Weather, Climate, and Climate Change… What the Data Say

Bob Endlich

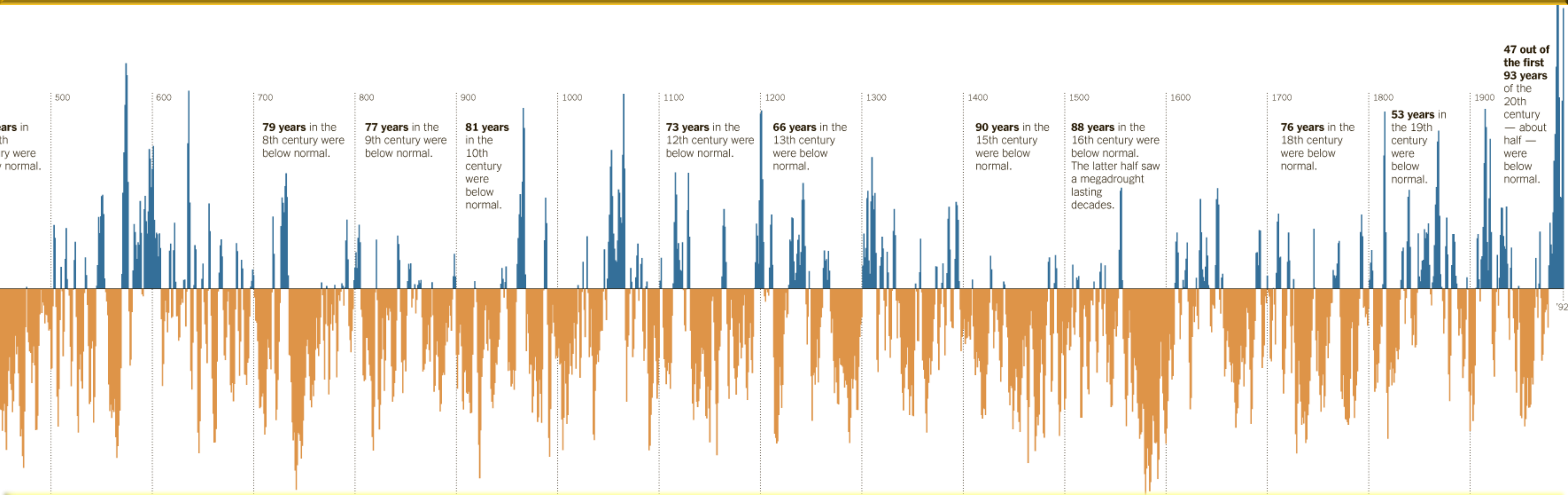
[*bendlich@msn.com*](mailto:bendlich@msn.com)

26 September 2017

[**http://casf.diskstation.me/wordpress/**](http://casf.diskstation.me/wordpress/)

Apologies for web page Technical Difficulties.

Seasonal, Annual, and other controls on rainfall and drought in the Chihuahuan Desert of far West Texas and New Mexico



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Weather, Climate and Climate Change—What the Data Say

Outline

How Geography of El Paso-Las Cruces area fits into global and local climate controls

Storms, Storminess, and Climate Change

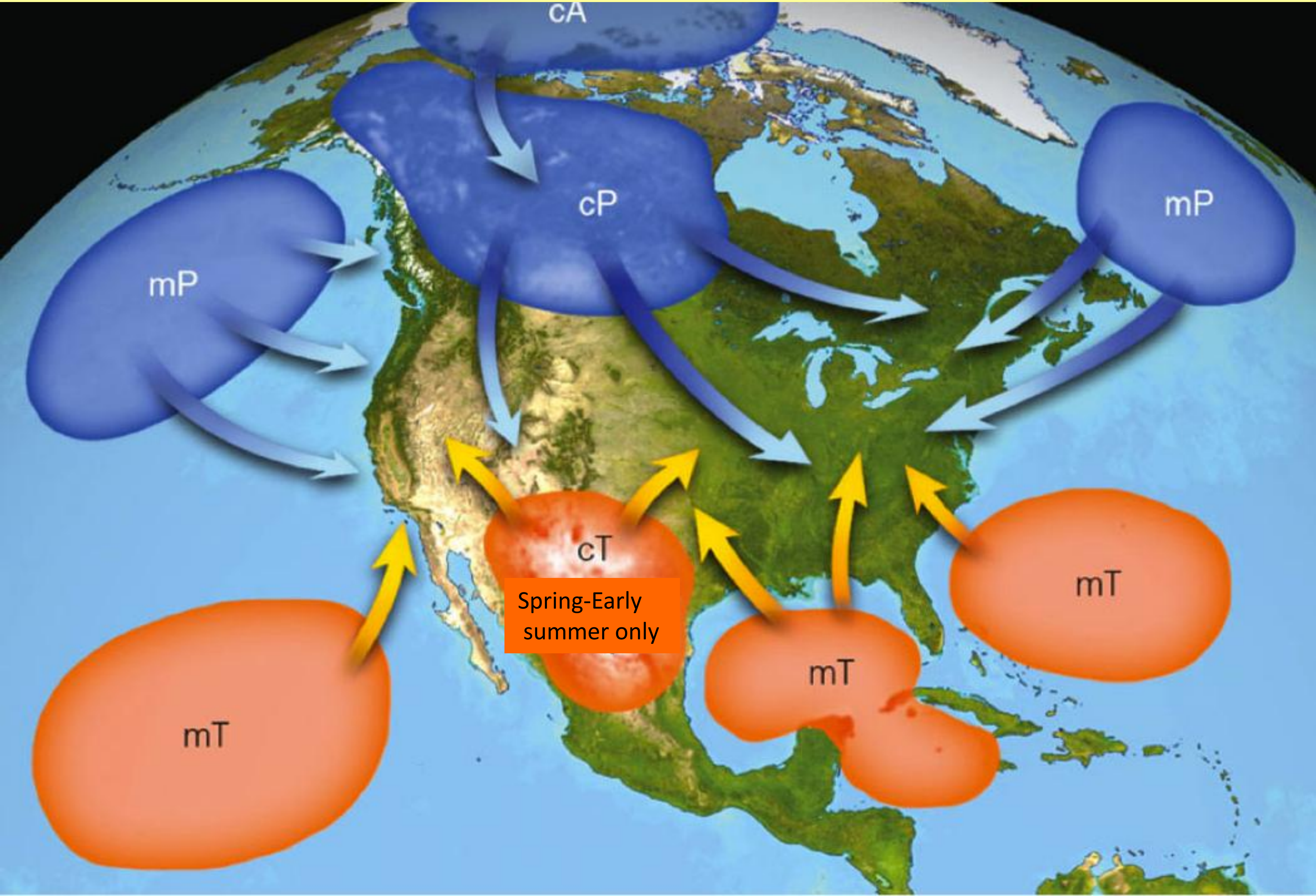
The Subtropical Ridge

North American Monsoon

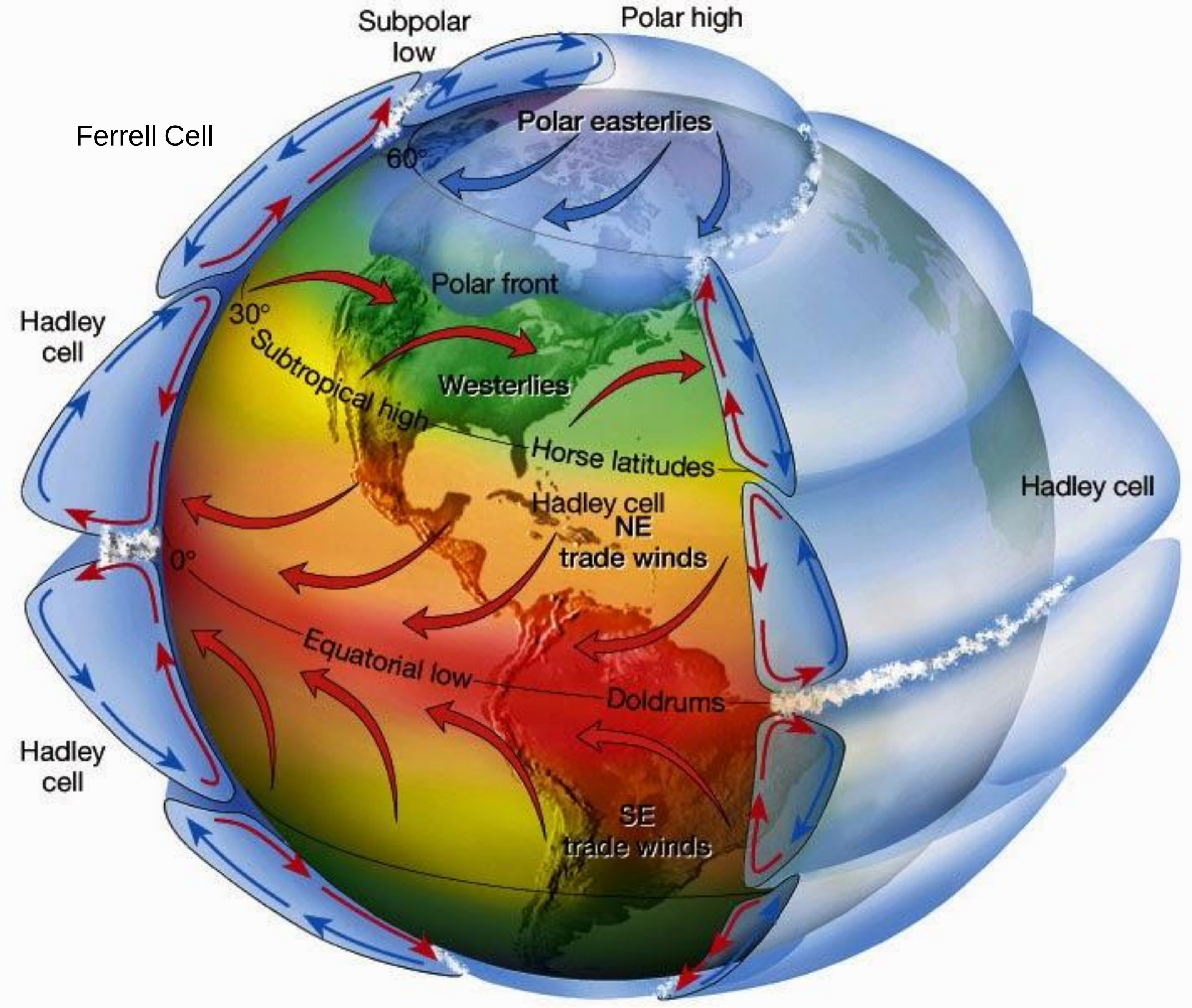
El Nino, La Nina, ENSO-Neutral

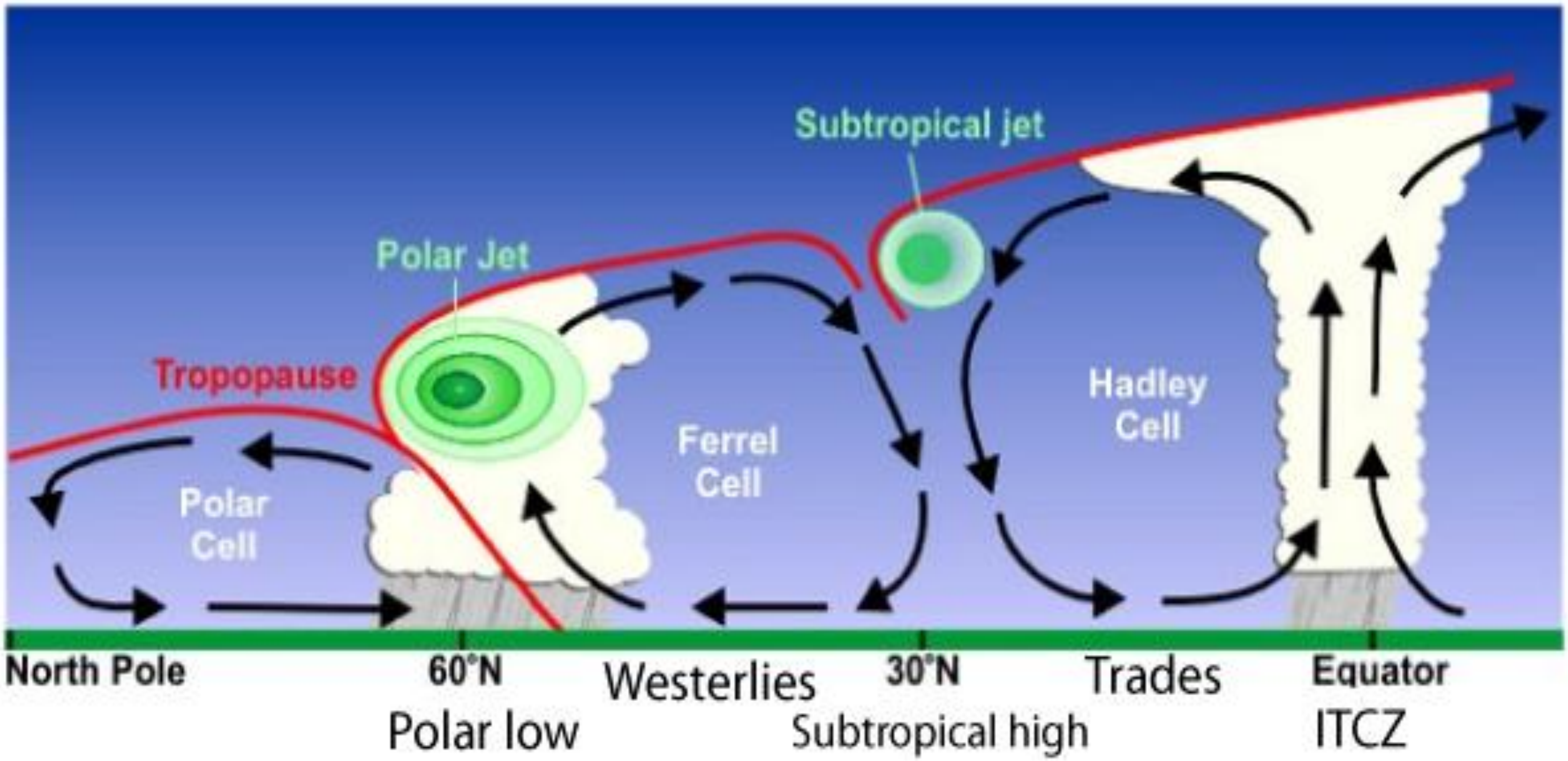
Pacific Decadal Oscillation
The 60-year feature many mistook for human-caused CO2-fueled "global warming"

Air Masses, source regions, movement patterns. Sometimes Arctic air reaches El Paso
A = Arctic cP = Continental Sub Polar mP = Maritime Sub Polar cT = Continental Tropical

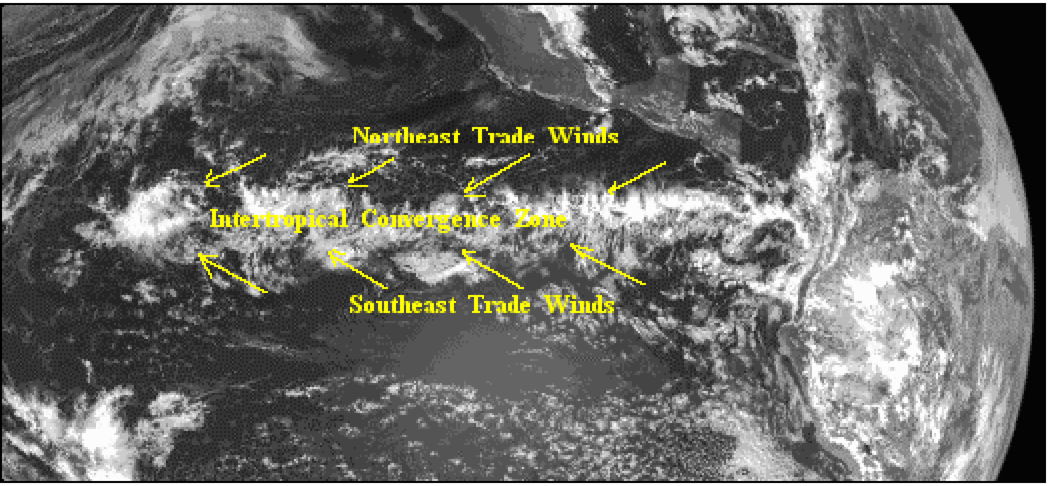


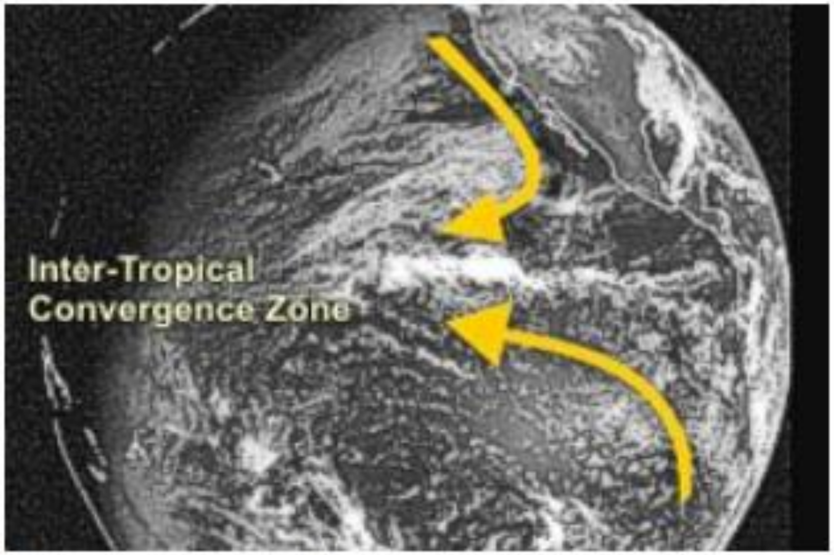
http://1.bp.blogspot.com/tDTpvWrModo/U2XoP6s57XI/AAAAAAAAA7o/r6Ik0N5VHk8/s1600/Hadley+cells+2_ux1_eiu_edu.jpg





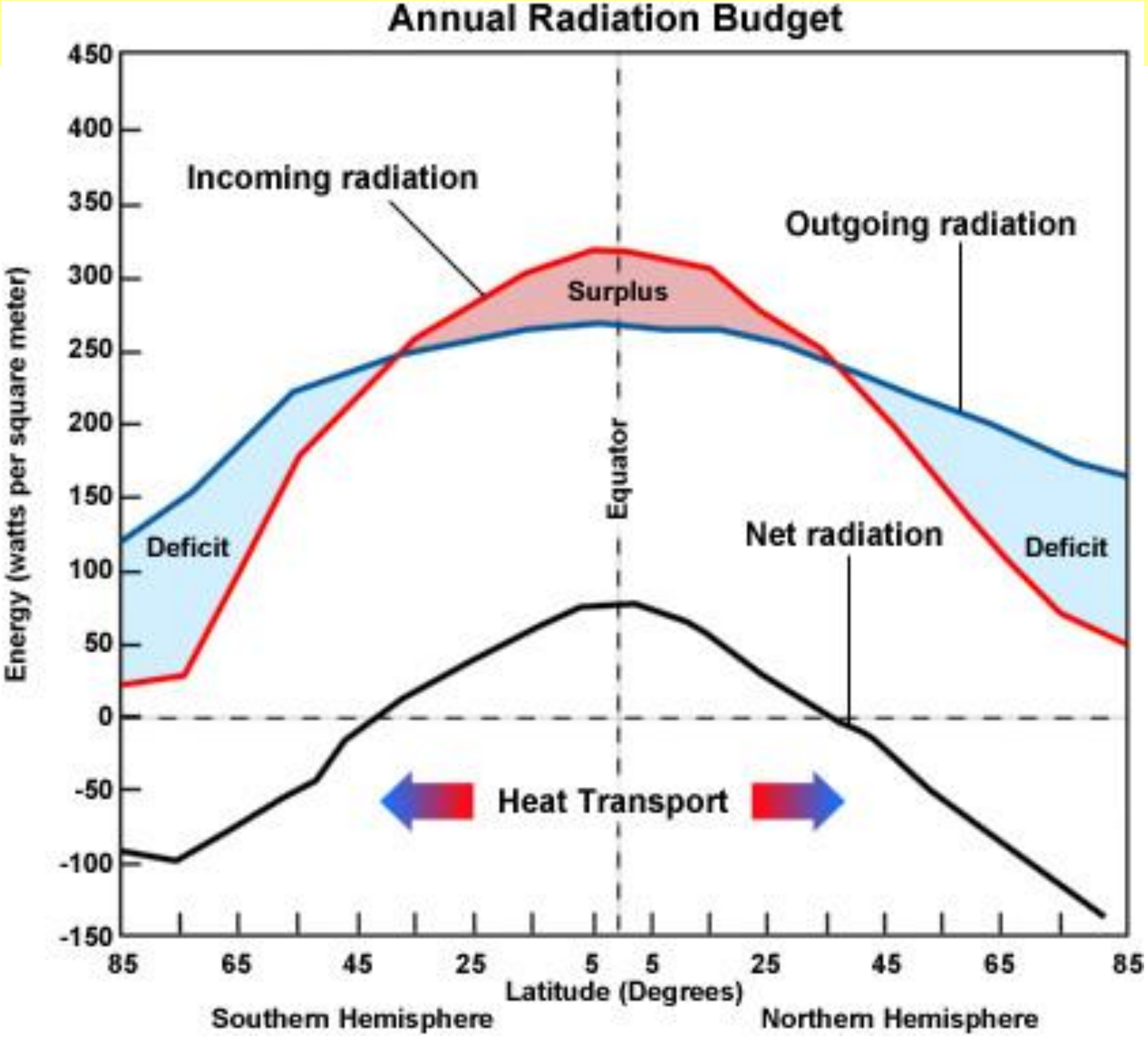
http://globalsailingweather.com/globalpatterns.php http://ggweather.com/enso/itcz.gif





The location of the Inter-Tropical Convergence Zone is usually readily seen as a line of cumulus clouds in the tropics. This is the location where northeast winds in the Northern Hemisphere converge with the southeast winds from the Southern Hemisphere.

http://www.srh.noaa.gov/jetstream/tropics/itcz.html http://www.visionlearning.com/en/library/Earth-Science/6/Factors-that-Control-Regional-Climate/255



Incoming radiation, (insolation), and outgoing radiation vary with latitude.
Tropics receive more solar radiation than they emit, creating an energy surplus.
Polar regions emit more than they receive. Imbalance causes storms!
Cooler Planet is stormier! Warmer Planet has fewer strong storms.

http://people.oregonstate.edu/~schmita2/Teaching/ATS421-521/2015/papers/hansen81sci.pdf

36-year old paper in SCIENCE blurts out truth: **Cooling from 40s to 70s**.

28 August 1981, Volume 213, Number 4511

SCIENCE

Climate Impact of Increasing Atmospheric Carbon Dioxide

J. Hansen, D. Johnson, A. Lacis, S. Lebedeff
P. Lee, D. Rind, G. Russell

Atmospheric CO_2 increased from 280 to 300 parts per million in 1880 to 335 to 340 ppm in 1980 (*1*, *2*), mainly due to burning of fossil fuels. Deforestation and changes in biosphere growth may also

The major difficulty in accepting this theory has been the absence of observed warming coincident with the historic CO_2 increase. In fact, the temperature in the Northern Hemisphere decreased by

Greenhouse Effect

The effective radiating temperature of the earth, T_e, is determined by the need for infrared emission from the planet to balance absorbed solar radiation:

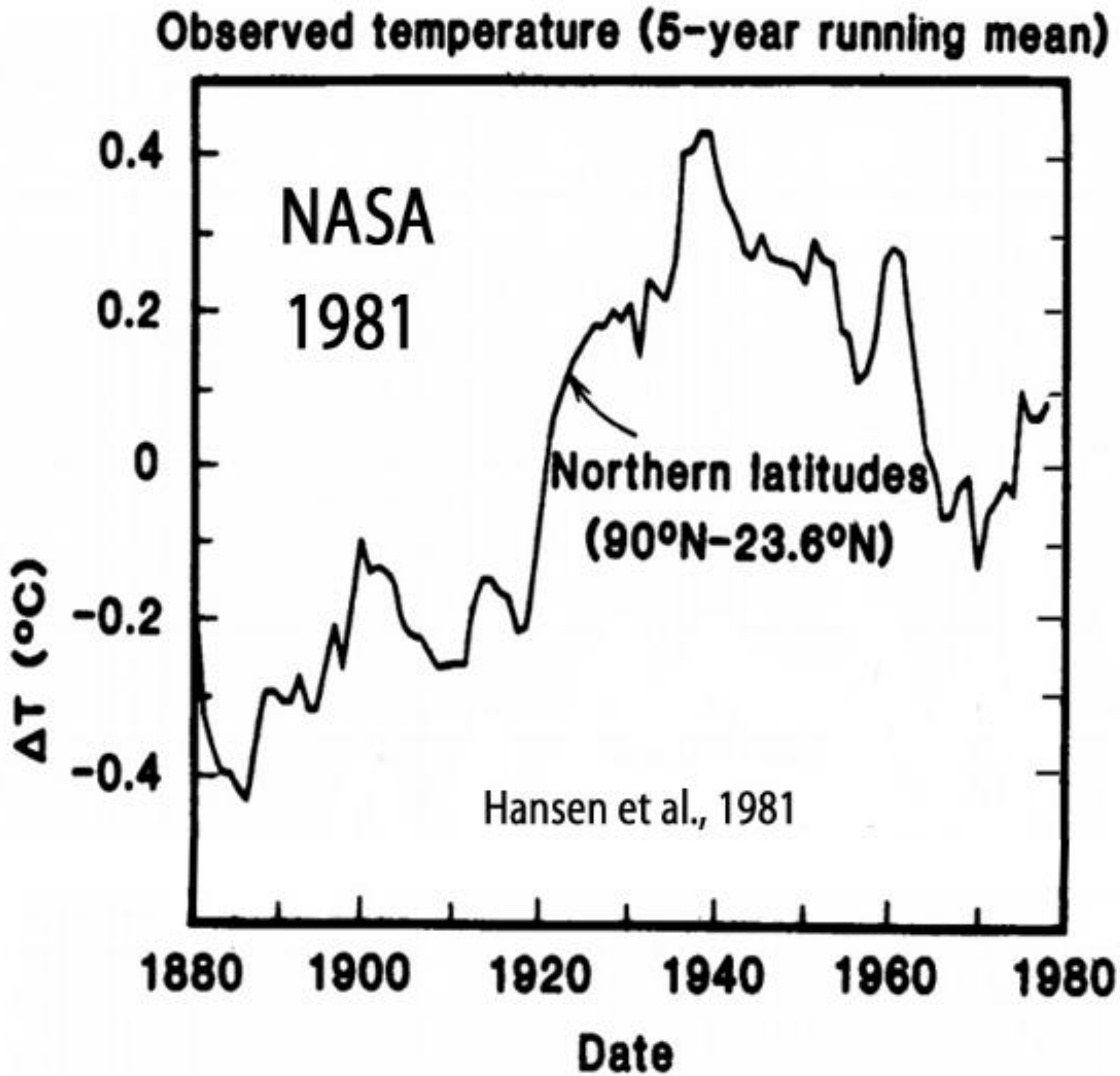
$$\pi R^2(1 - A)S_0 = 4\pi R^2\sigma T_e \qquad (1)$$

or

$$T_e = [S_0(1 - A)/4\sigma]^{1/4} \qquad (2)$$

where R is the radius of the earth, A the albedo of the earth, S_0 the flux of solar radiation, and σ the Stefan-Boltzmann constant. For $A \sim 0.3$ and $S_0 = 1367$ watts per square meter, this yields $T_e \sim 255$ K.

