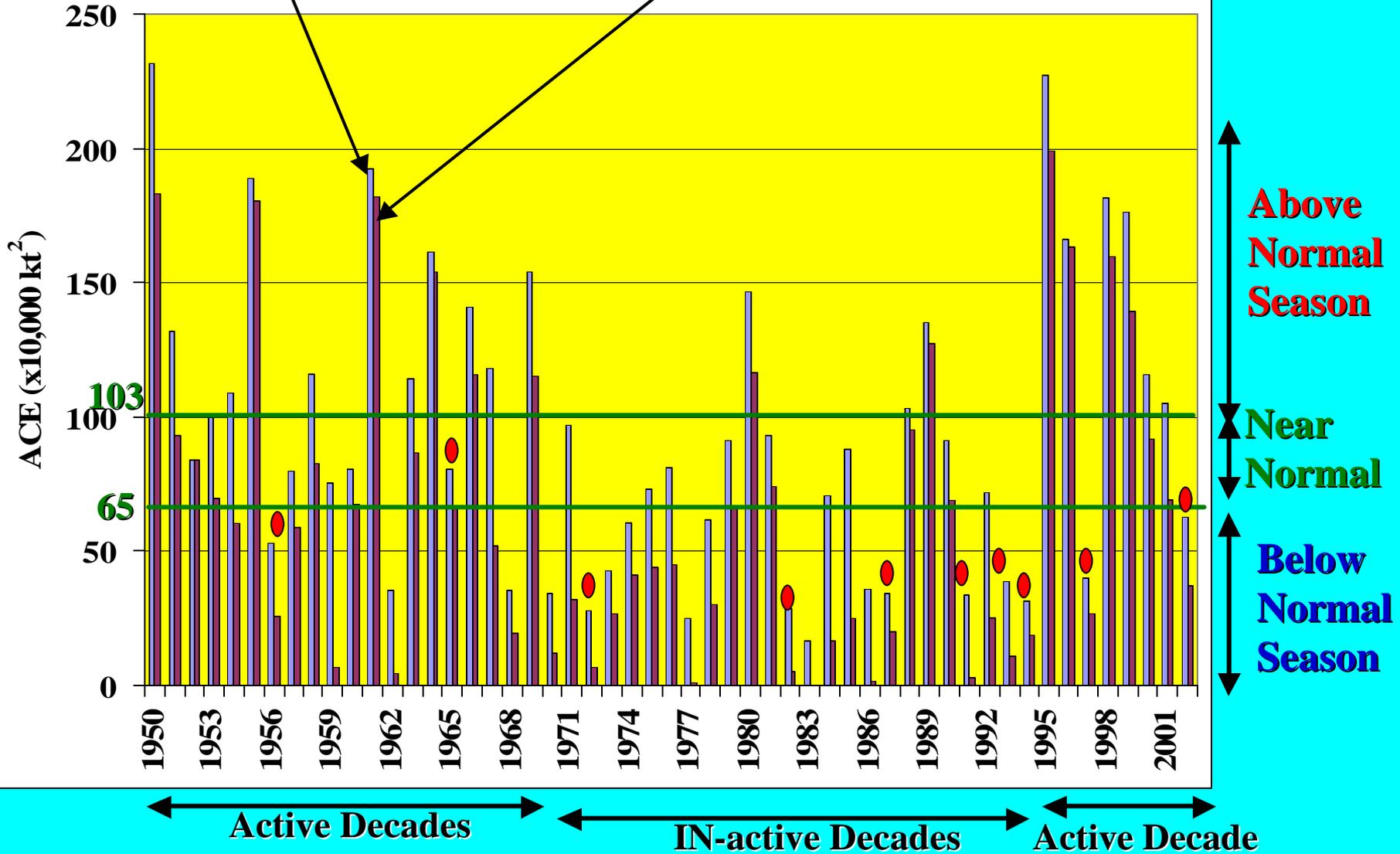
Definition:

Sum of squares of 6-hourly maximum sustained wind for all systems while at least tropical storm strength.

Historical Perspective: ACE Index

Atlantic Basin

Main Development Region



● Moderate and Strong El Niño during July-September (CPC Official)



Summary

- **The definition of El Niño is still a work in progress**
- **Impacts can be global, national, regional, even local**
- **El Niño is one of many factors that may affect Agriculture**
- **Other factor include rain and snow distribution in time, other short-term weather events, soil conditions,**
- **Advantages and limitations of outlooks – downscaling, local**
- **Drought appears to be the #1 Ag problem??**