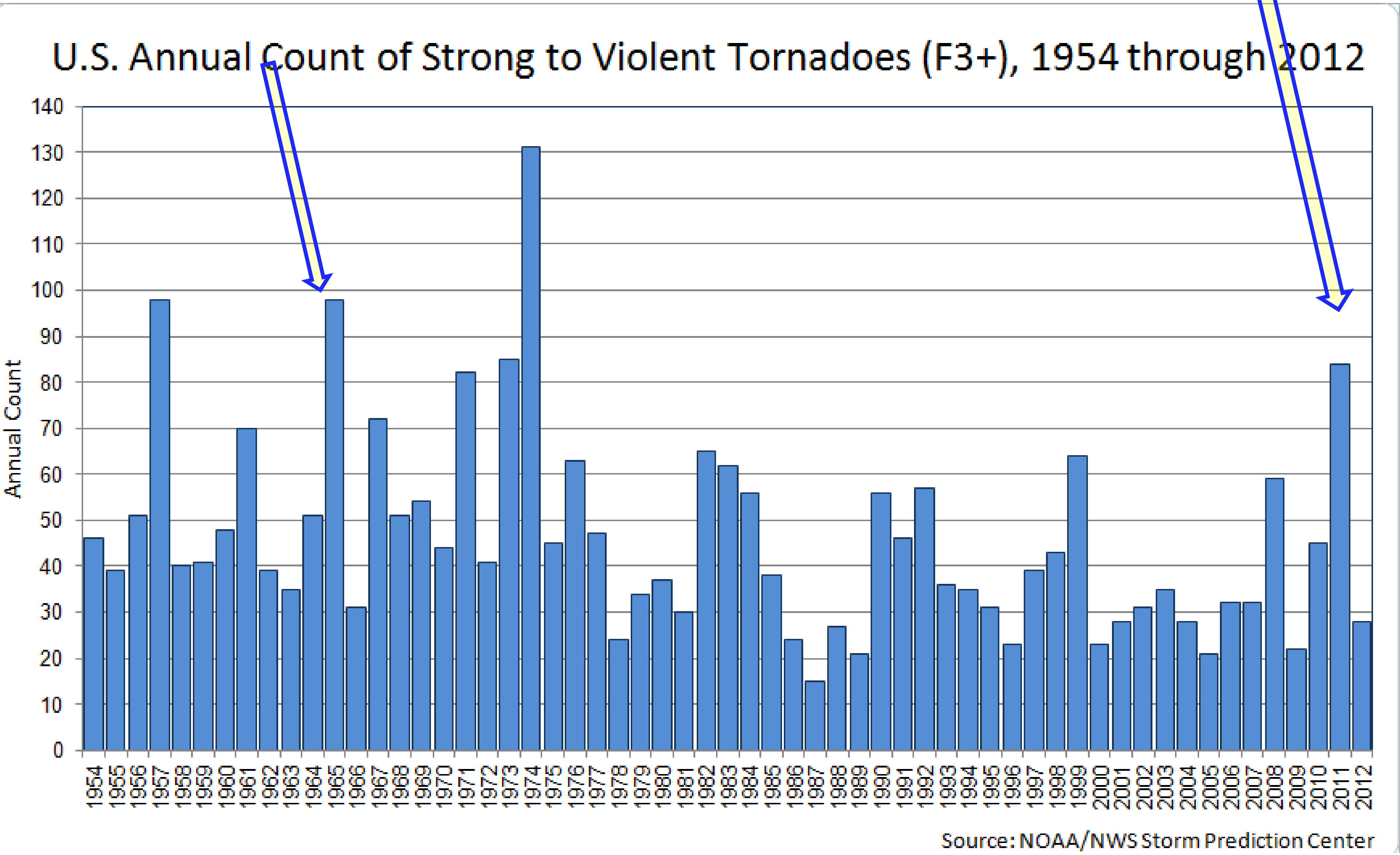
The mean surface temperature is $T_s \sim 288$ K. The excess, $T_s - T_e$, is the greenhouse effect of gases and clouds, which cause the mean radiating level to be above the surface. An estimate of the http://people.oregonstate.edu/~schmita2/Teaching/ATS421-521/2015/papers/hansen81sci.pdf



http://www1.ncdc.noaa.gov/pub/data/cmb/images/tornado/clim/EF3-EF5.png

Cooling from 1954-1977; then warming.

Feb, 2011, Arctic blast followed by violent spring tornadoes Joplin, MO, Tuscaloosa, AL



Midlatitude Cyclones

- Life Cycle
  - Cyclogenesis
    - Birth of midlatitude cyclone
  - Occlusion
    - Death of midlatitude cyclone

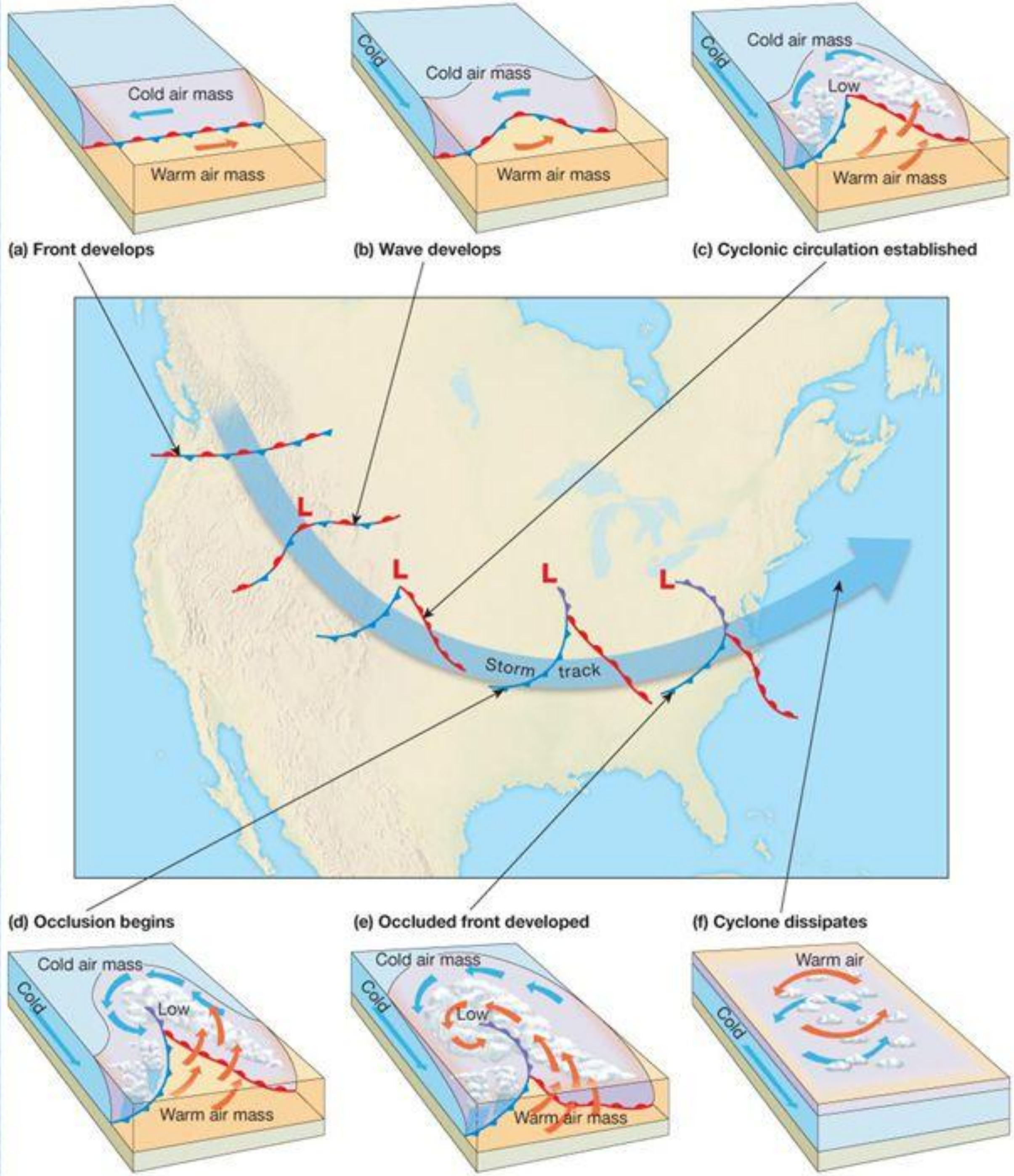
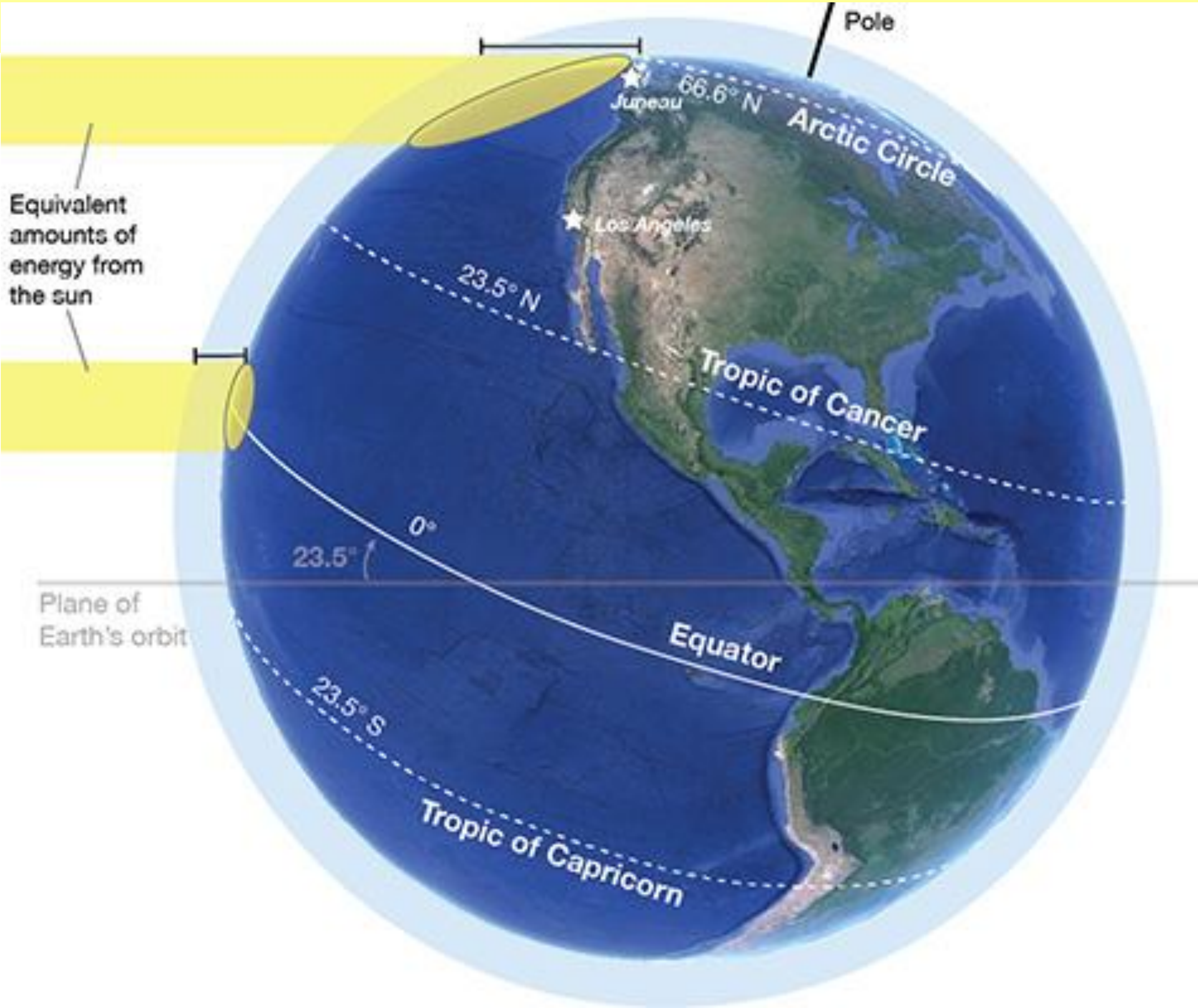


Figure 7-9

http://www.visionlearning.com/en/library/Earth-Science/6/Factors-that-Control-Regional-Climate/255



Progression of the Seasons El Paso and Las Cruces

Winter:
Nominally Dry, with light winds; Morning drainage winds down the Rio Grande Valley and upslope winds from the valley towards the mountains in the afternoons.

During El Nino years, “Winter Wet” prevails-- extensive periods of snow remains on the mountains. 1997-98 El Nino had plentiful snow in the Organ Mountains.

Spring: Afternoons have the brisk winds from the southwest. On days with severe weather to the east, in Tornado Alley, strong dry southwesterly winds cause blowing sand and dust.

June-early July. Hottest Month; only a few days with southwesterly afternoon winds. Fire season; the strong sun dries out vegetation. Dry thunderstorms exacerbate fire danger.

~4 July to ~12 September: Summer Monsoon: Surface winds from southeast with over half Of the annual rainfall in typically PM thunderstorms .

Fall: Frequent fine days with light winds, minimum cloudiness and visibilities often over 100 miles.

Geography, Weather, and Climate

We're far from the moderating influences of large water bodies.

700 miles straight-line distance

Interiors of large continents -- large differences in winter-to-summer temperatures

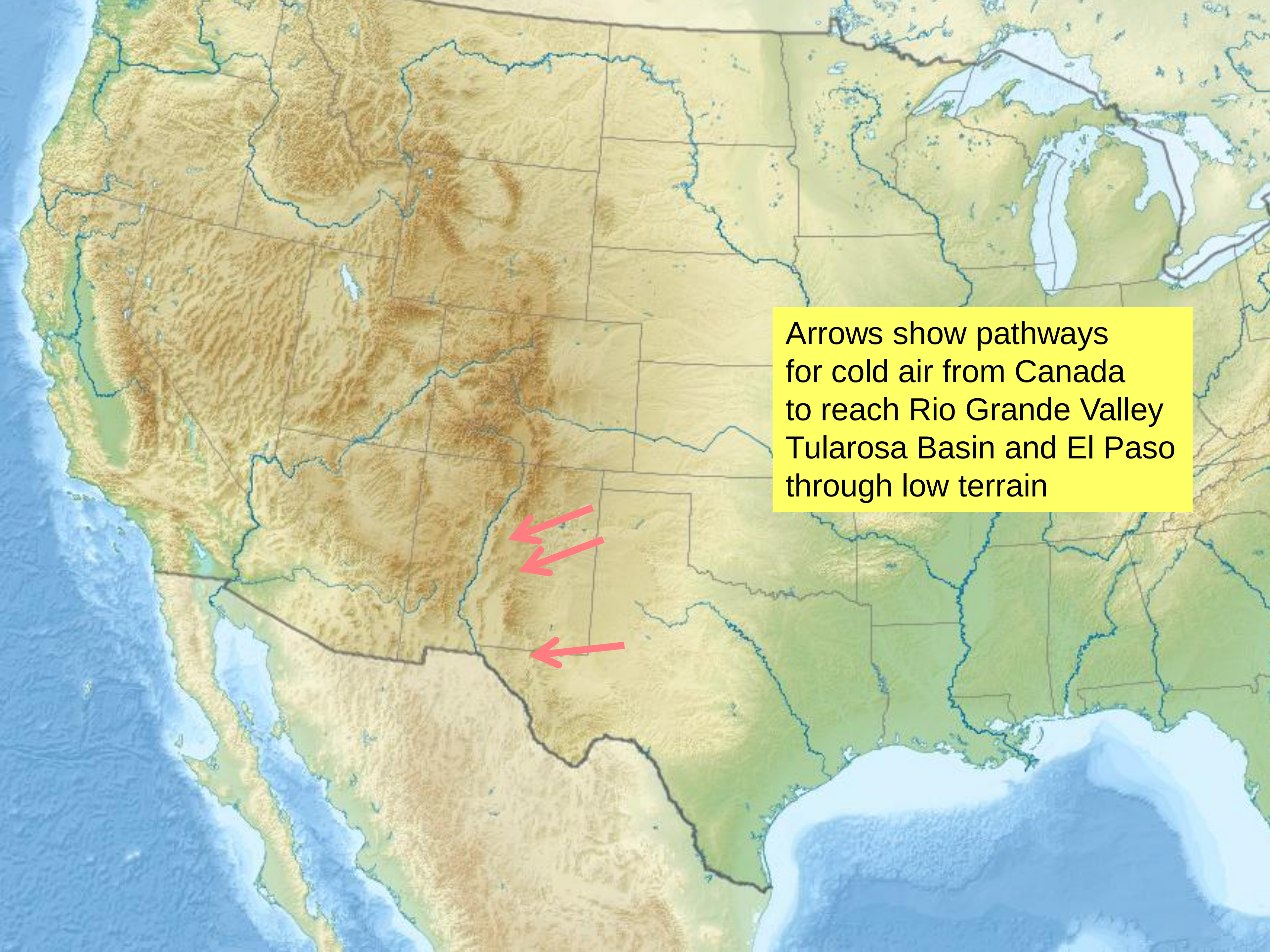
We're in the Basin and Range Province -- few high mountain ranges to our East.

sub-Polar Air Masses frequent as "back-door" cold fronts

Arctic Air Masses occasionally arrive here: Feb 2011

Our Area = source region for hot, dry air Continental Air masses, especially March-June


730 miles
700 miles


Arrows show pathways
for cold air from Canada
to reach Rio Grande Valley
Tularosa Basin and El Paso
through low terrain

http://www.weather.gov/epz/elpwindrosedata

NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

ELP windrose

El Paso, T

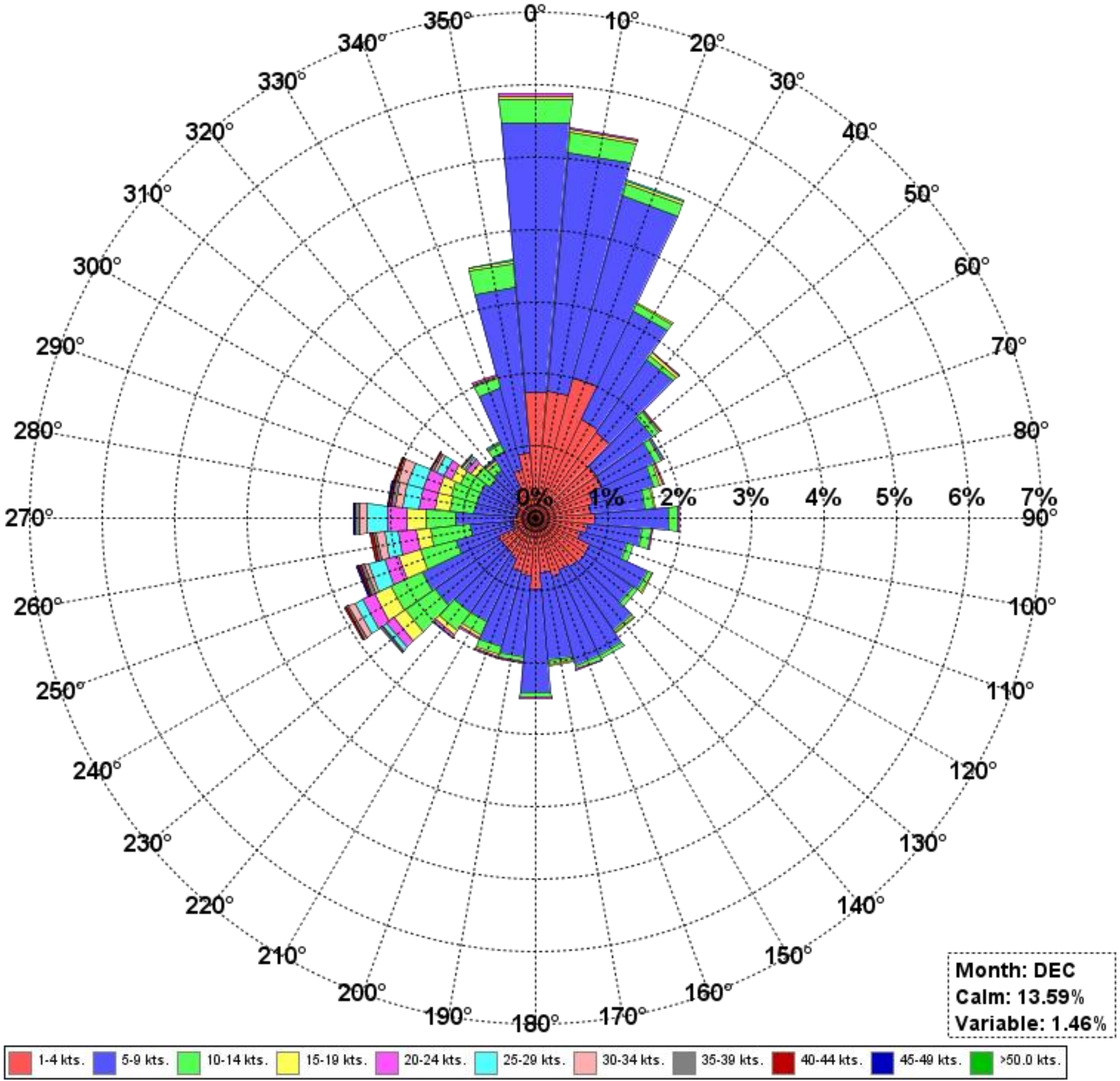
Weather Forecast Offic

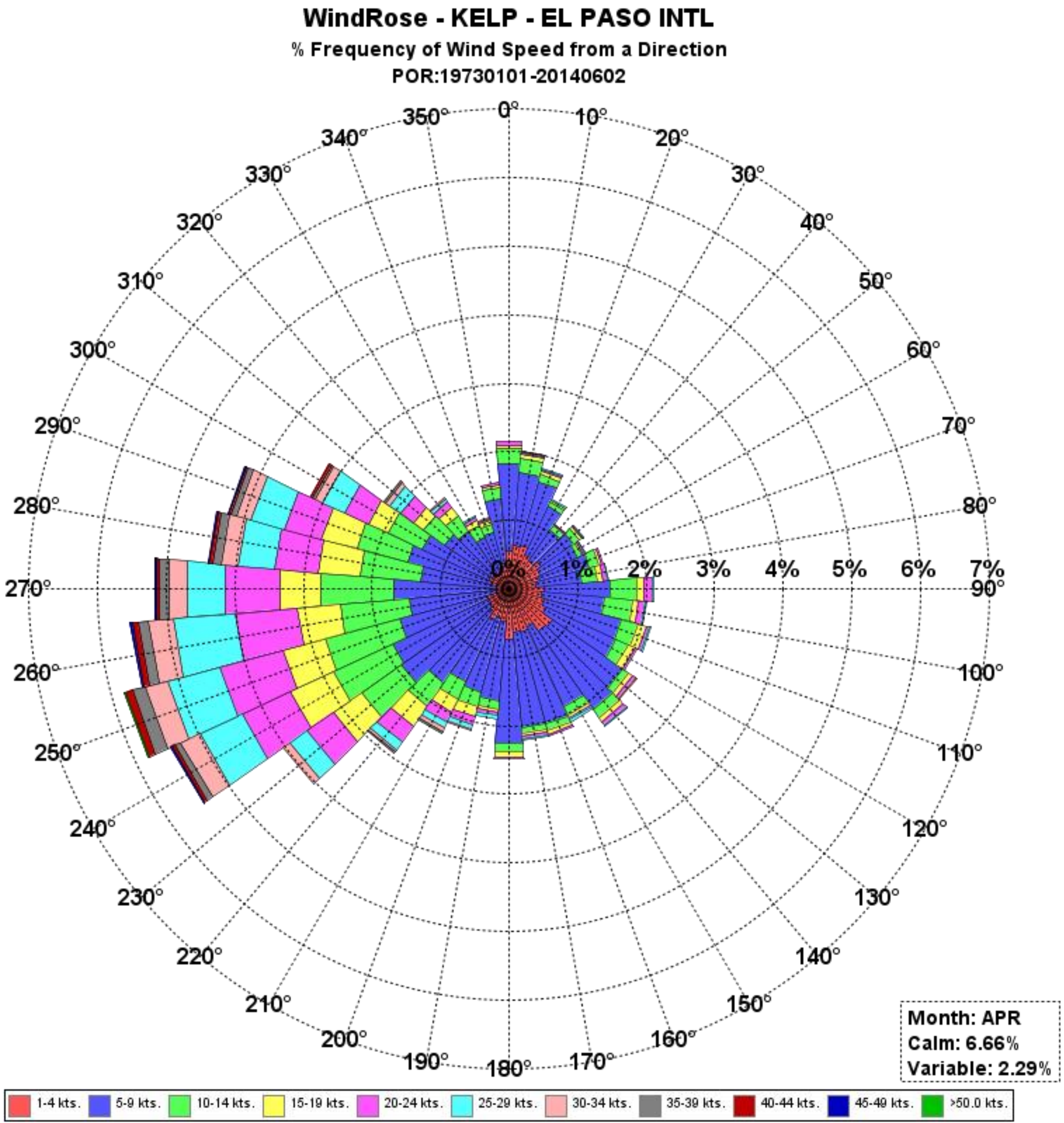
El Paso Wind Rose Data	
https://www.tceq.state.tx.us/assets/public/compliance/monops/air/windroses/elpjan.gif	Wind roses can be used to graphically depict the predominant transport direction of an area's winds. Air quality is often correlated with the dominant transport direction of the wind. Wind roses provide the best information regarding the percentage of time the direction(s) and speed(s) associated with a certain air quality can be expected over a long period of time. The following data was collected 01-01-1973 - 06-02-2014 at the El Paso International Airport.

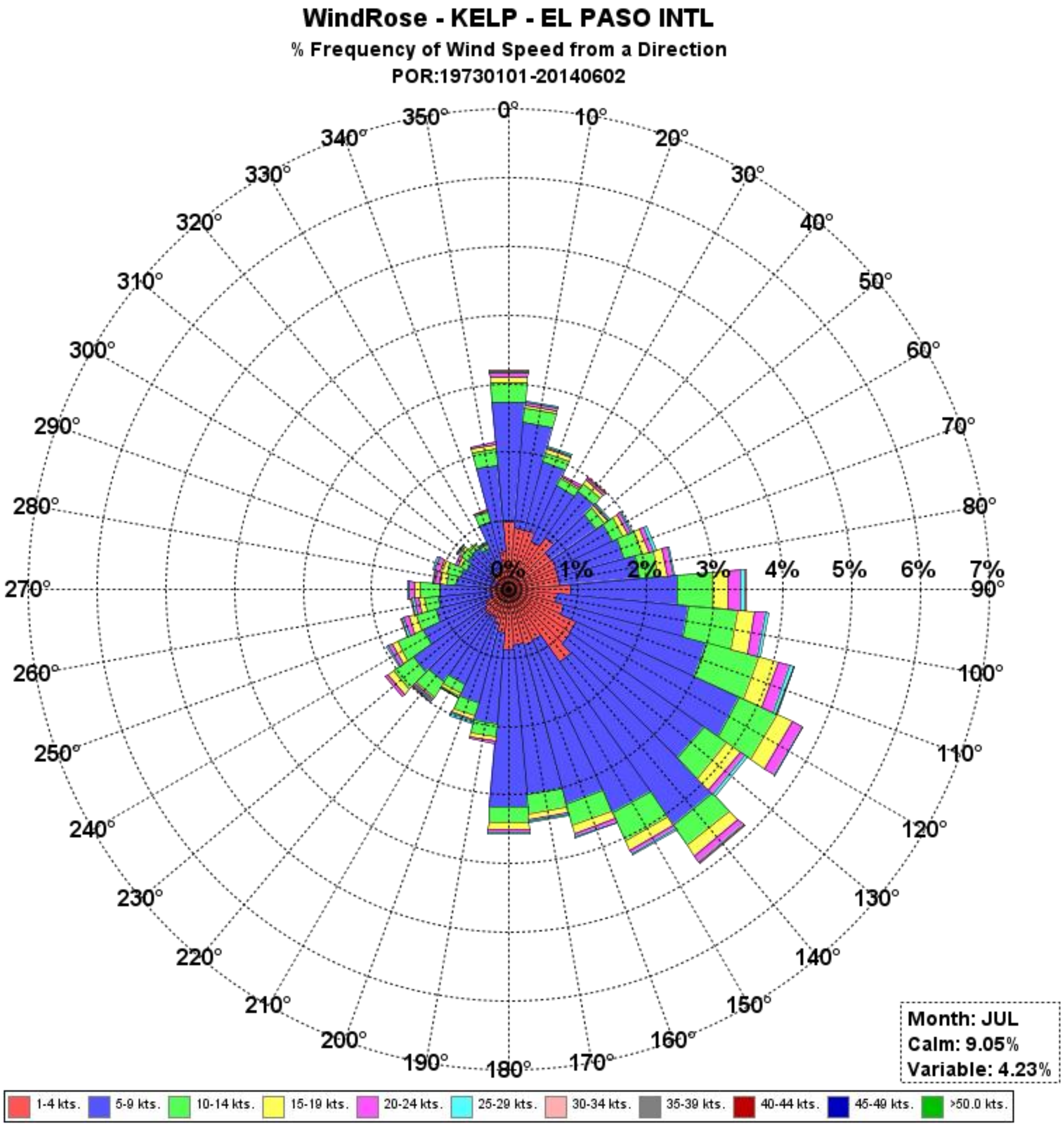
WindRose - KELP - EL PASO INTL

% Frequency of Wind Speed from a Direction

POR:19730101-20140602




WindRose - KELP - EL PASO INTL
% Frequency of Wind Speed from a Direction
POR:19730101-20140602
0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
280°
290°
300°
310°
320°
330°
340°
350°
0%
1%
2%
3%
4%
5%
6%
7%
Month: APR
Calm: 6.66%
Variable: 2.29%
1-4 kts.
5-9 kts.
10-14 kts.
15-19 kts.
20-24 kts.
25-29 kts.
30-34 kts.
35-39 kts.
40-44 kts.
45-49 kts.
>50.0 kts.


WindRose - KELP - EL PASO INTL
% Frequency of Wind Speed from a Direction
POR:19730101-20140602
0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
280°
290°
300°
310°
320°
330°
340°
350°
0%
1%
2%
3%
4%
5%
6%
7%
Month: JUL
Calm: 9.05%
Variable: 4.23%
1-4 kts.
5-9 kts.
10-14 kts.
15-19 kts.
20-24 kts.
25-29 kts.
30-34 kts.
35-39 kts.
40-44 kts.
45-49 kts.
>50.0 kts.

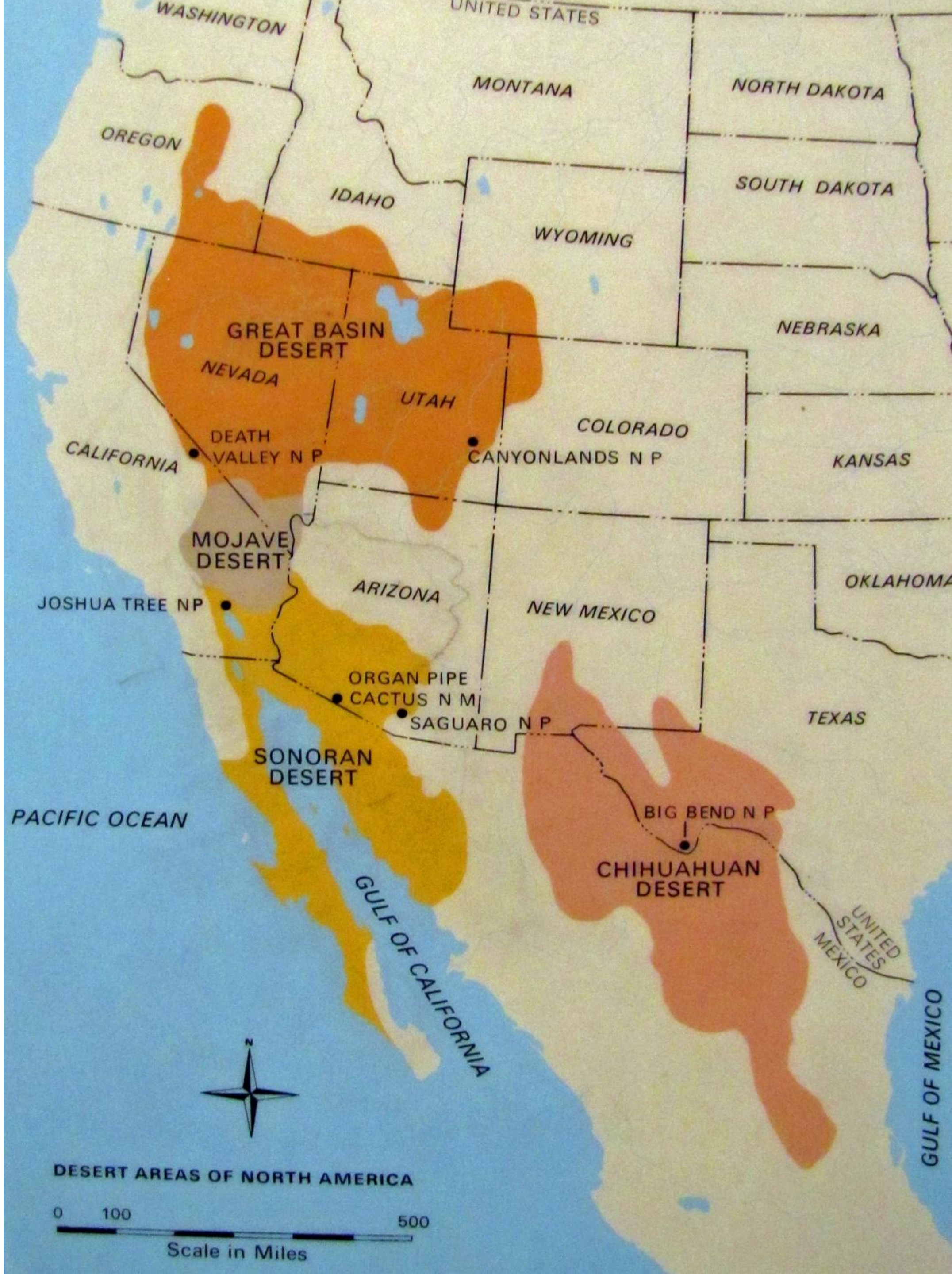
Drought in the West:

Desert: defined by **Wikipedia**

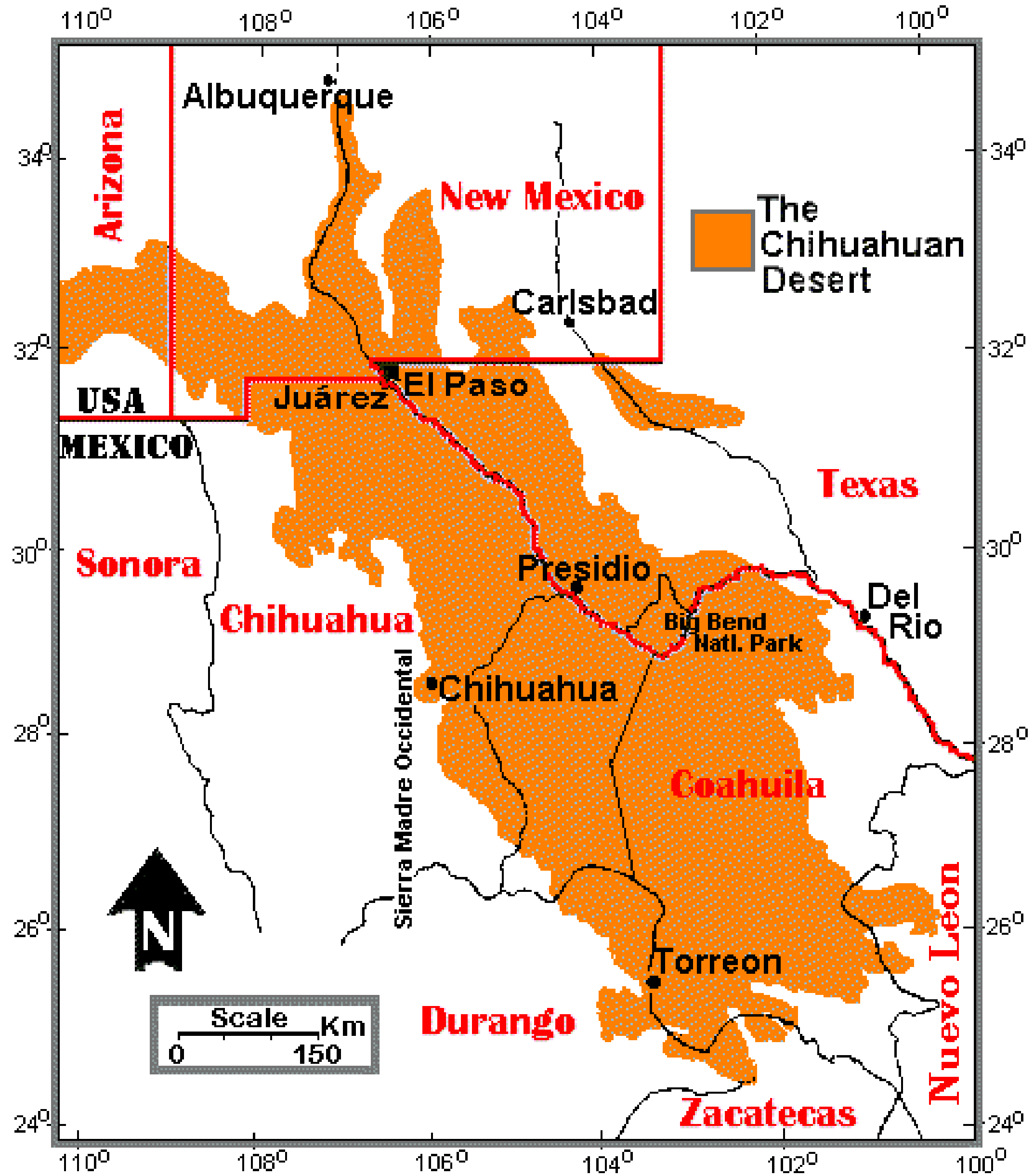
"a barren area of land where little [precipitation] occurs and consequently living conditions are hostile for plant and animal life."

Sound familiar?

El Paso and Las Cruces are in the Chihuahuan Desert, so droughts are common.



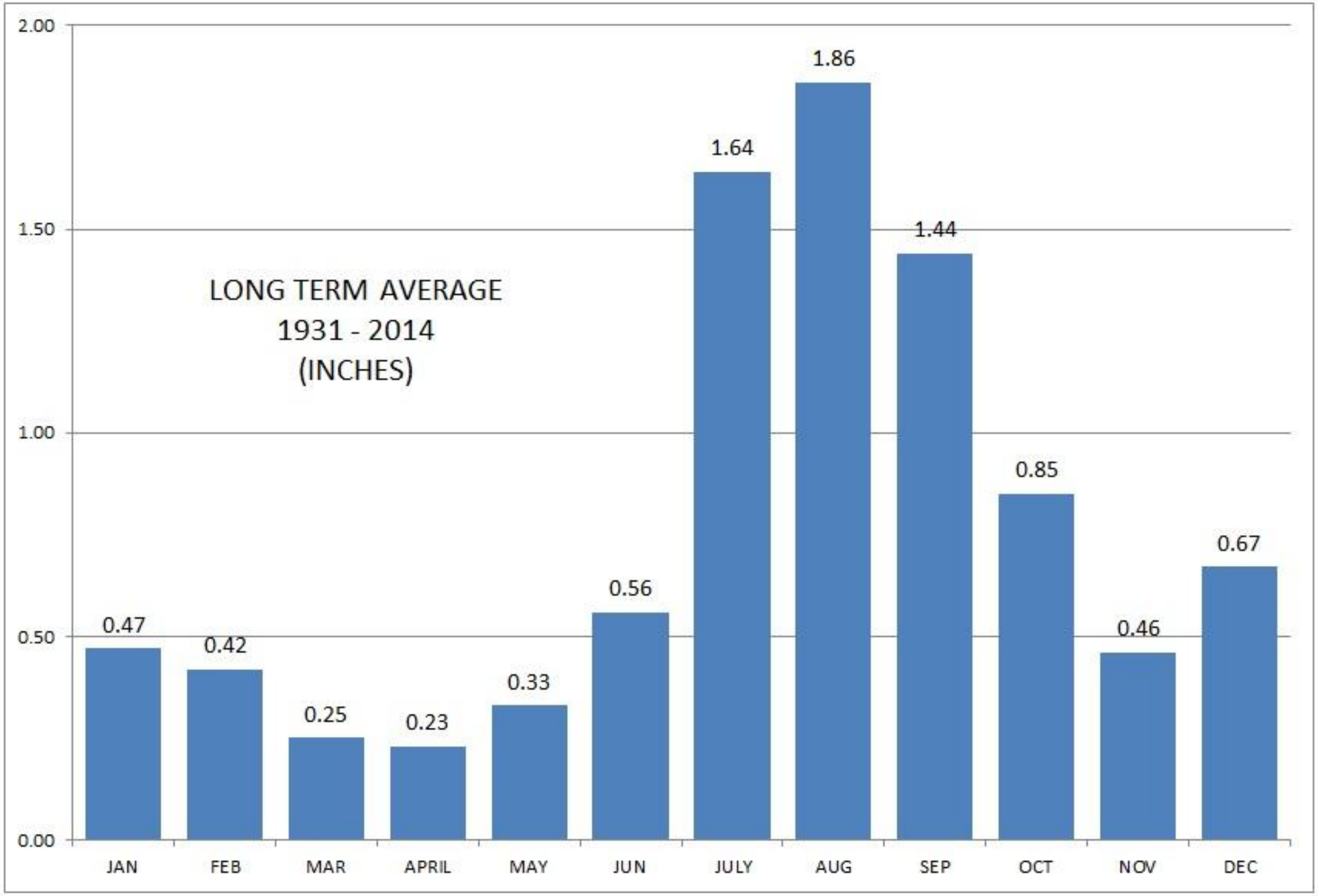
http://museum.utep.edu/chih/chihdes.htm



Chihuahuan Desert Region. After an original map by R. Schmidt (1979).

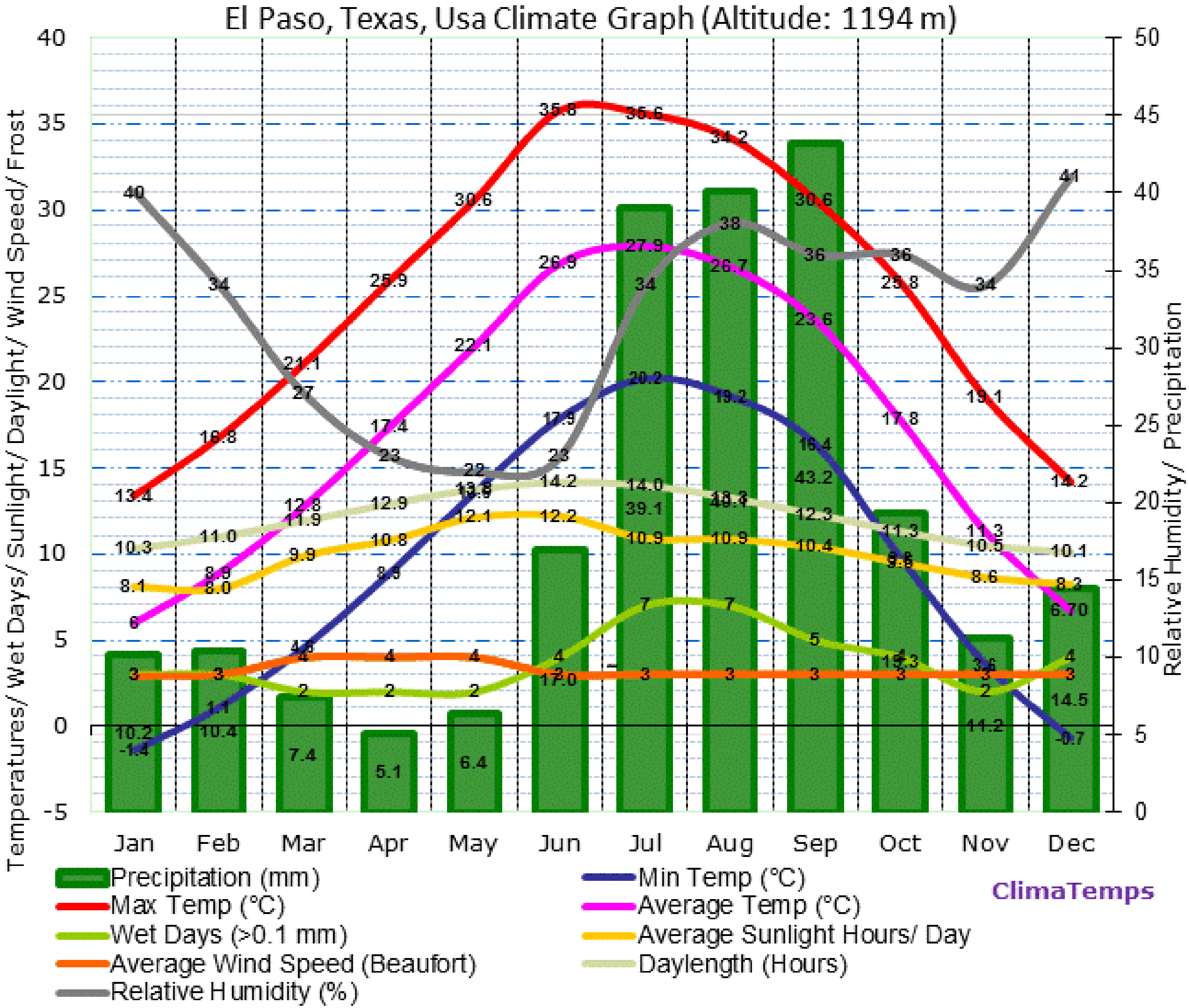
http://chihuahuansc.nmsu.edu/climate.html

Monthly distribution of rainfall in Southern New Mexico.

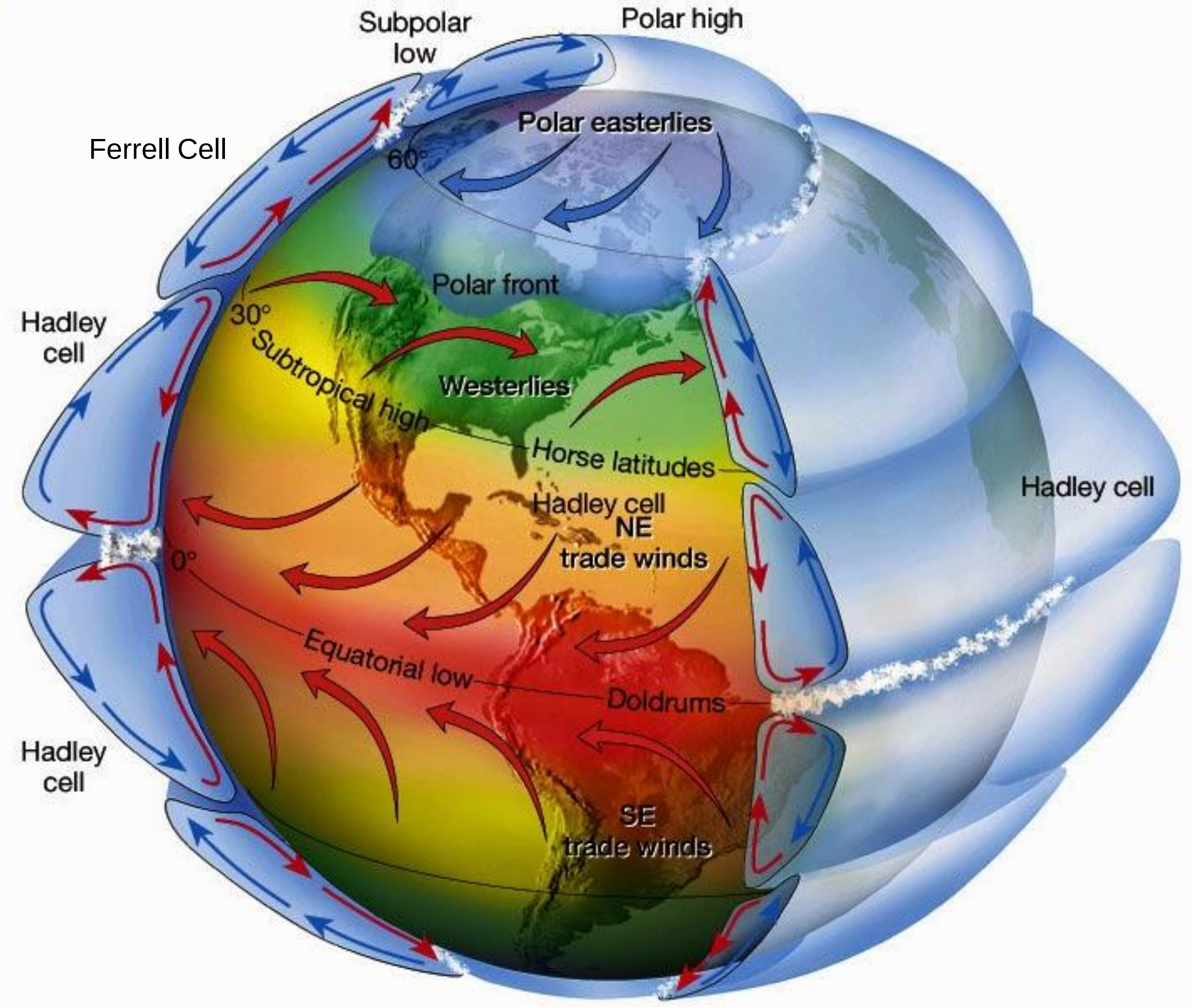


Annual Rainfall = 9.17 inches

http://www.el-paso.climatemps.com/



http://1.bp.blogspot.com/-tDTpvWrModo/U2XoP6s57XI/AAAAAAAAA7o/r6Ik0N5VHk8/s1600/Hadley+cells+2_ux1_eiu_edu.jpg

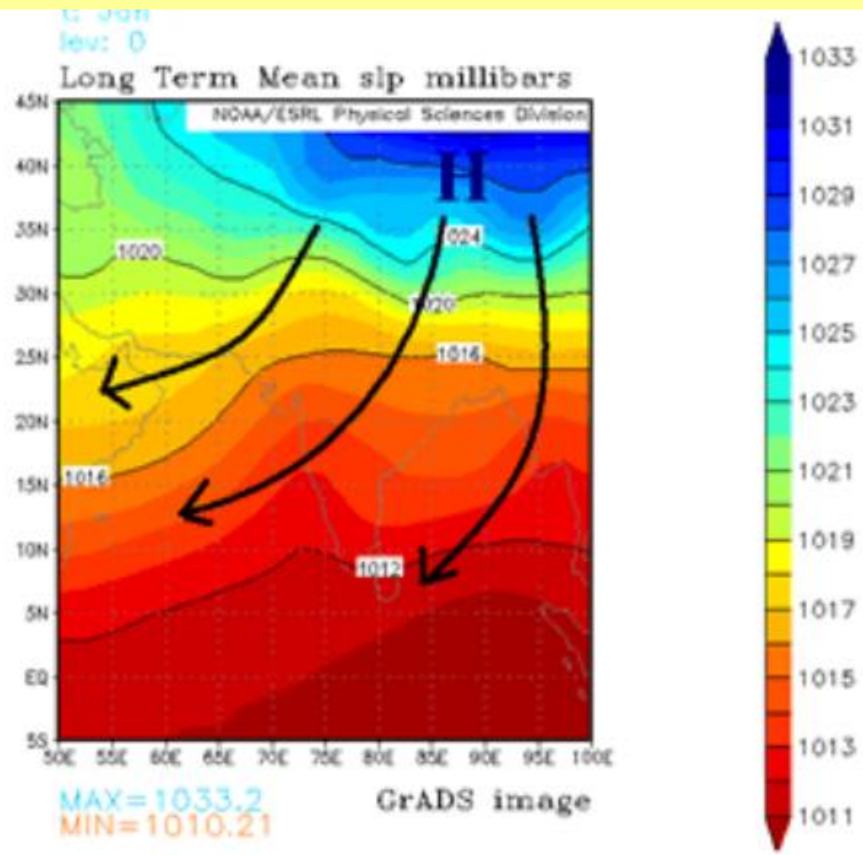


http://www.wrh.noaa.gov/twc/monsoon/monsoon_whatis.pdf

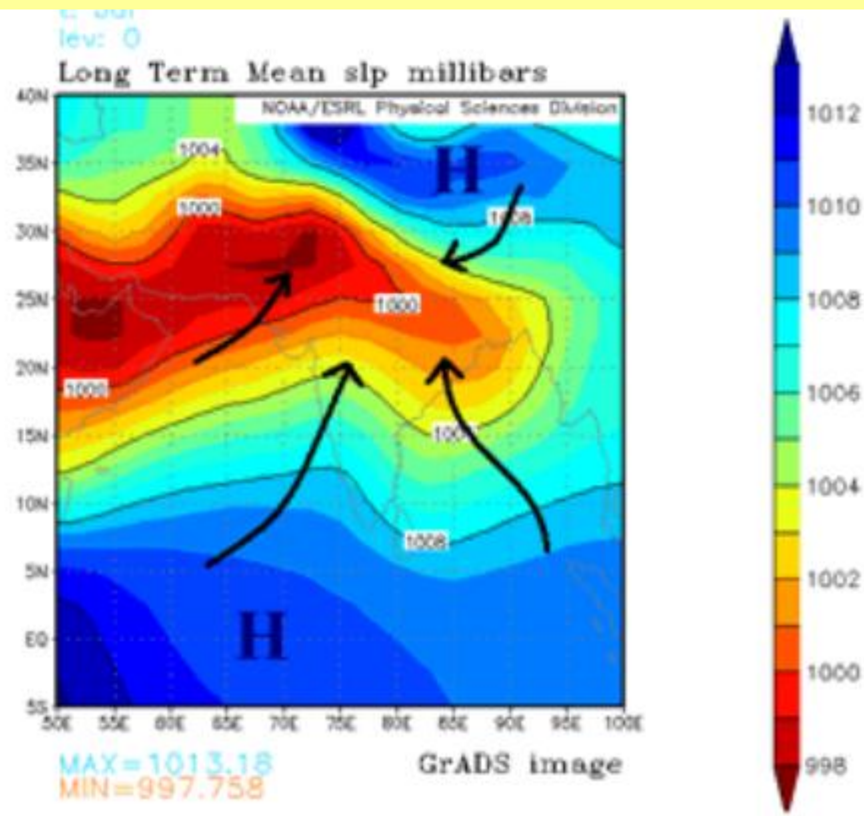
Classic definition of "monsoon" from Arabic, meaning "season," or "seasonal wind"

WINTER : Cold High Pressure over Asia

SUMMER: Land Heating => Low pressure over Asia:



Graphic 1: Mean seal level pressure and near surface flow over India, January (dry season)



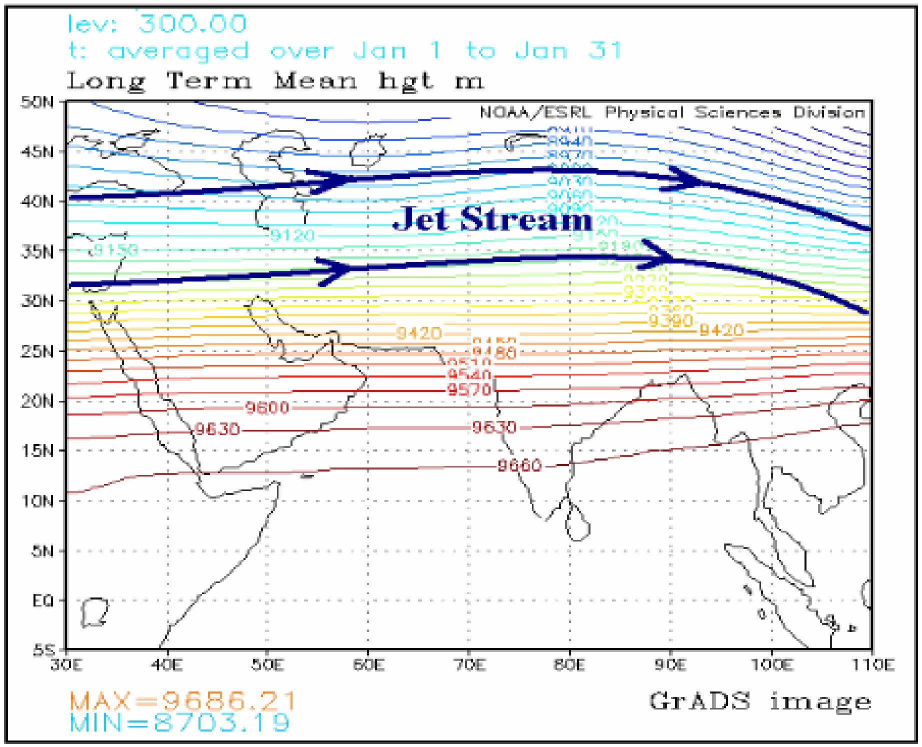
Graphic 2: Mean sea level pressure and near surface flow over India, July (monsoon season)

http://www.wrh.noaa.gov/twc/monsoon/monsoon_whatis.pdf

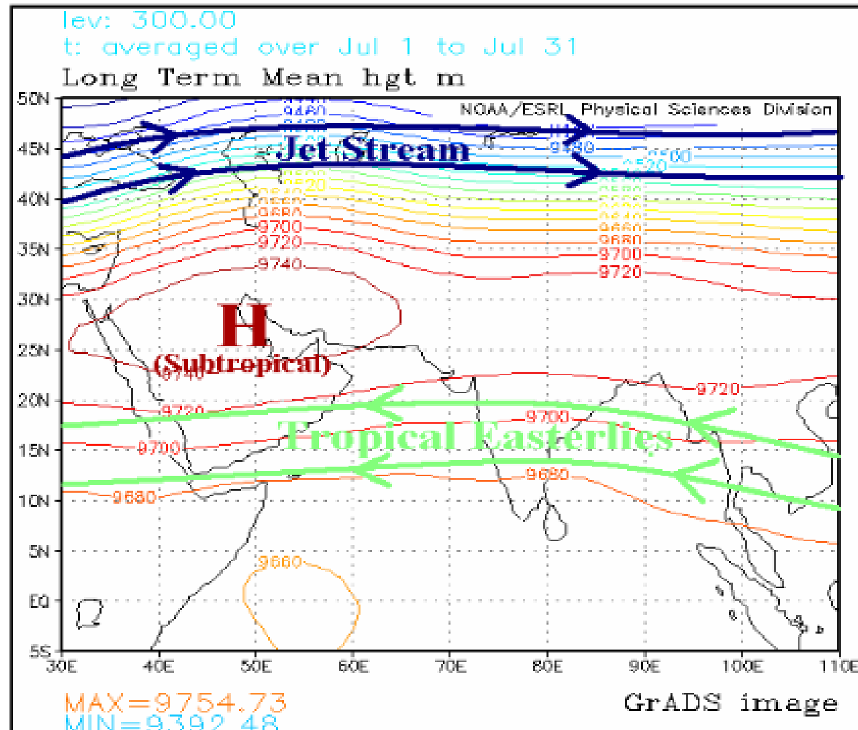
Classic definition of "monsoon" from Arabic, meaning "season" or "seasonal wind"

WINTER: Jet Stream over Asia
Westerly winds dominate

SUMMER: Subtropical Ridge moves over SWA
Jet Stream has migrated to north; weakened.
Easterly winds (Green) dominate SEA, India, Bay of Bengal, Arabian Sea



Graphic 3: 300mb (jet stream level) flow over south Asia, January (dry season)



Graphic 4: 300mb (jet stream level) flow over south Asia, July (monsoon season)

Sub-Tropical Ridge

Sub-Tropical Ridge—feature which causes the Sun Belt , deserts around the world.

Also called: Sub-Tropical Ridge , Bermuda High, Hawaiian High and Bermuda-Azores High

High pressure: descending air - sunny skies - less rainfall-- "Sun Belt"

Follows the Sun: Stronger in Summer -- Strongest after the Summer Solstice.

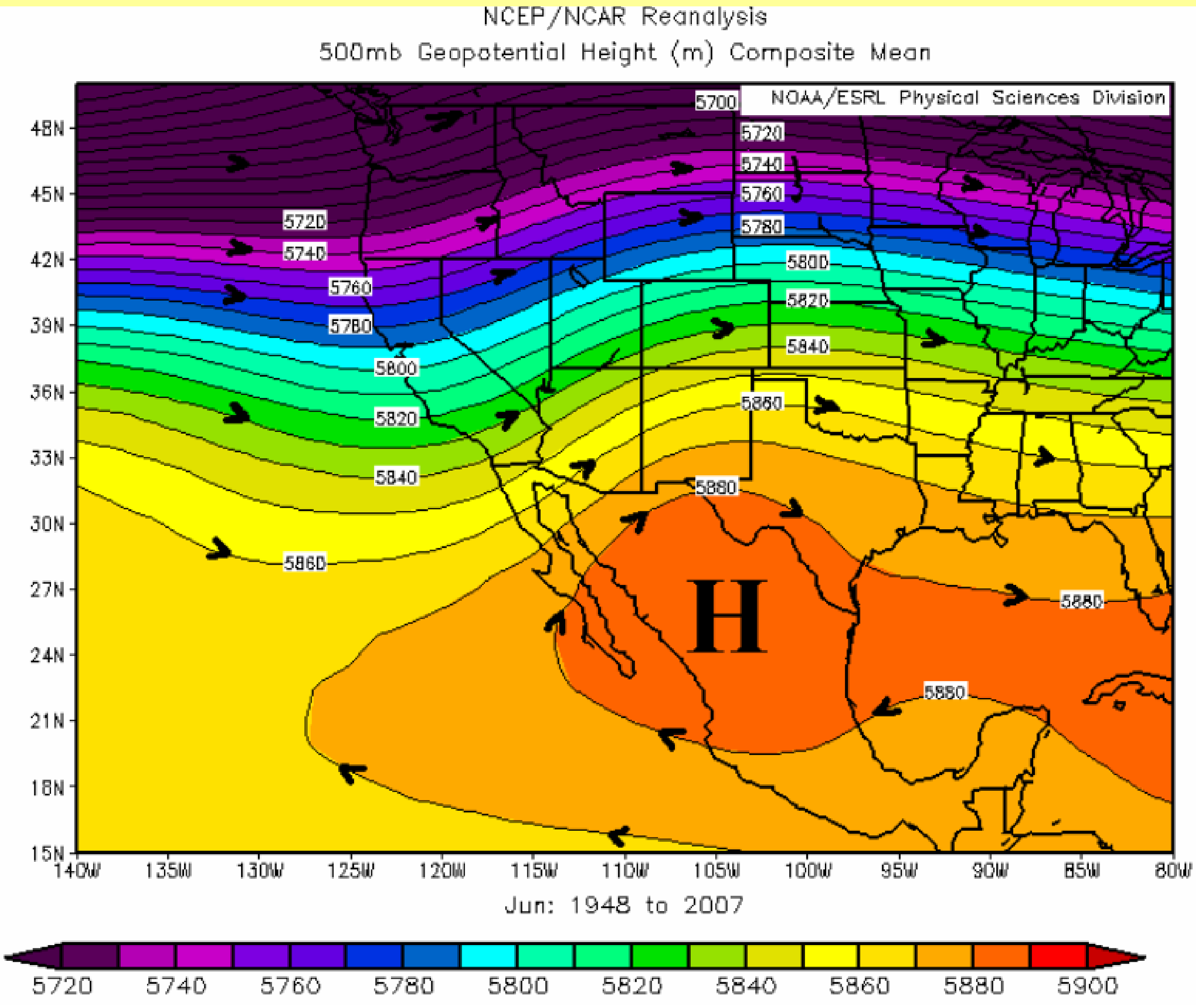
June: Centered Monterey-Saltillo Mexico, moving north

July: Strongest. center near Santa Fe, north into So. Colorado
Southeast winds in most of Texas, NM, AZ

Brings moisture from Gulf of Mexico. Dominates weather in AZ, NM
ELP, ABQ, TUS, PHX, GBN , YUM , FLG

http://www.wrh.noaa.gov/twc/monsoon/monsoon_NA.pdf

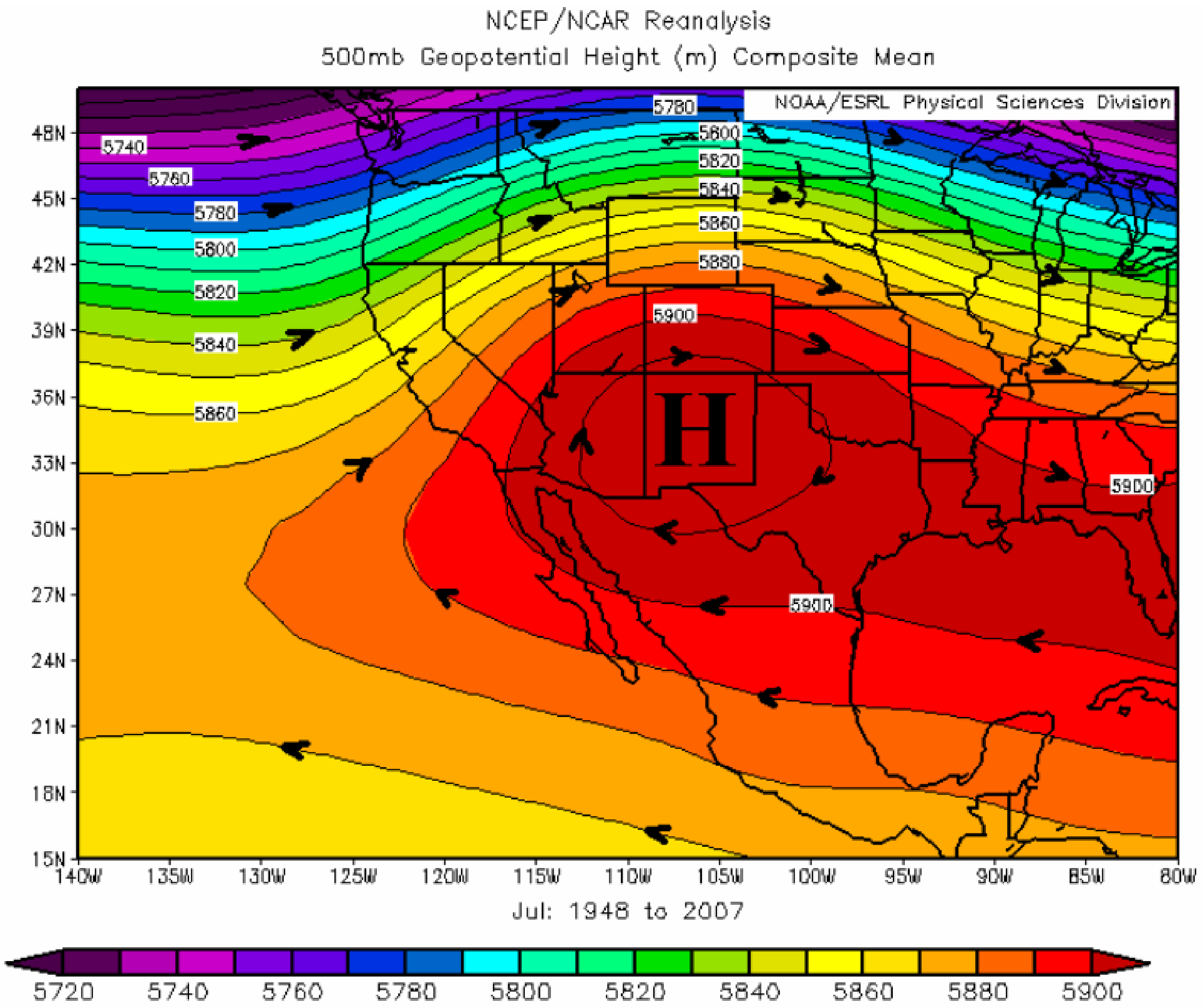
North American Monsoon-June



Graphic 2: Mean 500mb height pattern, June. Subtropical high is strengthening over northern Mexico

http://www.wrh.noaa.gov/twc/monsoon/monsoon_NA.pdf

North American Monsoon-July

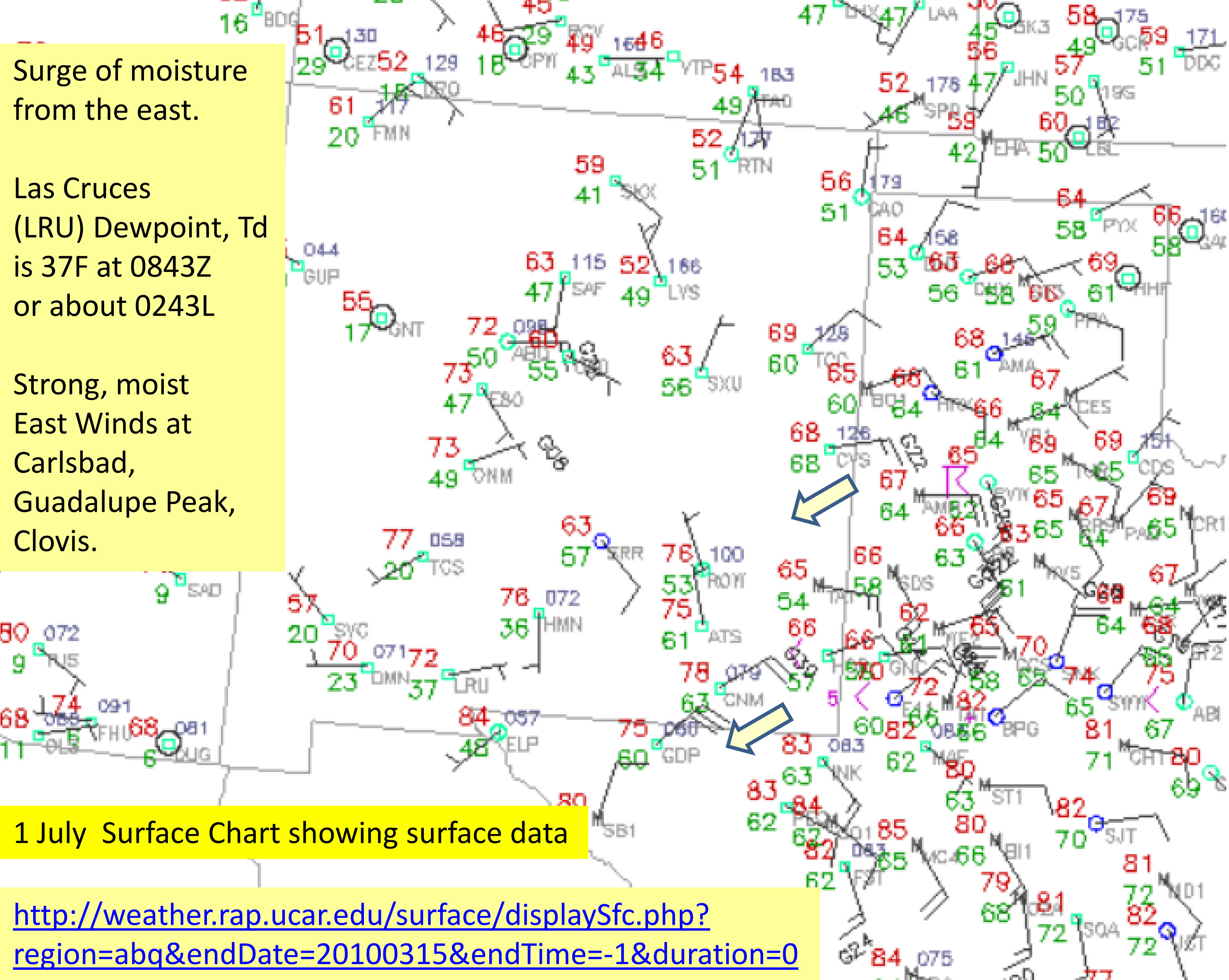


Graphic 3: Mean 500mb height pattern, July. Subtropical high is near maximum seasonal strength over New Mexico.

http://www.wrh.noaa.gov/twc/monsoon/monsoon_NA.pdf

North American Monsoon

Graphic 1: Moisture sources for the North American Monsoon.



Surge of moisture from the east.

Las Cruces (LRU) Dewpoint, Td is 37F at 0843Z or about 0243L

Strong, moist East Winds at Carlsbad, Guadalupe Peak, Clovis.

1 July Surface Chart showing surface data

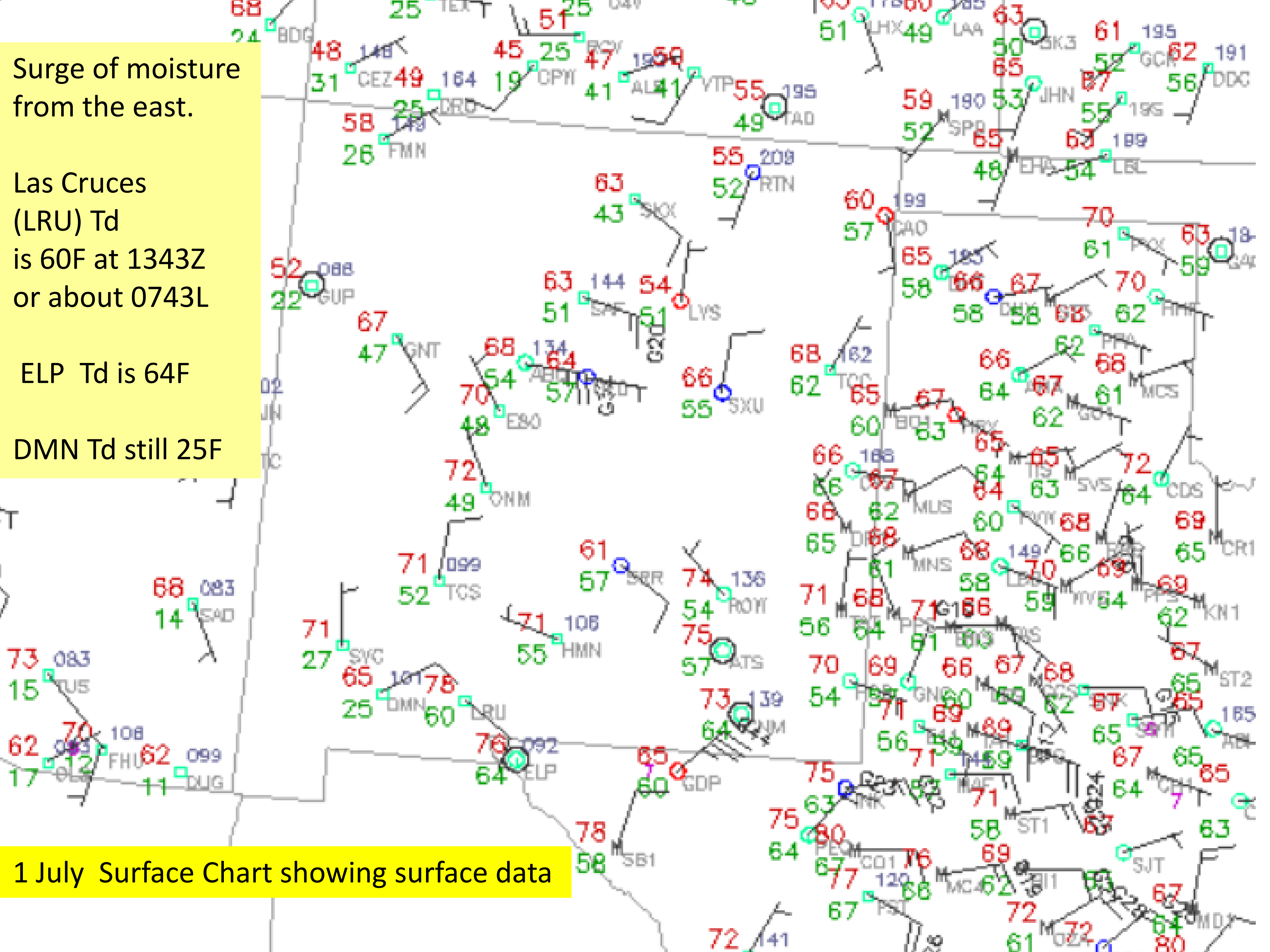
http://weather.rap.ucar.edu/surface/displaySfc.php?region=abq&endDate=20100315&endTime=-1&duration=0

Surge of moisture from the east.

Las Cruces (LRU) Td is 60F at 1343Z or about 0743L

ELP Td is 64F

DMN Td still 25F



1 July Surface Chart showing surface data

Monsoon Characteristics

“Monsoon” – from Arabic meaning season or seasonal wind.
Pronounced Wind shift in the Arabian Sea:
Dry Northeast monsoon off India, to Wet Southwest Monsoon onto India.

North American Monsoon in far West Texas and New Mexico:

Westerlies especially strong, dry spring westerlies….light in June…

and become moist easterlies from ~ 4 July to about 12 September.

Characteristics:

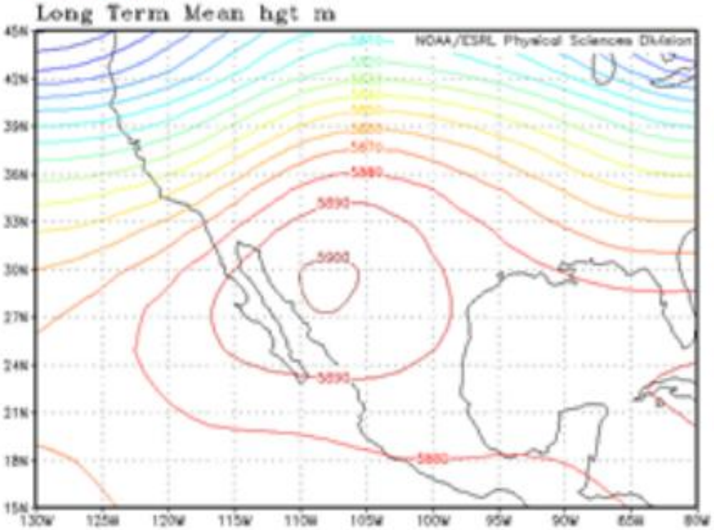
Dewpoints go above 55F (Onset defined by NWS as Td>55F for 3 days)

Precipitable Water goes above 1 inch.

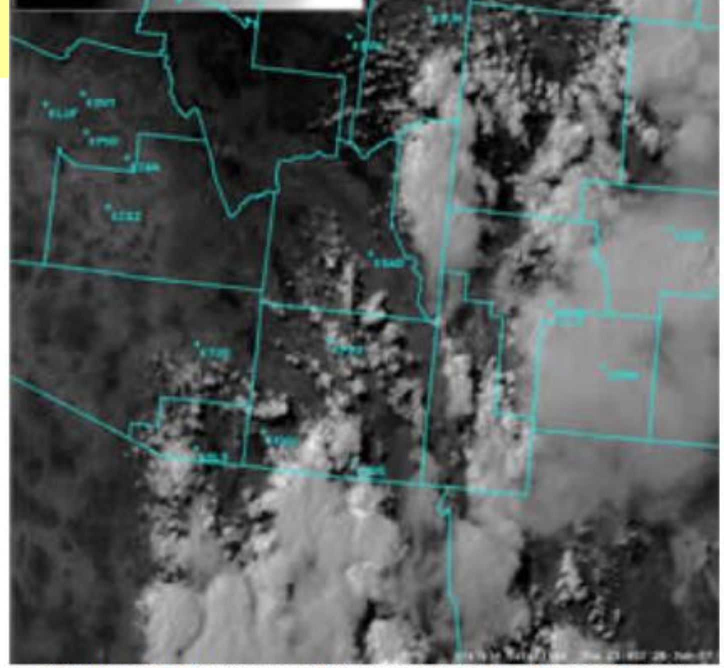
Our Evaporational Coolers are less effective

“Monsoon” refers to the pattern. The rain comes from showers and thunderstorms

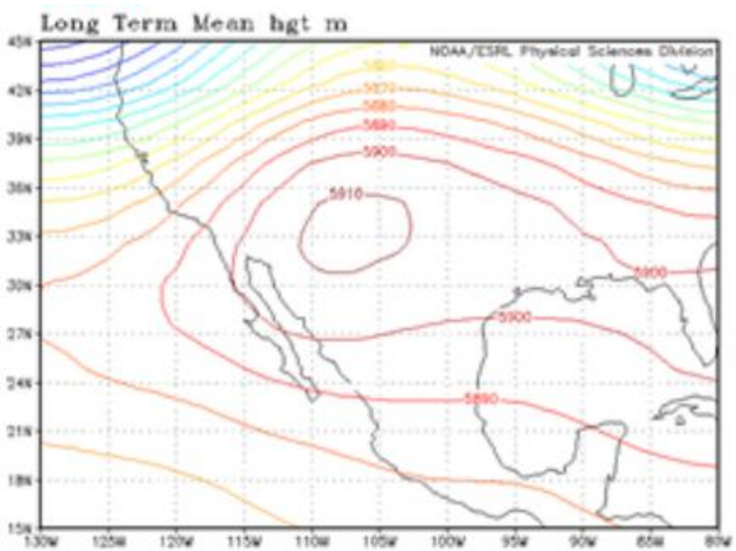
Monsoon progression charts



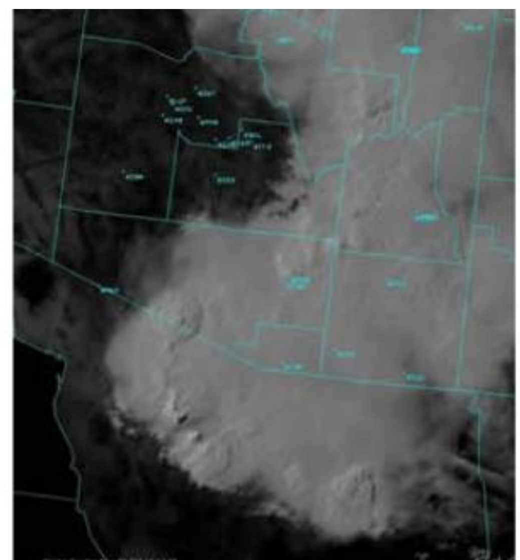
Mean 500mb heights, June 25 (monsoon ramp up)



Visible satellite image of isolated thunderstorms during monsoon ramp-up, June 28, 2007

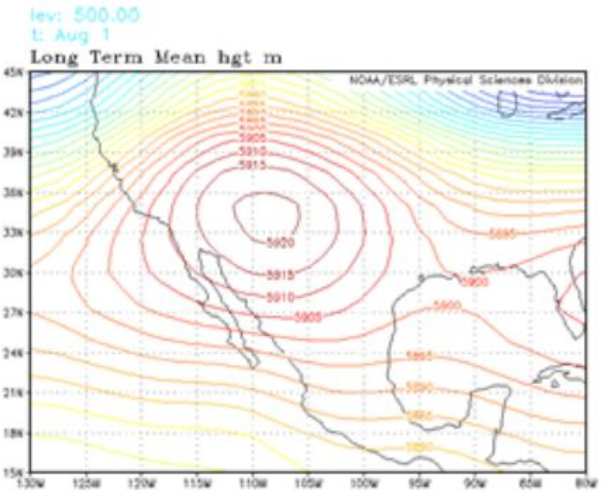


Mean 500mb heights, July 10 (monsoon onset)

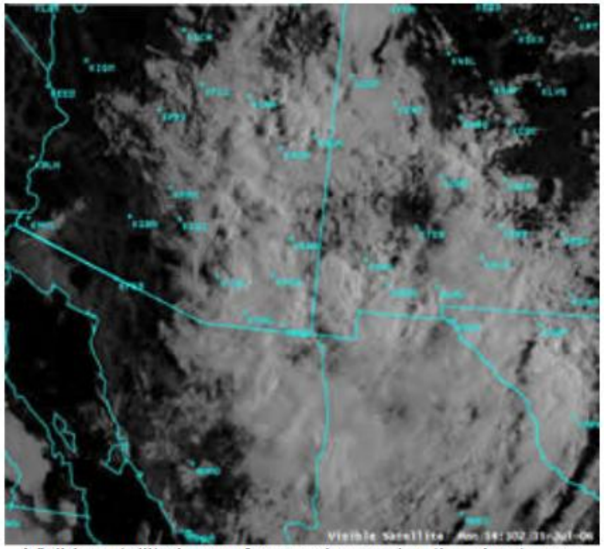


Visible satellite image from an onset phase severe thunderstorm outbreak over southeast Arizona, July 14, 2002.

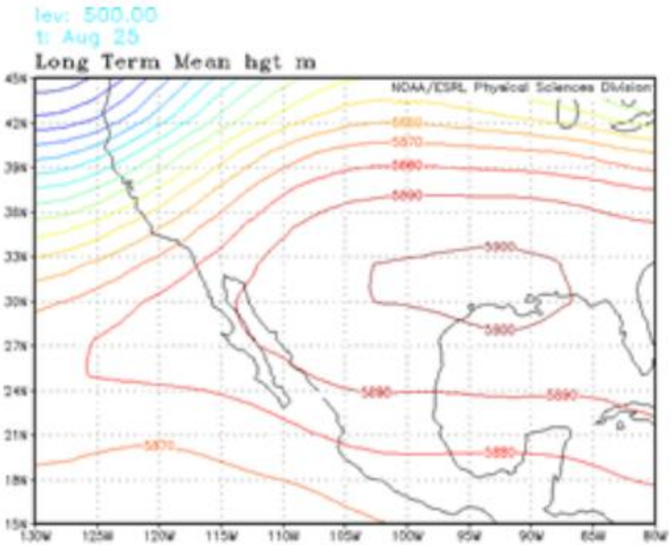
Monsoon progression charts



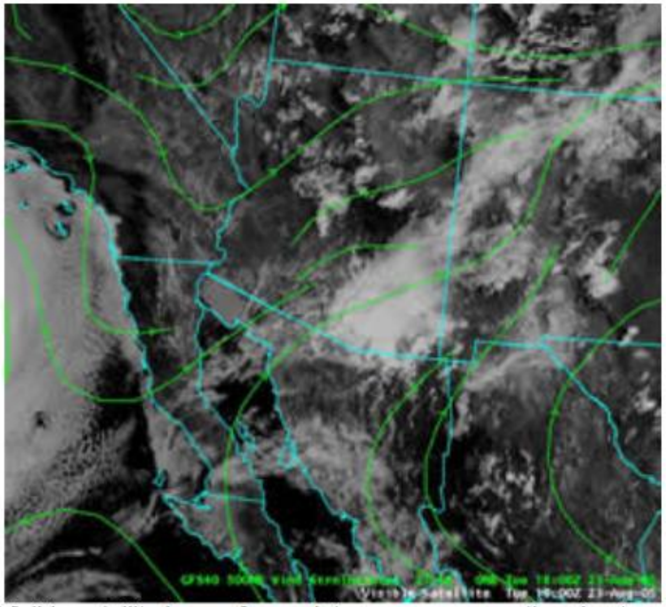
Mean 500mb height, August 1 (monsoon peak)



Visible satellite image from early morning thunderstorms, 0730am MST July 31, 2006, during the peak of the 2006 monsoon. Many of these thunderstorms produced 1-2 inches of rain per hour.

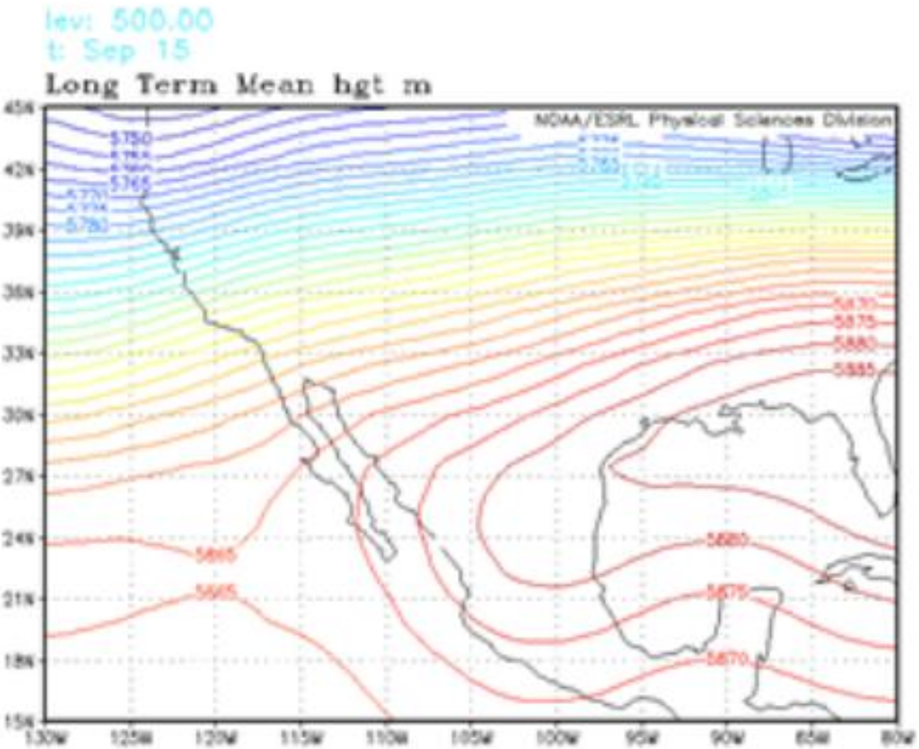


Mean 500mb height, August 25 (late monsoon)

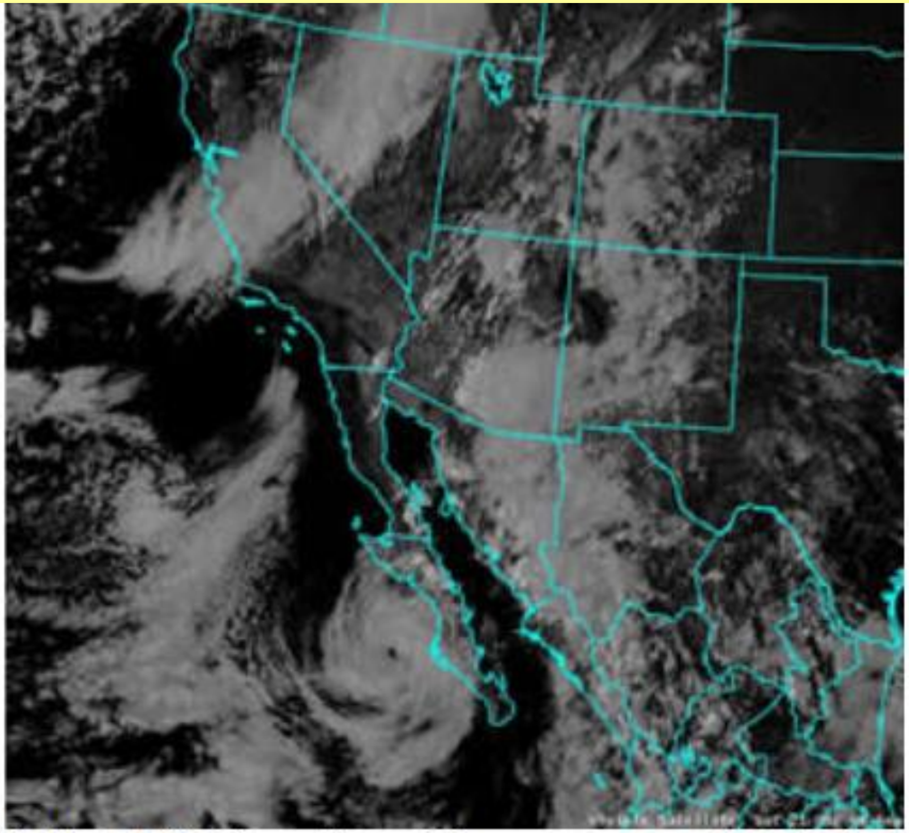


Visible satellite image from a late season severe thunderstorm and flash flood event, August 23, 2005. Note southwest flow aloft and weak trough near the lower Colorado River.

http://www.wrh.noaa.gov/twc/monsoon/monsoon_progression.pdf



Mean 500mb height, August 25 (late monsoon)



Visible satellite image from a late season severe thunderstorm and flash flood event, August 23, 2005. Note southwest flow aloft and weak trough near the lower Colorado River.

National Weather Service

A Year’s Worth of lightning data in Five Minutes

https://youtu.be/JzRTIqP0Xdw

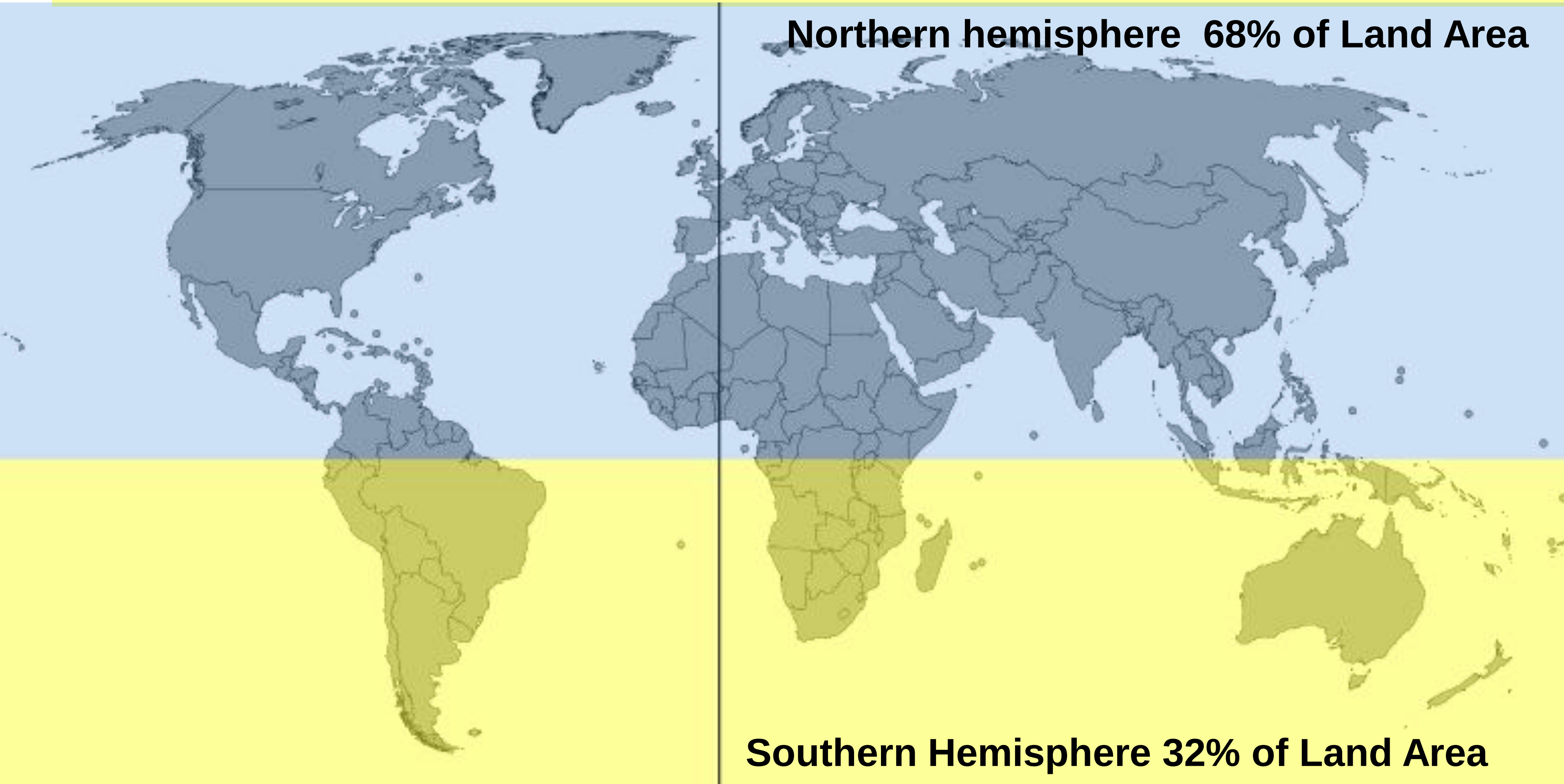
The variability of the monsoon rainfall in Tucson is from driest, 1.59” to wettest, 13.84,” or 12.25 inches.

In El Paso, the variability of the monsoon rainfall is from driest 0.23” to wettest, 15.28,” or 15.05 inches.

Origins of the name, *El Niño*

El Niño was originally recognized by fisherman off the coast of South America as the appearance of **unusually warm water in the Pacific Ocean**, occurring near the beginning of the year. El Niño means *The Little Boy* or *Christ child* in Spanish. This name was used for the tendency of the phenomenon to arrive around Christmas…

…the Northern Hemisphere's Winter Solstice



IMPORTANT POINT!

WATER TEMPERATURE OF OCEAN OFFSHORE NORTH AMERICA DETERMINES RAINFALL/DROUGHT in (especially) Western North America

What determines that water temperature?

A Multi-year weather pattern called EL NINO

El Nino Southern Oscillation "ENSO"

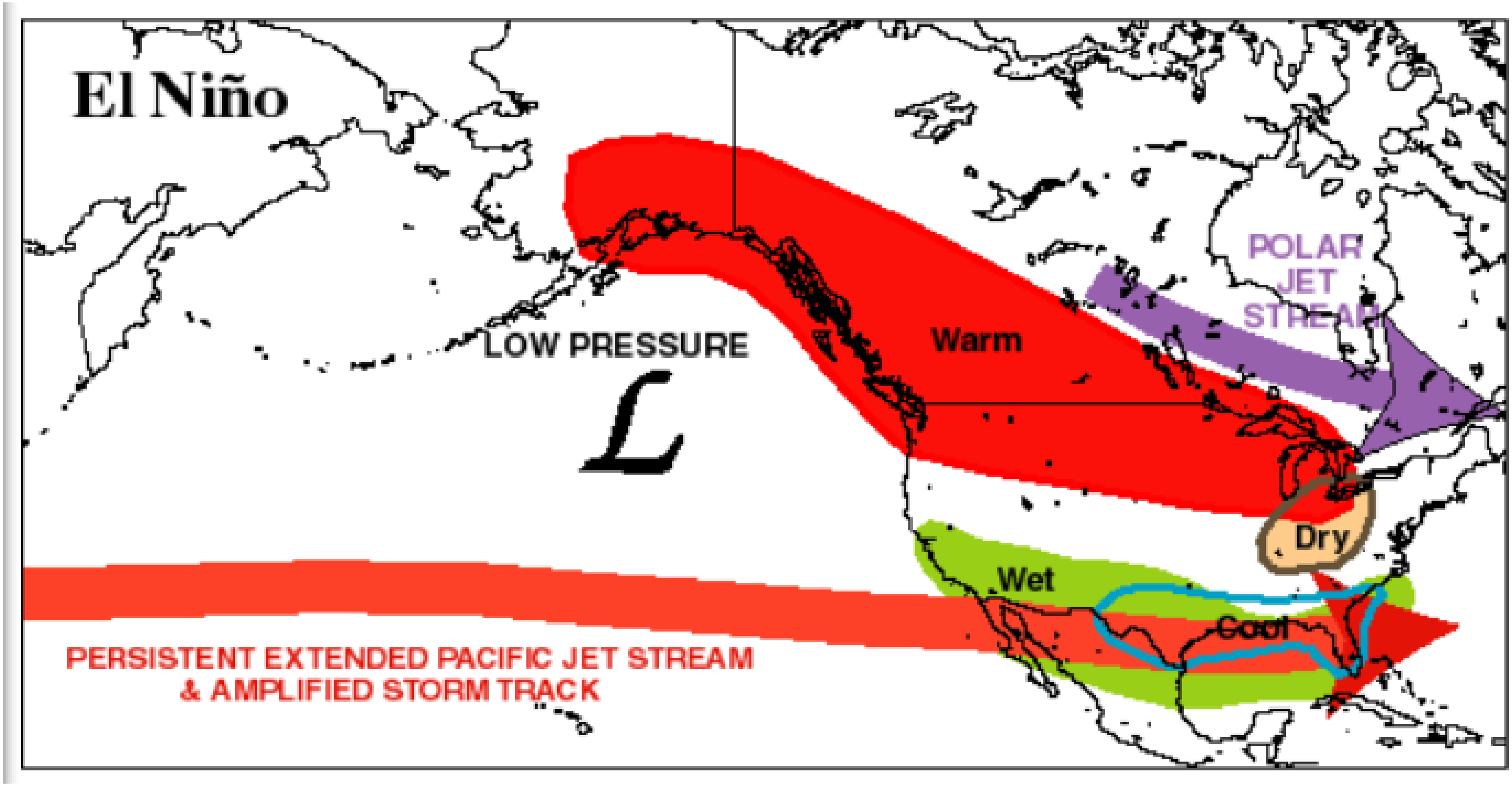
Later, we'll study a 60-year pattern

PACIFIC DECADAL OSCILLATION or "PDO"

30 years MORE EL NINOS, and
30 years FEWER EL NINOS.

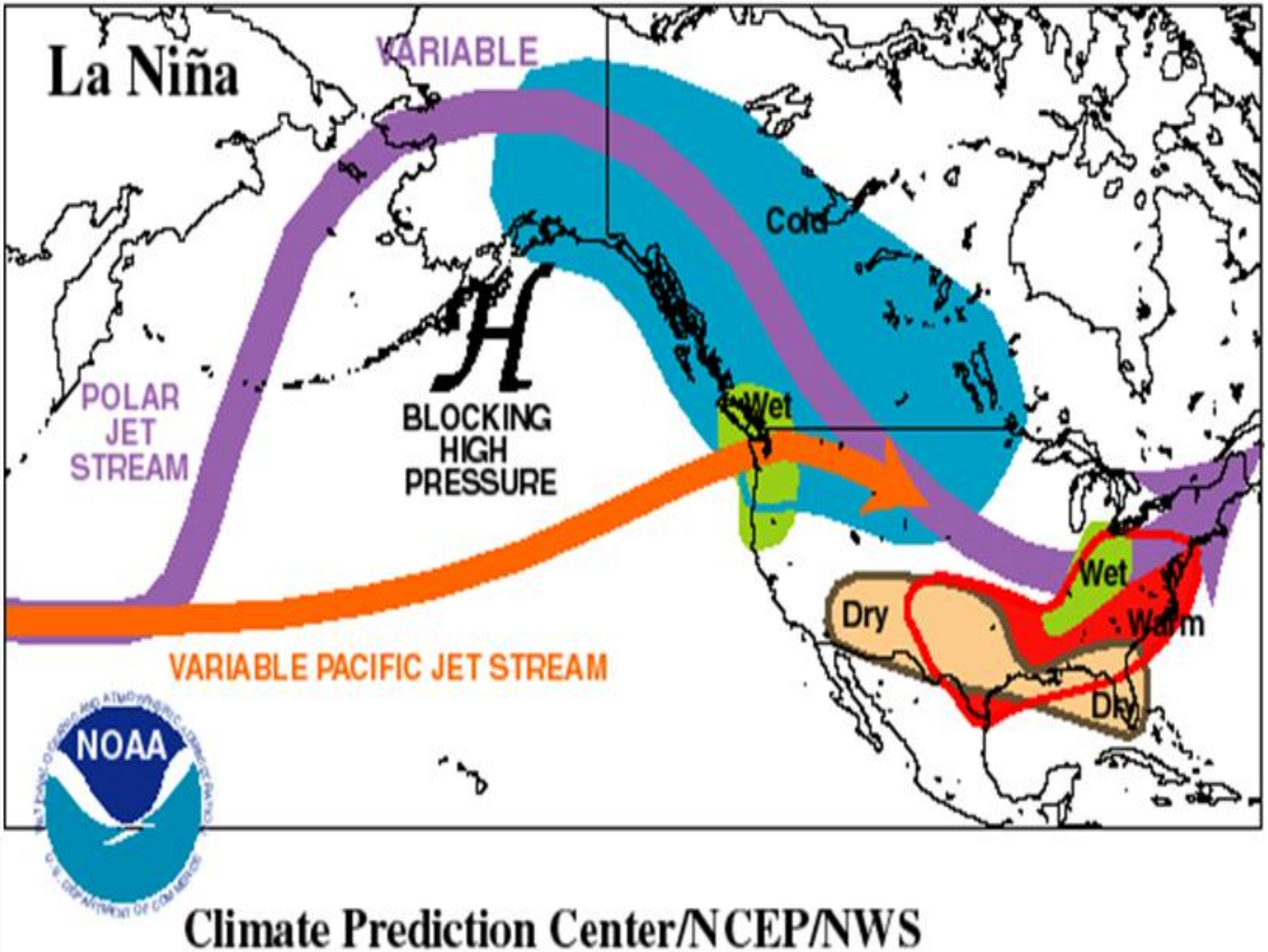
El Nino pattern: Brings wet from California to New Mexico to East Coast

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensocycle/nawinter.shtml



La Nina **pattern, brings dry/drought from Arizona to Florida**

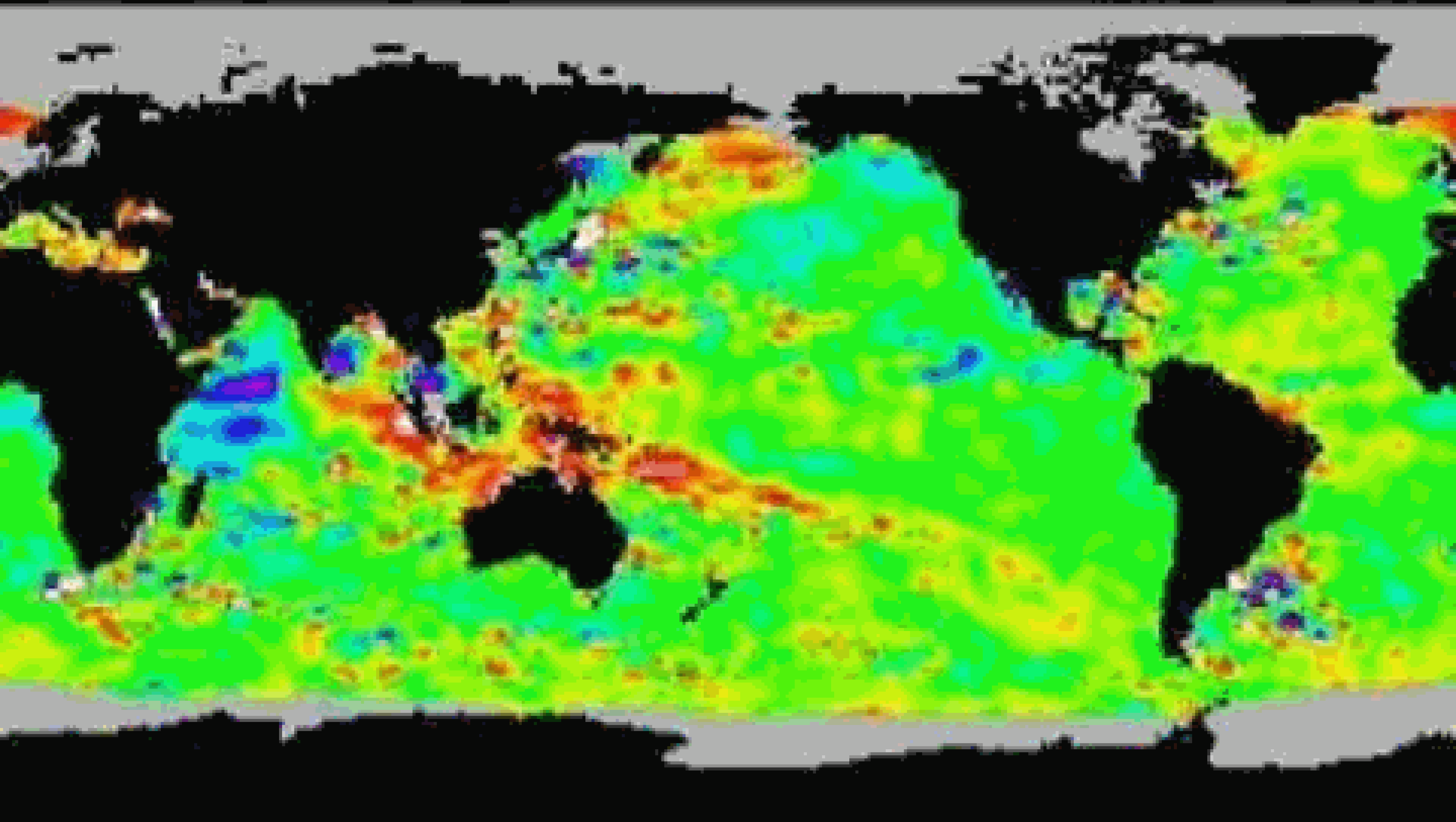
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensocycle/nawinter.shtml



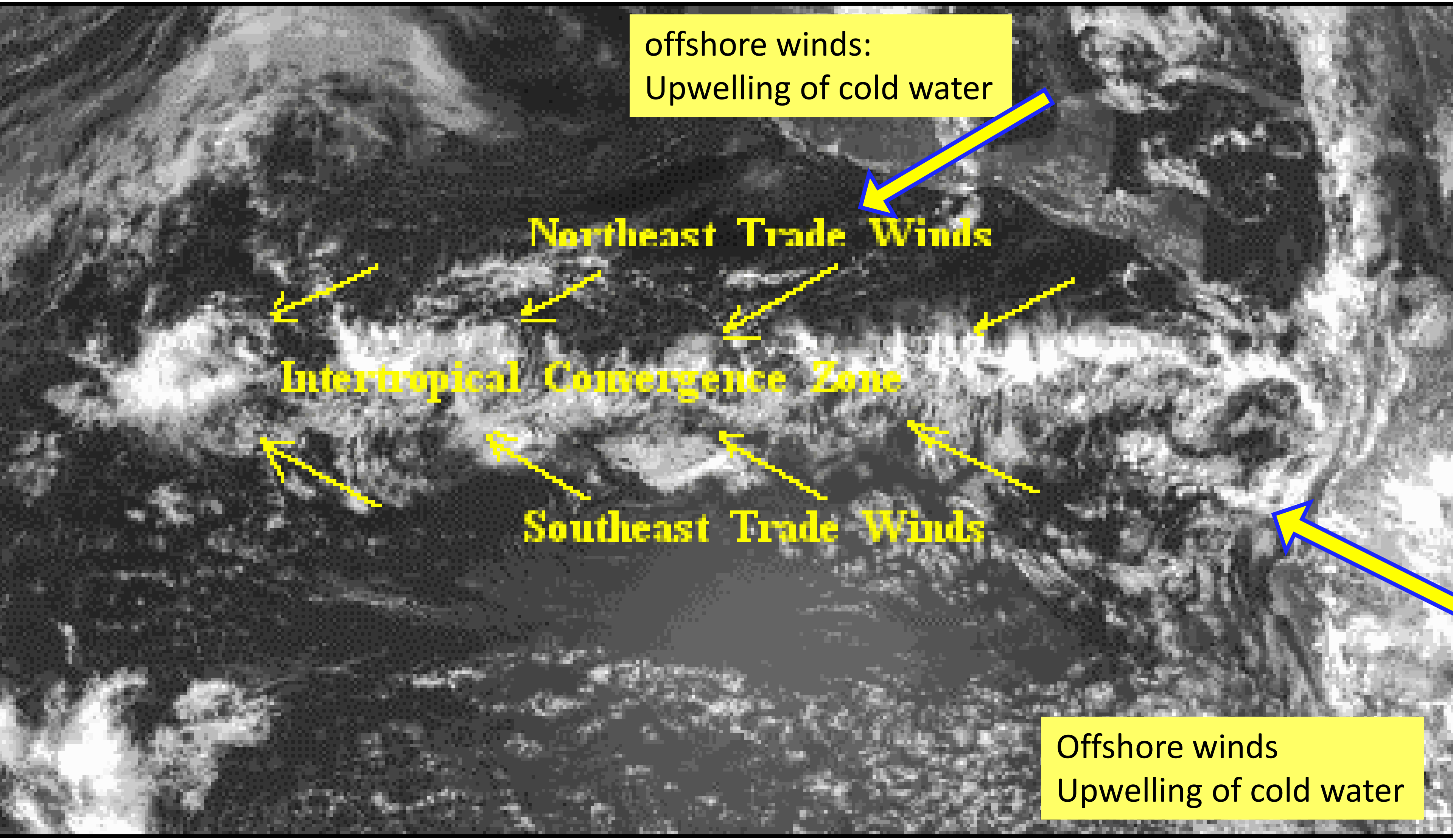
Next graphics show animations of El Nino, and then La Nina

START

DEC 16 1996



The Northeasterly Trade Winds are very prevalent, stronger in La Nina years. Visitors to Hawaii usually encounter the steady from the northeast Trade Winds

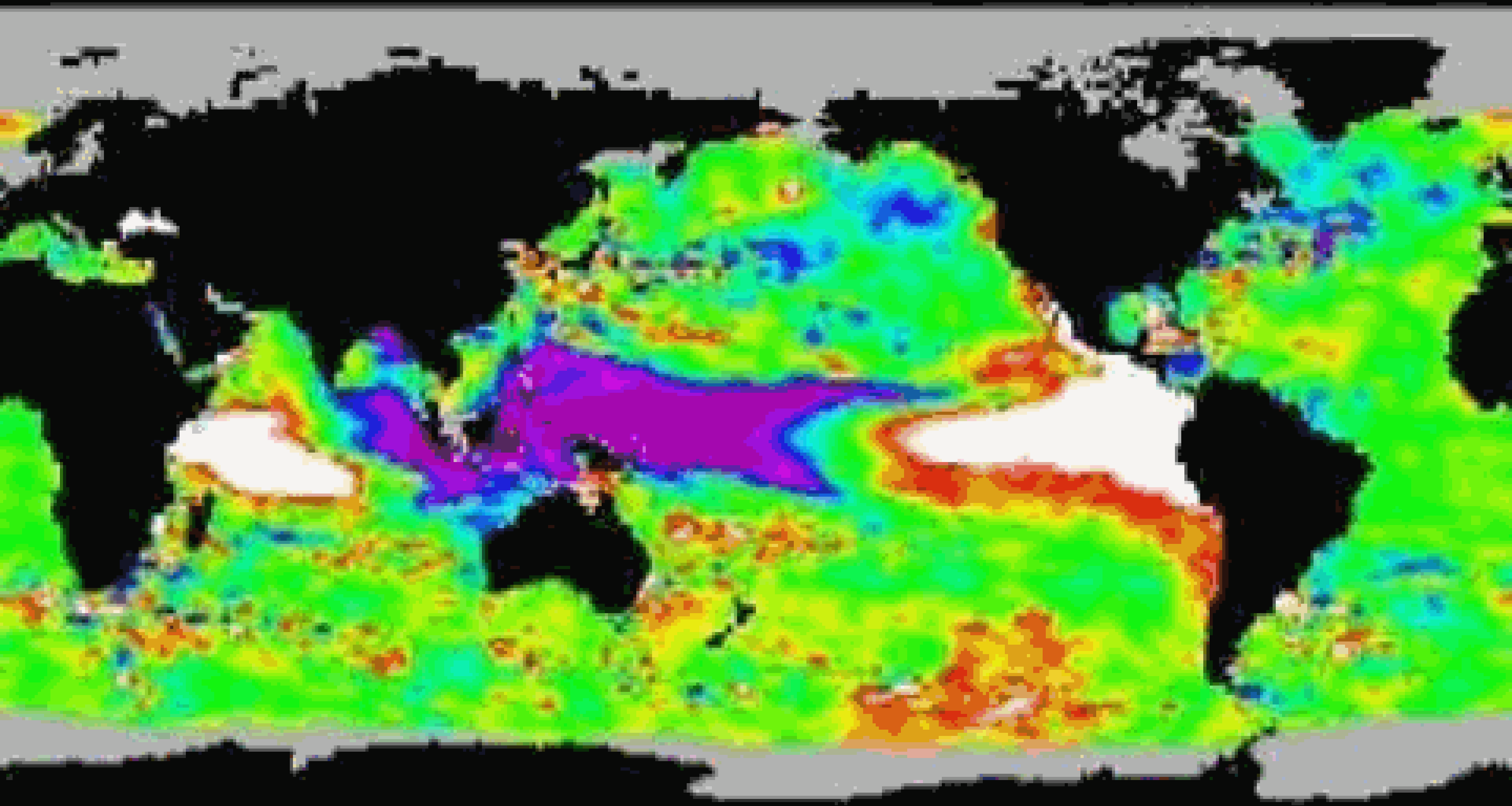


Animation of La Nina beginning on 31 Jan 1998

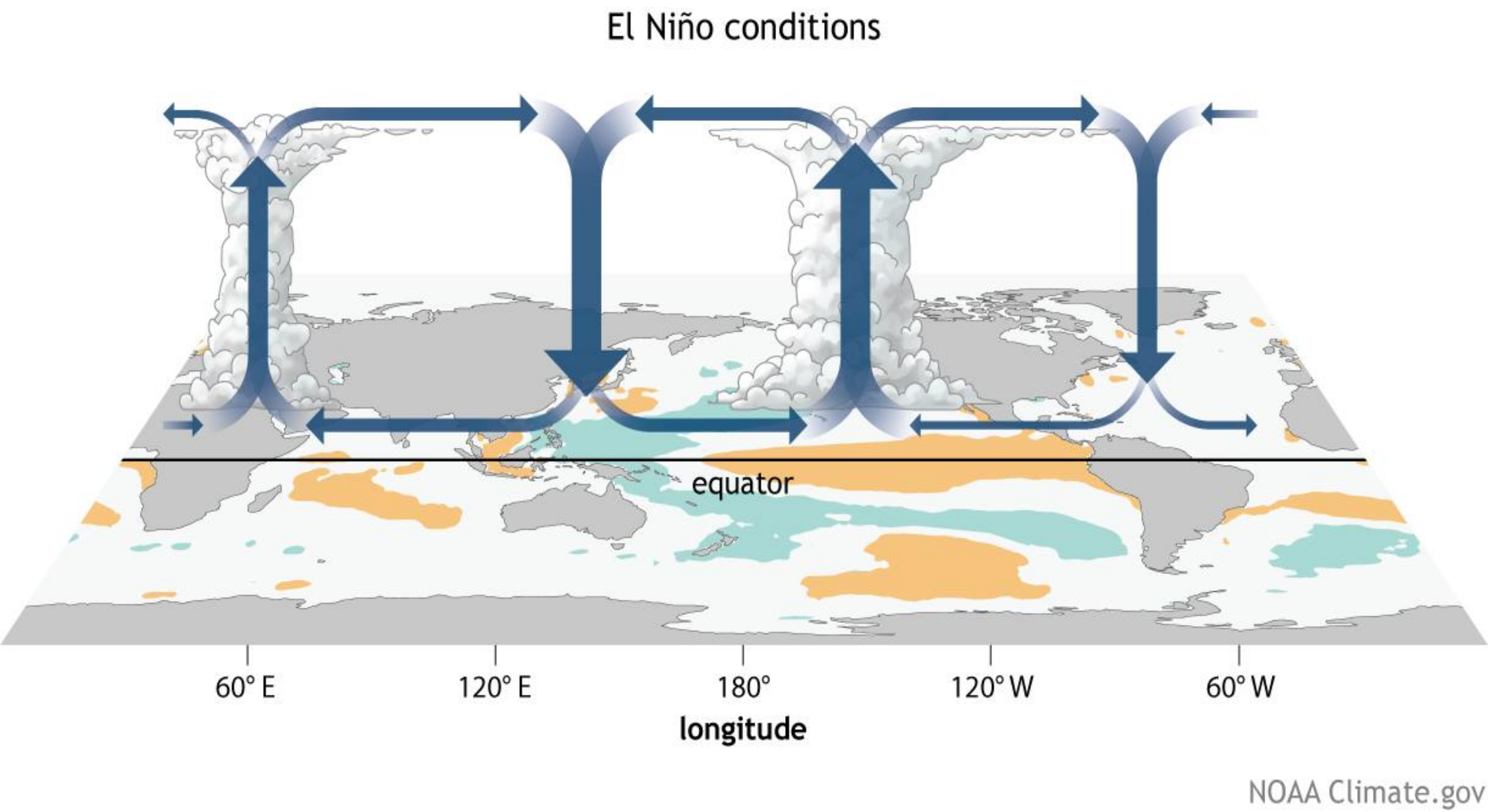
https://bobtisdale.files.wordpress.com/2012/06/animation-3-1.gif

START

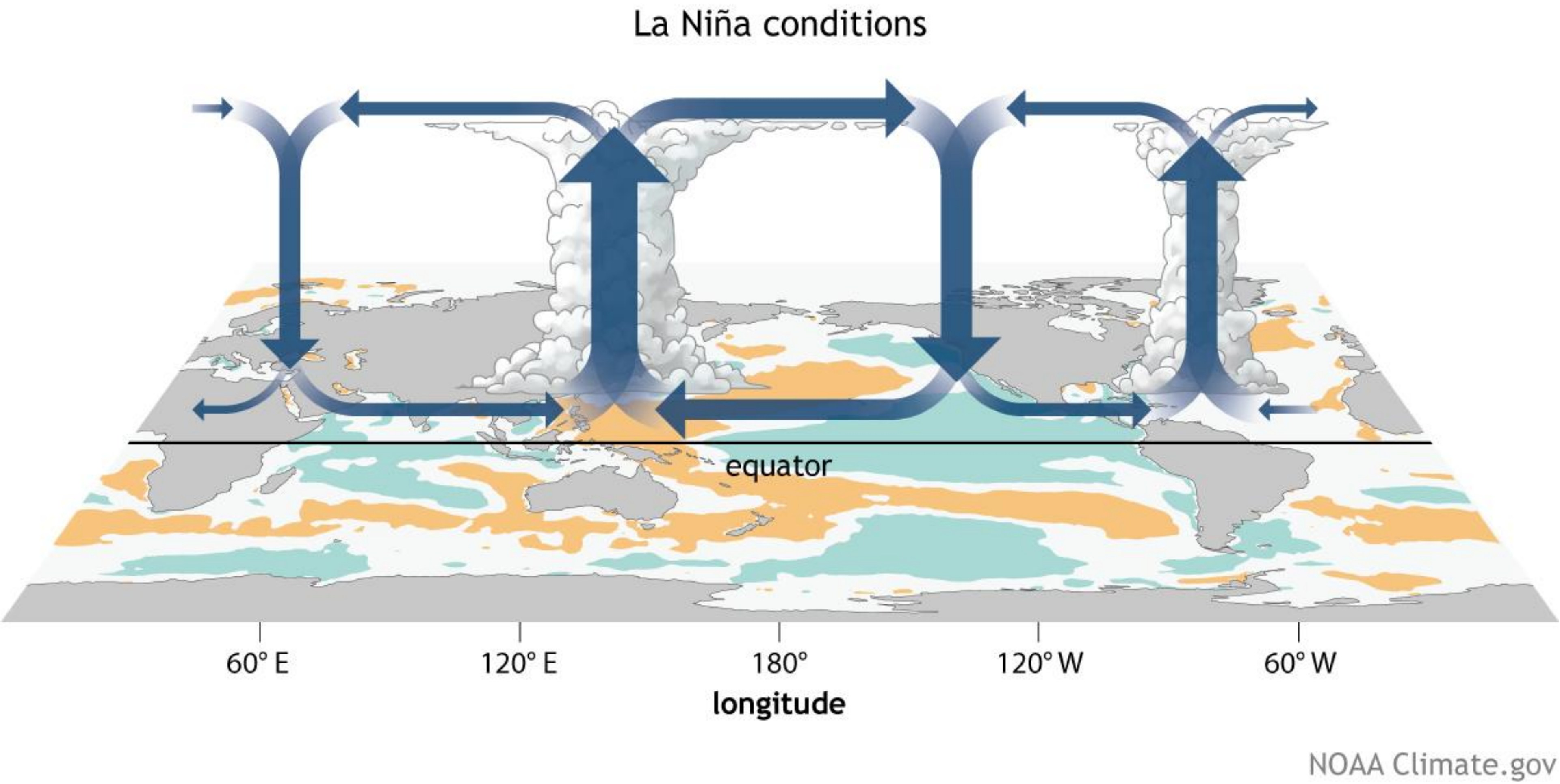
DEC 31 1997



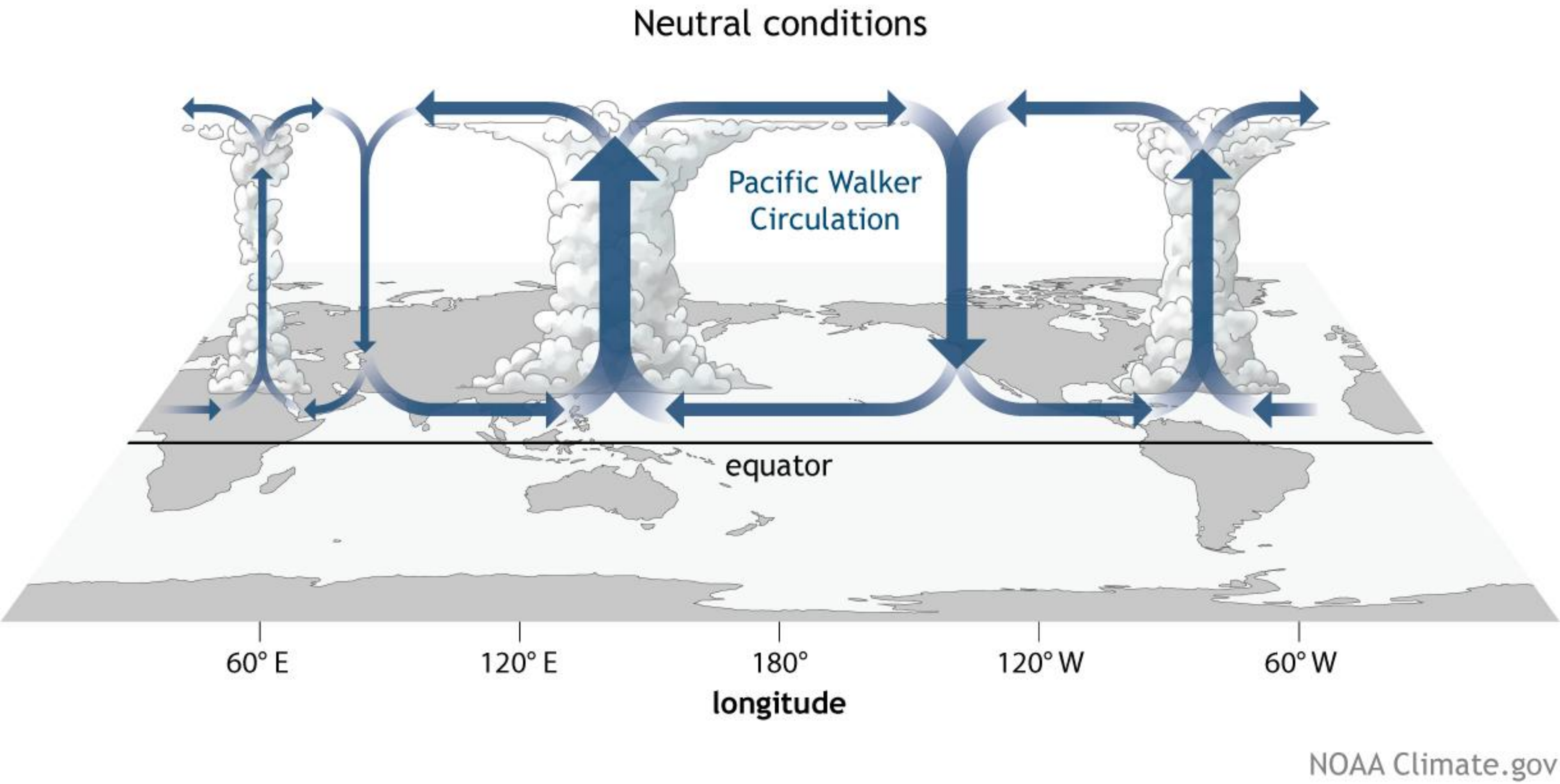
http://www.climate.gov/news-features/blogs/enso/walker-circulation-ensos-atmospheric-buddy



http://www.climate.gov/news-features/blogs/enso/walker-circulation-ensos-atmospheric-buddy



http://www.climate.gov/news-features/blogs/enso/walker-circulation-ensos-atmospheric-buddy



Nino 3.4 region: area bounded from 5N to 5S and from 120W to 160E

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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Home > Climate Monitoring > Equatorial Pacific Sea Surface Temperatures

July Global Release: Thu, 20 Aug 2015, 11:00 AM EDT

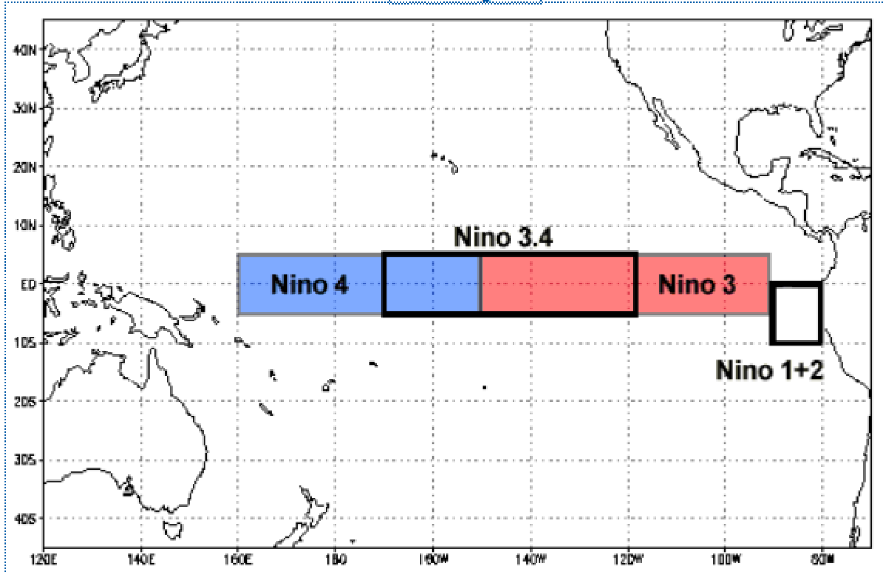
Equatorial Pacific Sea Surface Temperatures

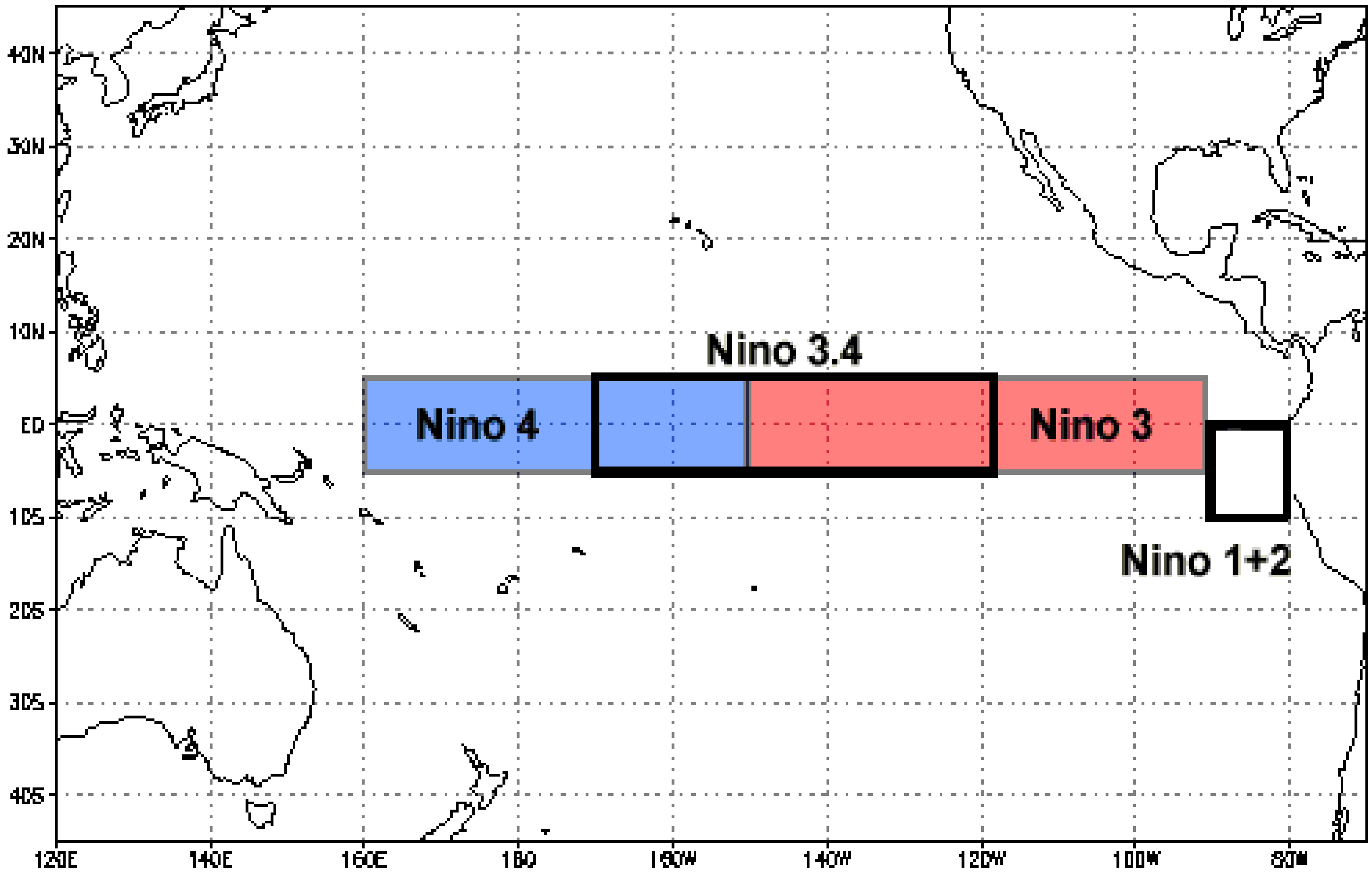
- Climate Monitoring
- State of the Climate
- BAMS State of the Climate
- Temp, Precip, and Drought
- Climate at a Glance
- Extremes
- Societal Impacts
- Snow and Ice
- Teleconnections
- GHCN Monthly
- Monitoring References

ENSO | Zonal Winds | SSTs | Sea Temps | SST Anomalies | OLR | SOI

El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above (below) the threshold of +0.5°C (-0.5°C). This standard of measure is known as the Oceanic Niño Index (ONI).

Niño Regions



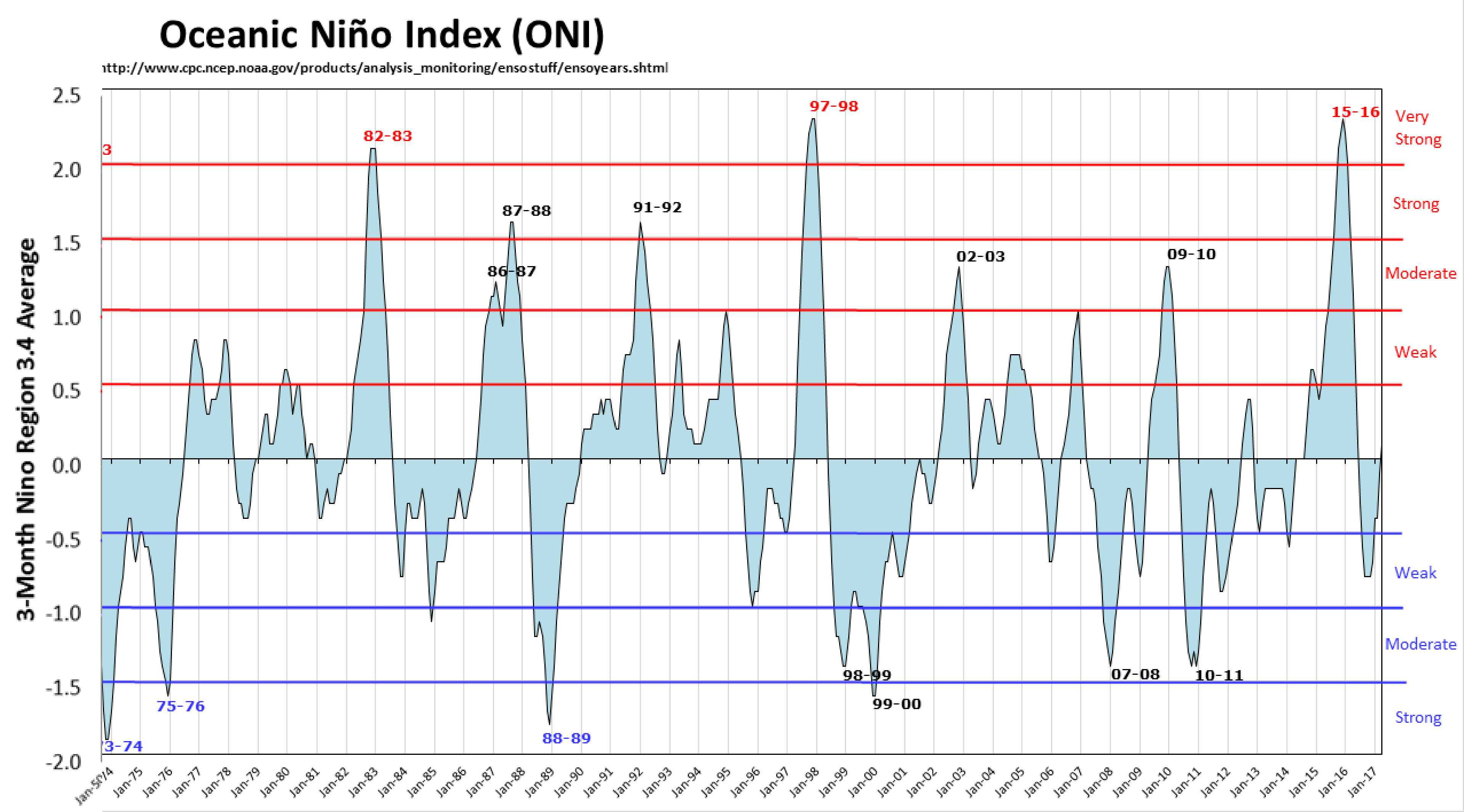


The **Oceanic Nino Index:** (ONI) is one of the primary **indices** used to monitor the El **Nino**-Southern Oscillation (ENSO). The ONI is calculated by averaging sea surface temperature anomalies in an area of the east-central equatorial Pacific **Ocean**, which is called the **Nino 3.4 region** (5S to 5N; 170W to 120W).

http://ggweather.com/enso/oni.htm

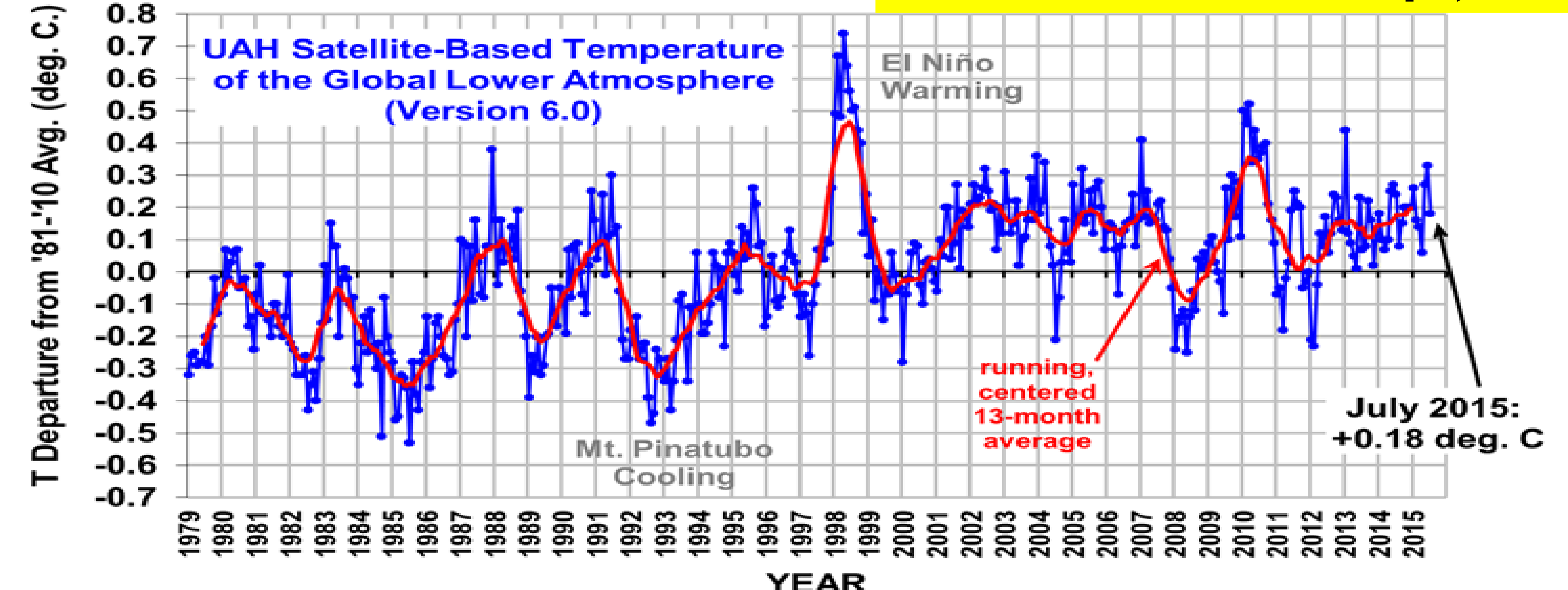
Golden Gate Weather Services, Jan Null, used with permission

Red = Strong El Niño
Blue = Strong La Niña
Black = Moderate (either)

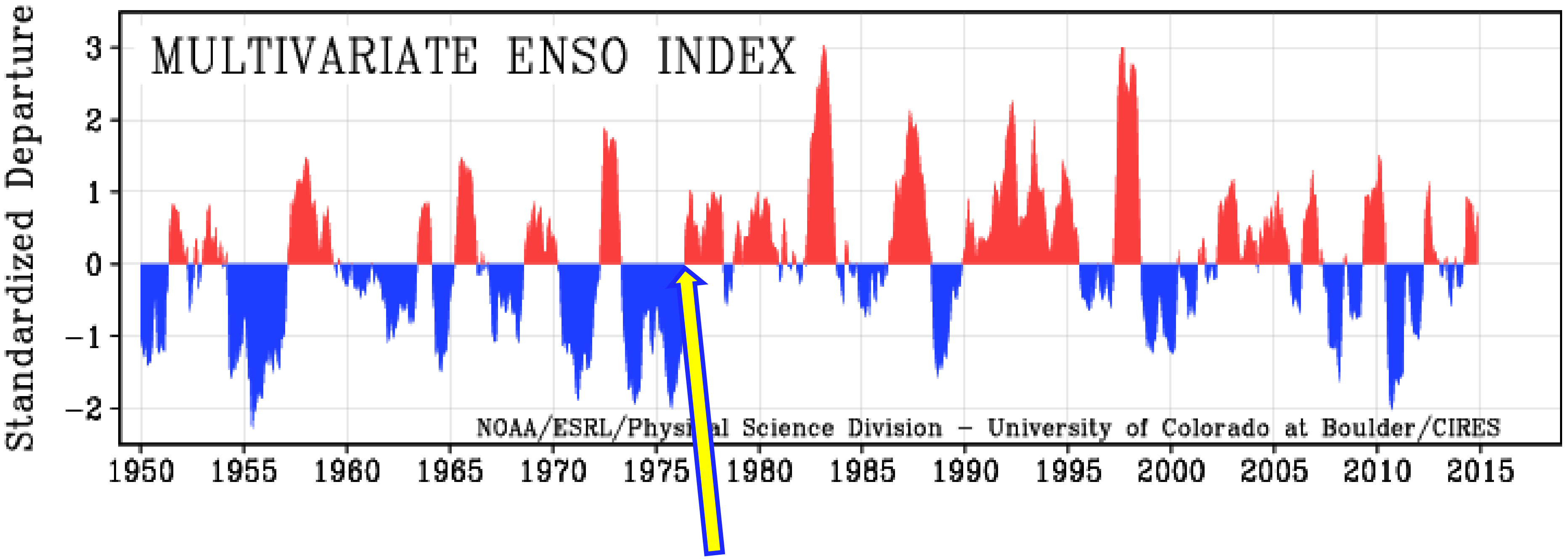


Nino 3.4 Temperatures, Ocean SST

Global Greenhouse Temps, TLT



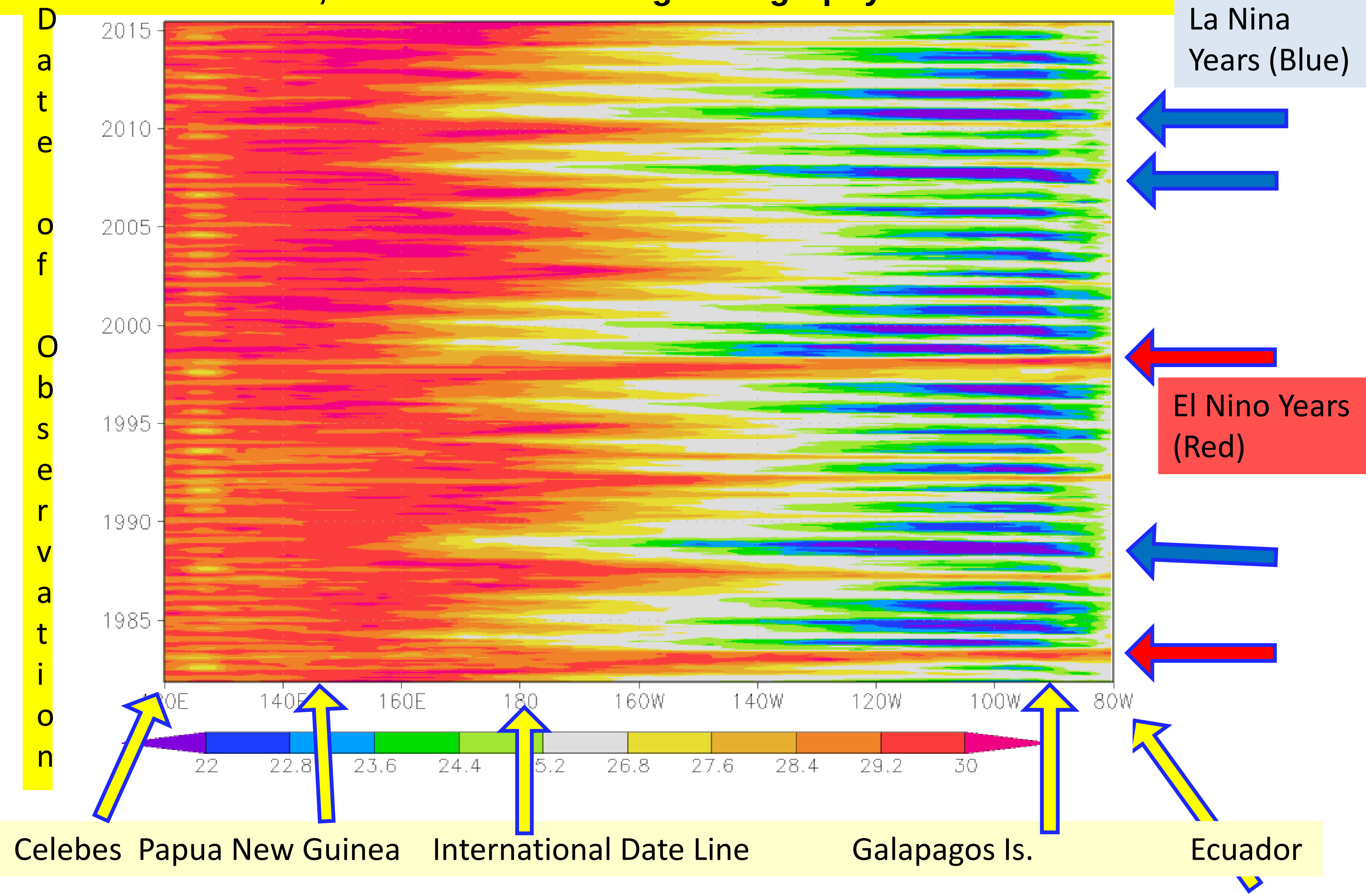
http://www.esrl.noaa.gov/psd/enso/mei/



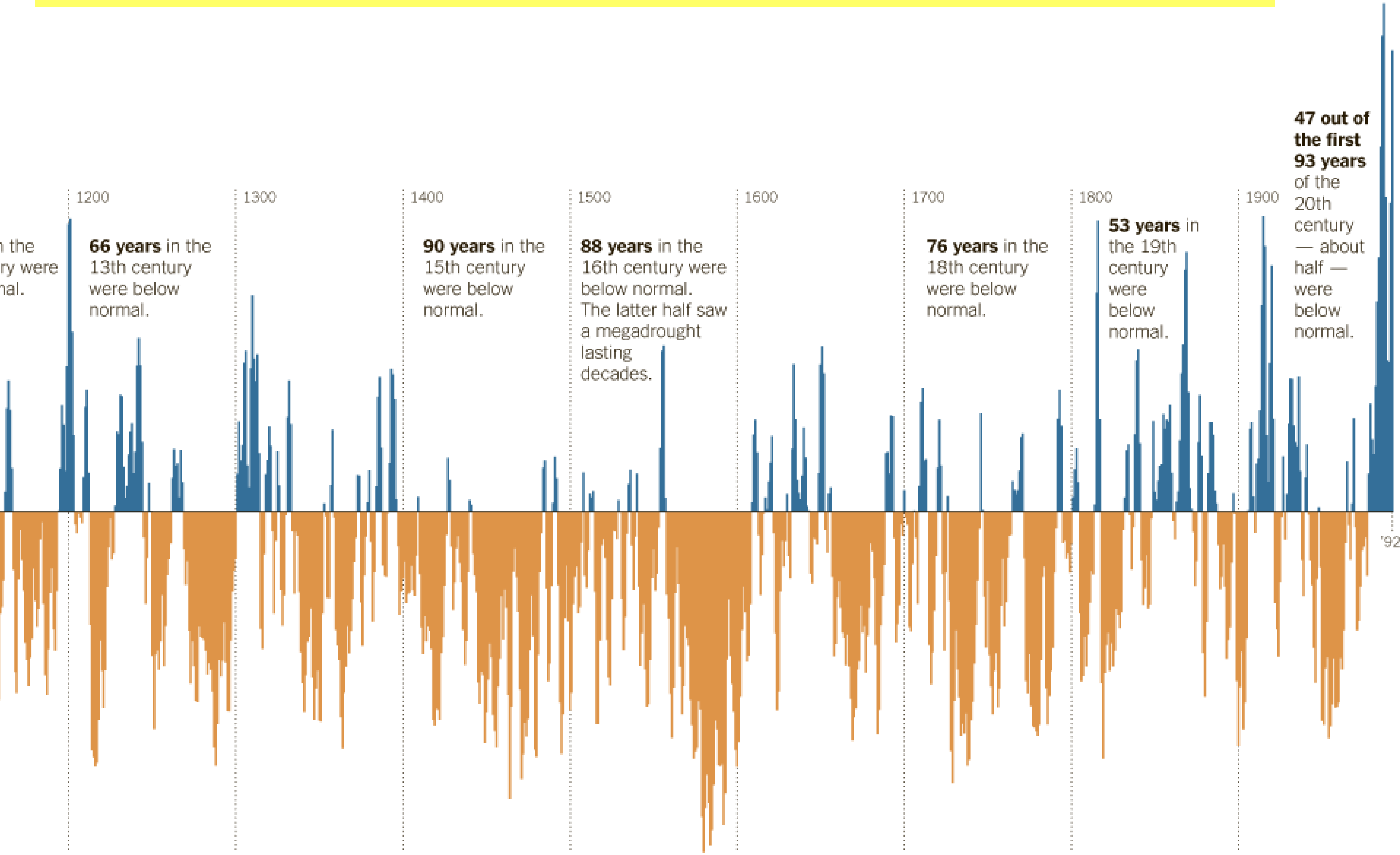
Notice the Great Climatic Shift of 1976, when the number of El Ninos per decade increased dramatically.

Bob Tisdale's Hovemuller diagram. Equator Sea Surface Temperature (Longitude)

SSTs , not anomalies. Rough Geography –Yellow arrows



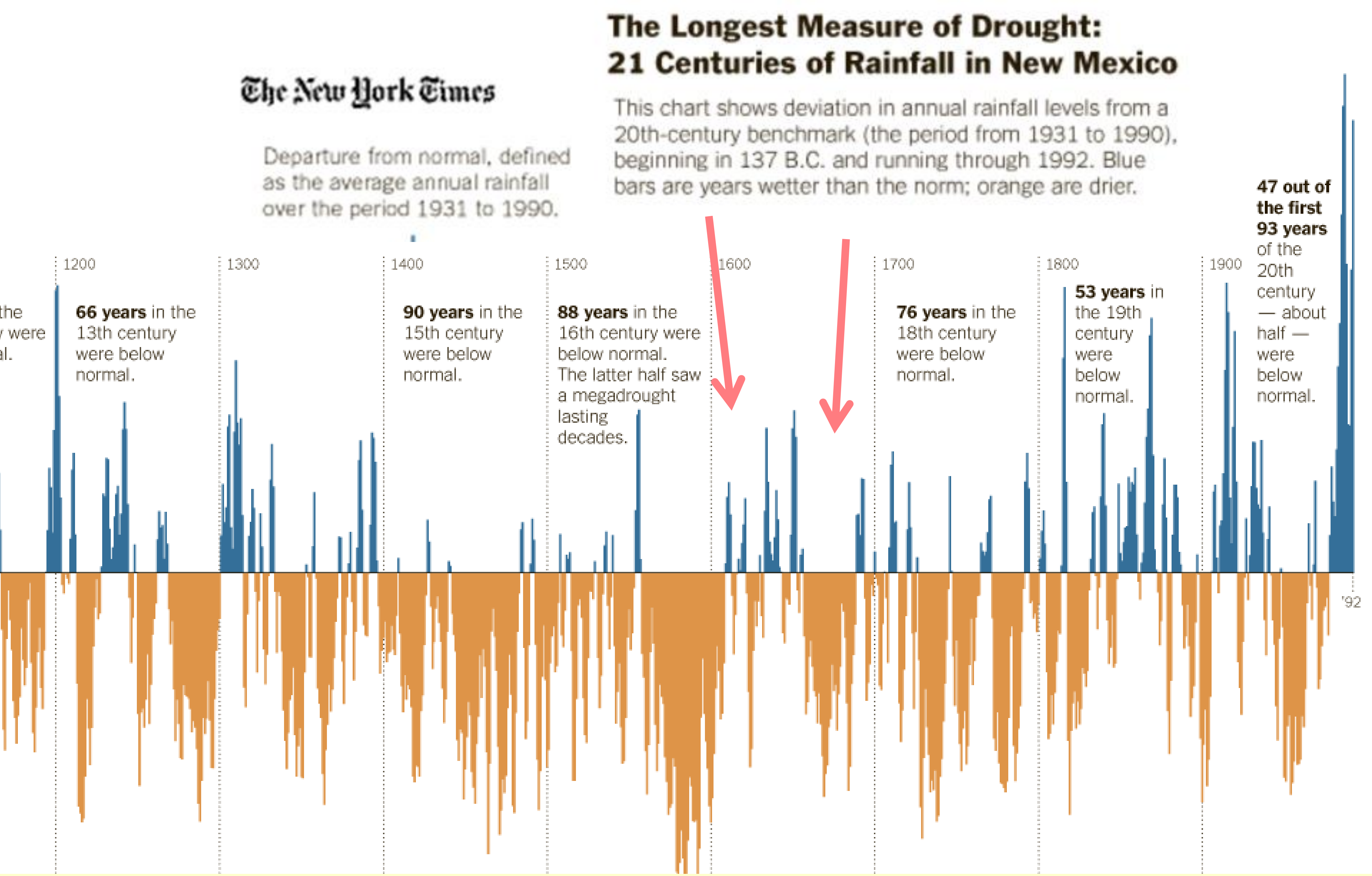
Rainfall and Drought Chart: New York Times, via U of A Tree Ring Laboratory



X-Axis Time: 1200s on LEFT -- present on RIGHT

Y-Axis: Rainfall (Blue, above Axis) Drought (Brown, Below Axis) Axis= 20th Century Avg 1900-1993

http://www.nytimes.com/imagepages/2012/08/12/opinion/sunday/12drought-horizch.html



<u>Late 20th Century was wettest in 2000 years</u>. Abo' Mission, Mountainair: founded 1620 re-roofed,1640, abandoned because of drought ~1675.

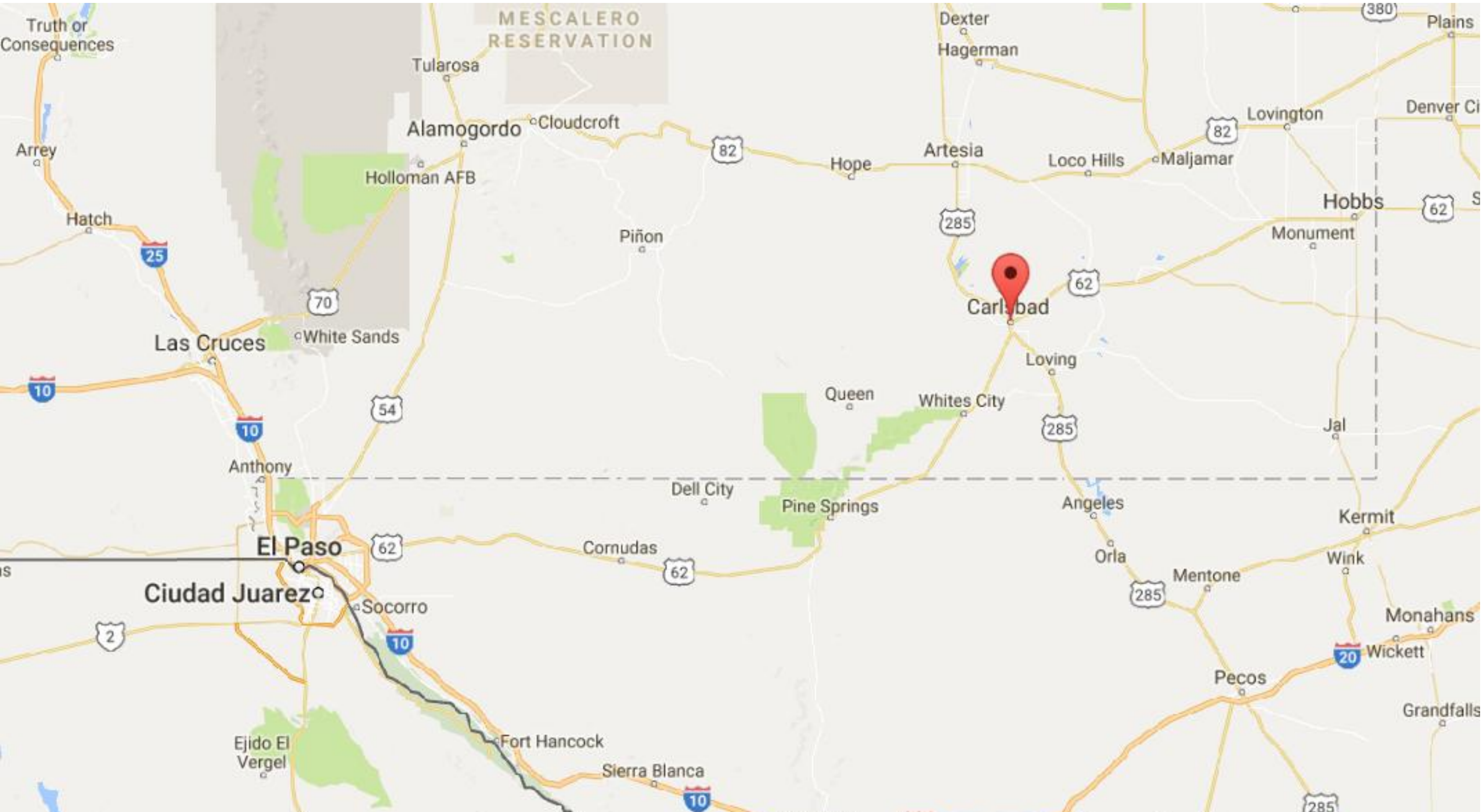
Extremes in precipitation, Carlsbad, New Mexico

1924: with 2.93 inches of Rain

1941: with 33.94 inches of Rain

Think of it: **30 inches difference between wettest and driest years a factor of Ten Times—difference between the two. And, 1941 stands out as the wettest year, by far.**

What about 1941 caused so much rain?



The global climate anomaly 1940–1942

http://onlinelibrary.wiley.com/doi/10.1256/wea.248.04/pdf

Weather – December 2005, Vol. 60, No. 12

Stefan Brönnimann

Institute for Atmospheric and Climate Sciences, ETH, Zürich, Switzerland

In summer 1941, German troops were advancing into the Soviet Union, starting the Eastern Front. In the beginning the troops progressed rapidly, but then an exceptionally harsh winter stopped the assault:

> "1942: The winter comes with full strength, hardly a way left to advance without missing winter equipment. Even the winter clothing is missing. (... midnight the temperature dropp... new reported low point. On 24 January 1942, −56°C was measured at our division observation post." (from the diary of Otto Geipel (Geipel 1997), see also Fig. 1).

"Strong, Long-Lasting El Nino"

RMetS
Royal Meteorological Society

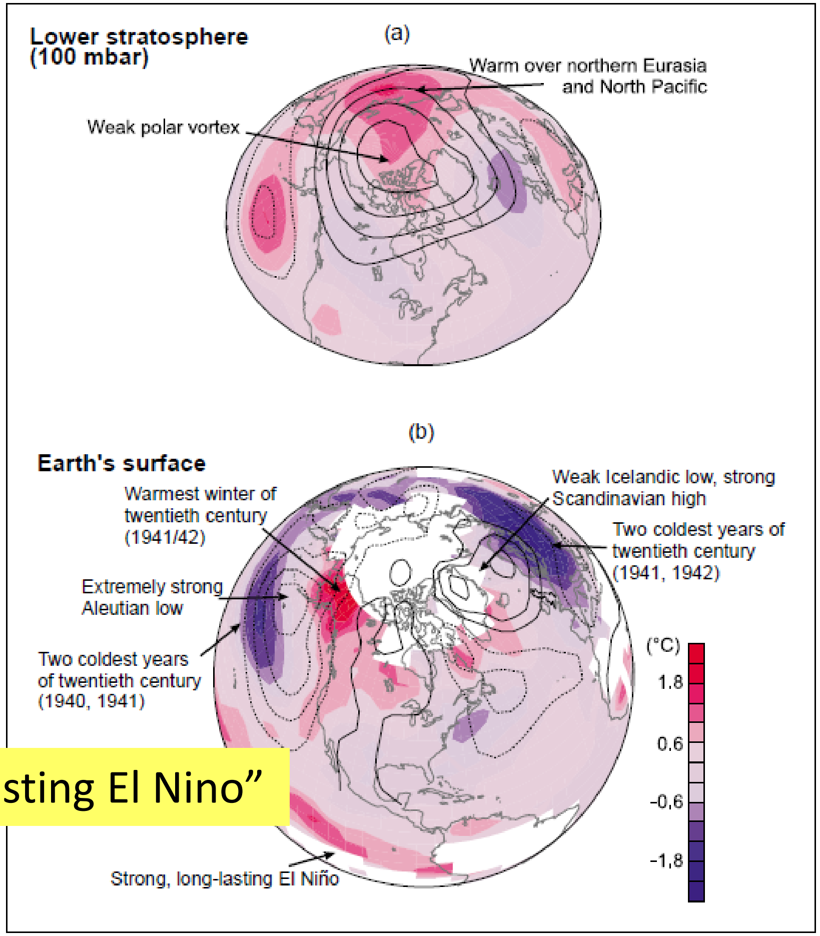
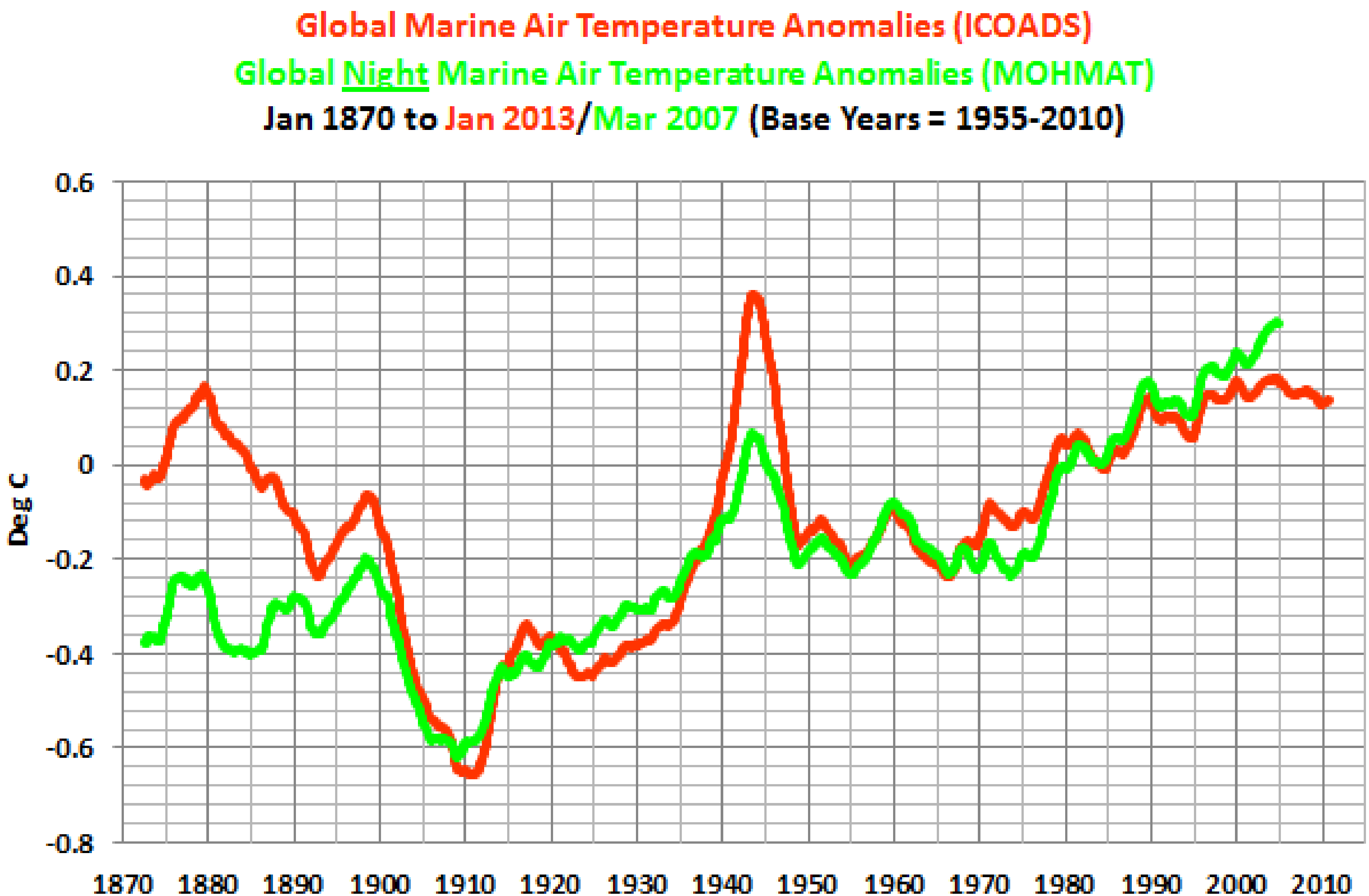


Fig. 7 Averaged anomaly fields (with respect to 1961–1990) from January 1940 to February 1942 of (a) temperature and geopotential height (contours, interval 20 gpm, zero contour not shown) at 100 mbar and (b) surface temperature (HadCRUT2v, Jones and Moberg 2003) and SLP (contours, interval 1 mbar, zero contour not shown, Trenberth and Paolino 1980).

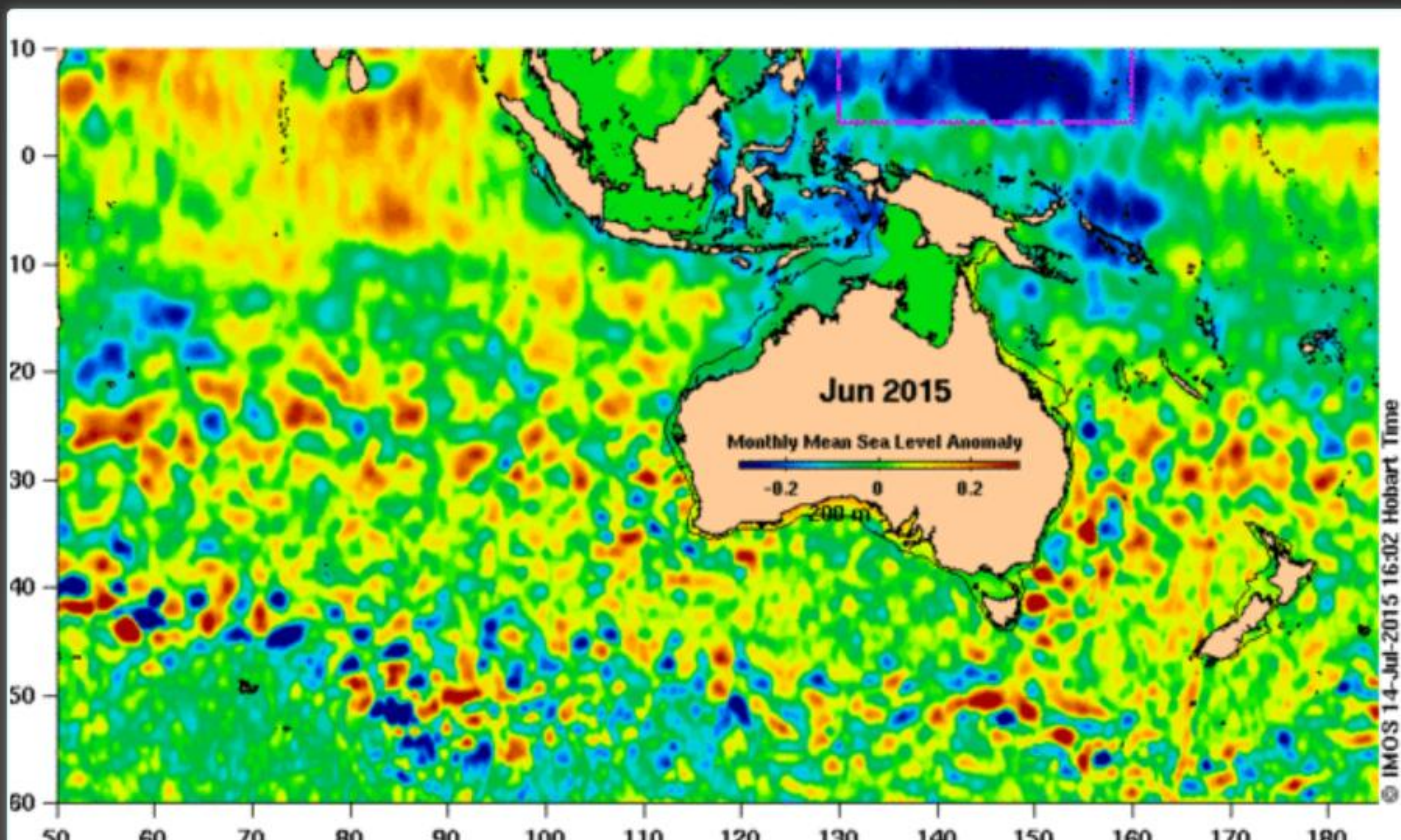
https://bobtisdale.files.wordpress.com/2013/05/figure-16.png



http://www.aviso.altimetry.fr/en/news/idm/2015/jul-2015-el-ninos-return-west-side-story.html

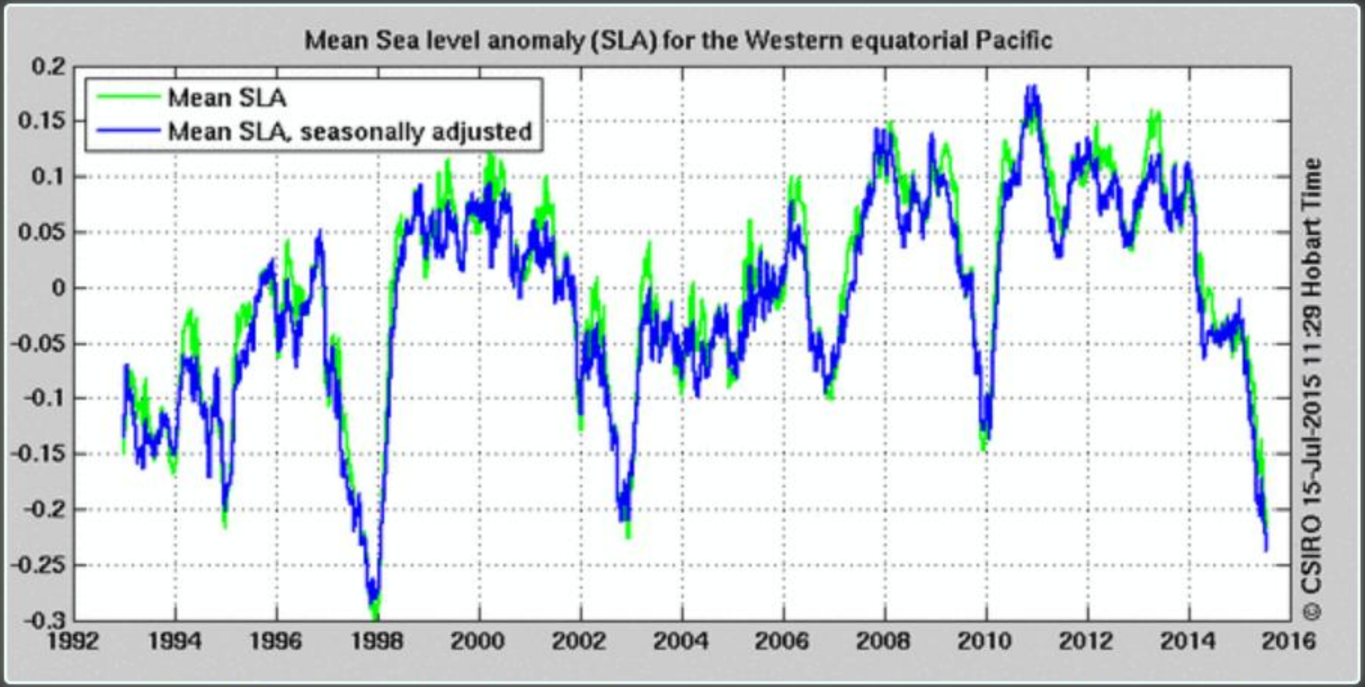
EL NIÑO'S RETURN, WEST SIDE STORY

Image of the Month - July 2015



http://www.bom.gov.au/climate/enso/

http://www.aviso.altimetry.fr/en/news/idm/2015/jul-2015-el-ninos-return-west-side-story.html



June monthly Mean Sea Level Anomaly around Australia (top), and the spatial mean SLA of the region (boxed in map) North of New Guinea (bottom) (Credits IMOS/CSIRO)

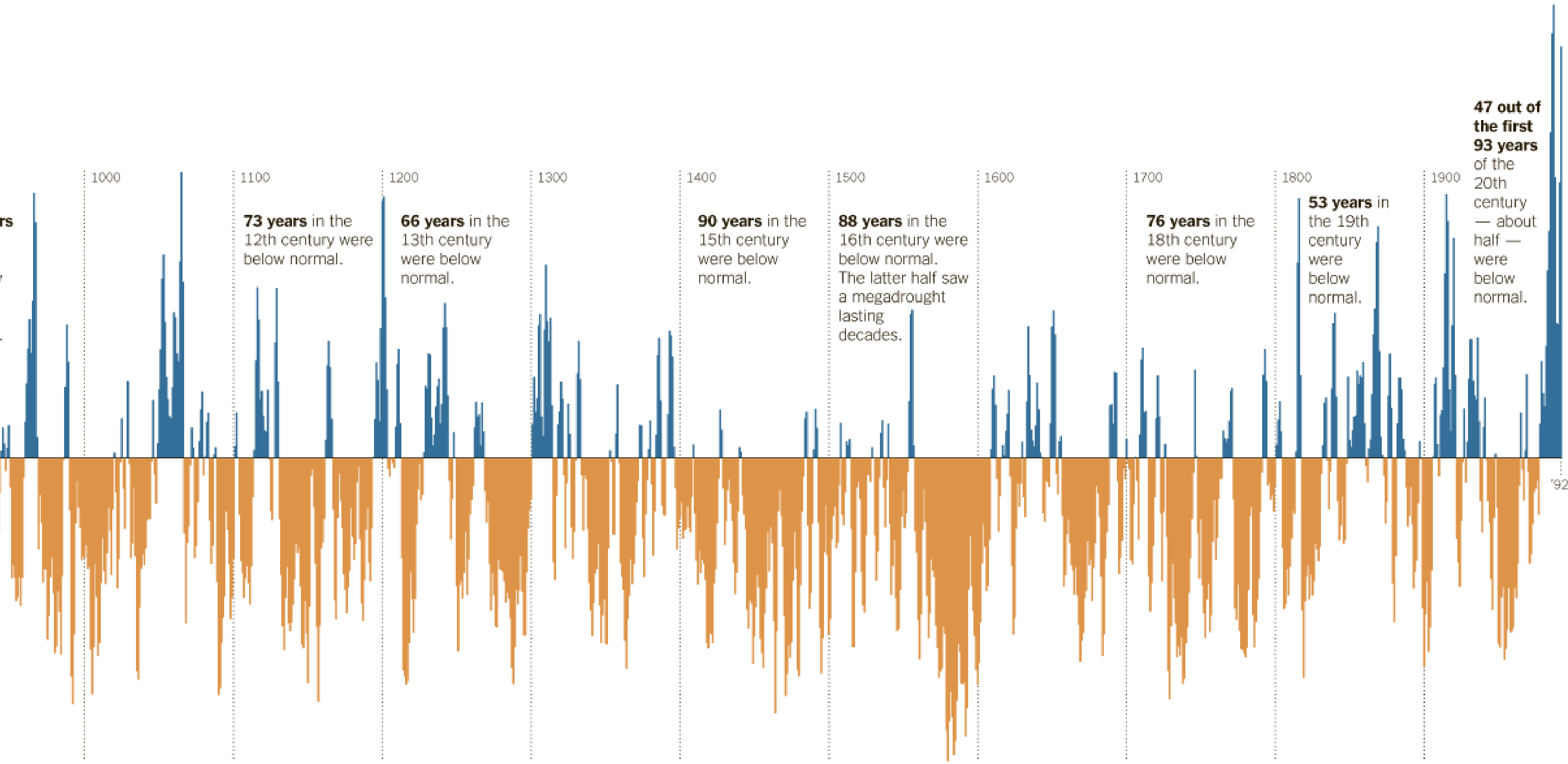
El *Niño*'s name comes from South America. However, this phenomenon impacts the whole Pacific, the Western part no less than the Eastern, though in opposite ways. While on the Peruvian coasts El *Niño* means heavy rainfalls, higher-than-usual sea levels and temperatures, along the Australian, Papuan and Indonesian coasts it means drought and lower sea levels and temperatures. This being as much a problem as the reverse. In 1997 in particular, a lot of forest fires devastated Indonesia.

http://www.bloomberg.com/news/articles/2015-08-12/worst-el-nino-in-30-years-pounds-south-american-economies-polls

El Niño Is Coming Back: Here's What You Need to Know

http://www.nytimes.com/imagepages/2012/08/12/opinion/sunday/12drought-horizch.html

El Nino/ENSO helps explain dramatic changes from Wet to Dry in New Mexico



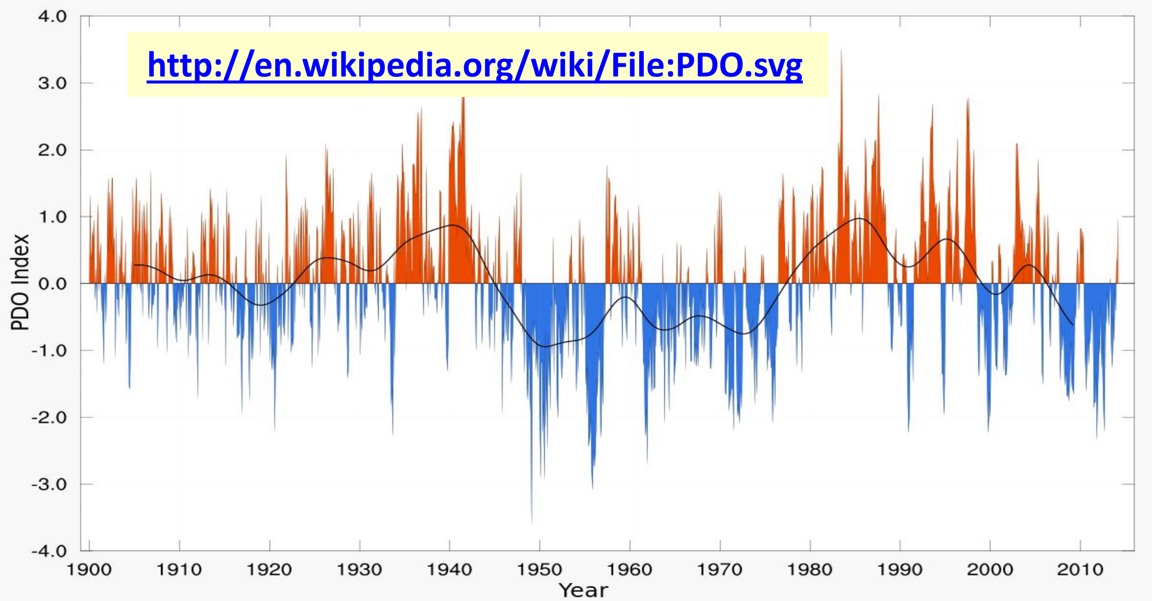
Pacific Decadal Oscillation

Natural change in offshore

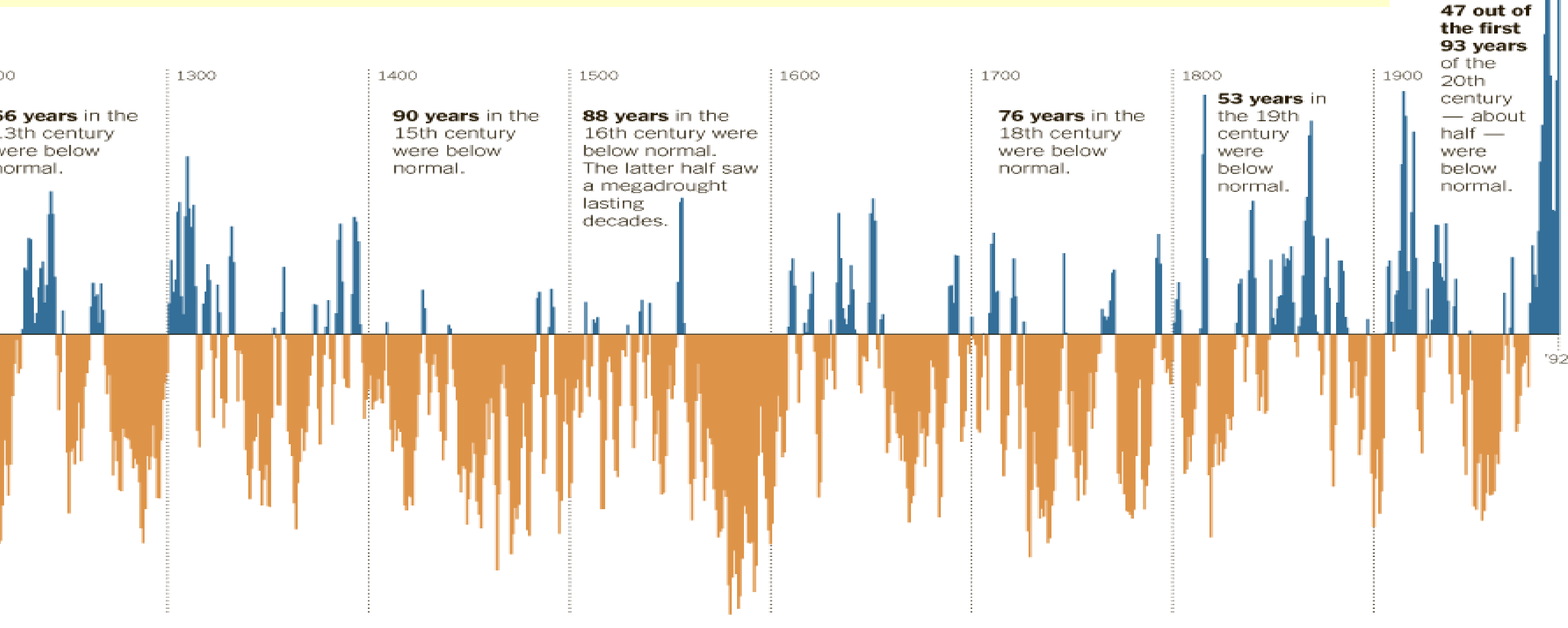
Water Temperature Pattern

Off North America

http://en.wikipedia.org/wiki/File:PDO.svg



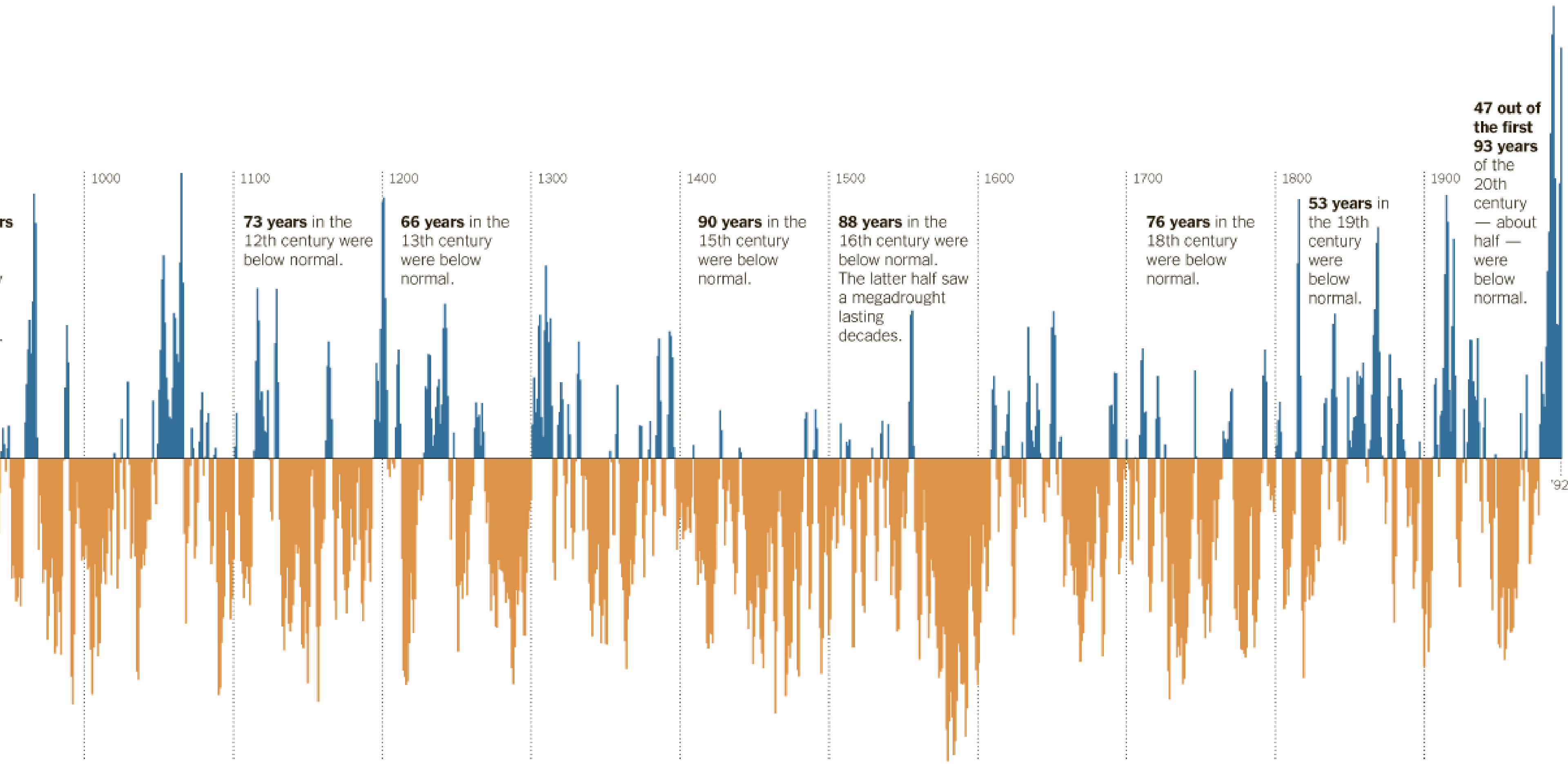
http://www.nytimes.com/imagepages/2012/08/12/opinion/sunday/12drought-horizch.html



http://www.nytimes.com/imagepages/2012/08/12/opinion/sunday/12drought-horizch.html

El Nino/ENSO helps explain dramatic changes from Wet to Dry in New Mexico

60-year Pacific Decadal Oscillation helps explain Rainfall and Drought in NM



http://www.wrh.noaa.gov/twc/monsoon/monsoon_variability.php

Climate Change and the Monsoon

A question of concern is how the North American Monsoon will be altered in the future as a result of climate change. Global warming projections are given by numerical computer models, such as those documented by the Intergovernmental Panel on Climate Change. Unfortunately the IPCC models poorly represent the North American Monsoon in the Southwest. Hence this question does not have an accurate answer at this time.

Here we have a presumably mid-level professional employee of the NWS, trying to provide good technical information on a complex subject, the variability of the North American Monsoon of the southwestern USA, and this employee blurts out the truth:

The Intergovernmental Panel on Climate Change, or IPCC, models “poorly represent the North American Monsoon in the Southwest.”

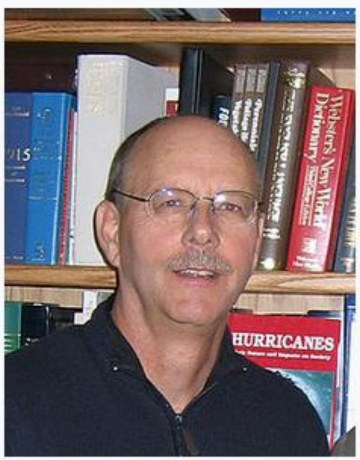
Who else has noticed that the IPCC models do poorly?

Climate Science: Roger Pielke Sr.

HOME MAIN CONCLUSIONS MESSAGE FROM R.A. PIELKE SR.

Pielke Research Group: News and Commentary

Roger A. Pielke Sr.



Born	October 22, 1946 (age 70) United States
Fields	Meteorology, Climatology, Earth System Science
Institutions	University of Colorado Boulder, Colorado State University, Duke University, University of Virginia, NOAA Experimental Meteorology Lab
Alma mater	Towson State College (B.A., 1968), Pennsylvania State University (M.S., 1969; Ph.D., 1973)

Climate Science: Roger Pielke Sr.

Pielke Research Group: News and Commentary

BY RPIELKE | OCTOBER 9, 2012 · 7:00 AM

Quotes From Peer Reviewed Paper That Document That Skillful Multi-Decadal Regional Climate Predictions Do Not Yet Exist

The Huge Waste Of Research Money In Providing Multi-Decadal Climate Projections For The New IPCC Report

there is an enormous amount of money being spent to provide multi-decadal regional climate forecasts to the impacts communities. In this post, I select just a few quotes from peer reviewed papers to document that the climate models do not have this skill. There are more detailed on this post also (e.g. see).

As the first example, from

Dawson A., T. N. Palmer and S. Corti: 2012: Simulating Regime Structures in Weather and Climate Prediction Models. Geophyscial Research Letters. doi:10.1029/2012GL053284 In press.

> We have shown that a low resolution atmospheric model, with horizontal resolution typical of CMIP5 models, is not capable of simulating the statistically significant regimes seen in reanalysis, …….It is therefore likely that the embedded regional model may represent an unrealistic realization of regional climate and variability.

Other examples, include

Taylor et al, 2012: Afternoon rain more likely over drier soils. Nature. doi:10.1038/nature11377. Received 19 March 2012 Accepted 29 June 2012 Published online 12 September 2012

> "…the erroneous sensitivity of convection schemes demonstrated here is likely to contribute to a tendency for large-scale models to `lock-in' dry conditions, extending droughts unrealistically, and potentially exaggerating the role of soil moisture feedbacks in the climate system."

Driscoll, S., A. Bozzo, L. J. Gray, A. Robock, and G. Stenchikov (2012), Coupled Model Intercomparison Project 5 (CMIP5) simulations of climate following volcanic eruptions, J. Geophys. Res., 117, D17105, doi:10.1029/2012JD017607. published 6 September 2012.

> The study confirms previous similar evaluations and raises concern for the ability of current climate models to simulate the response of a major mode of global circulation variability to external forcings.

Fyfe, J. C., W. J. Merryfield, V. Kharin, G. J. Boer, W.-S. Lee, and K. von Salzen (2011), Skillful predictions of decadal trends in global mean surface temperature, Geophys. Res. Lett.,38, L22801, doi:10.1029/2011GL049508

> ".…for longer term decadal hindcasts a linear trend correction may be required if the model does not reproduce long-term trends. For this reason, we correct for systematic long-term trend biases."

Xu, Zhongfeng and Zong-Liang Yang, 2012: An improved dynamical downscaling method with GCM bias corrections and its validation with 30 years of climate simulations. Journal of Climate 2012 doi: http://dx.doi.org/10.1175/JCLI-D-12-00005.1

> "…the traditional dynamic downscaling (TDD) [i.e. without tuning) overestimates precipitation by 0.5-1.5 mm d-1…..The 2-year return level of summer daily maximum temperature simulated by the TDD is underestimated by 2-6°C over the central United States-Canada region."