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BROWNING

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A BROWNING MEDIA PUBLICATION

It's BA-A-A-A-CK!

IN THIS ISSUE

- Currently, there are unofficial El Niño conditions and enough warm water to carry the weather patterns produced by these conditions into North and South America. Expect these conditions to linger into March, with a 65% chance of lasting until May.
- In North America, this, combined with the unusually cool Arctic air mass should create a cool winter in Central and Eastern North America and a warm winter in the West that will bring needed rain to California and the Southwest as well as the southern tier of states.
- The most dramatic impact of El Niño conditions is on the tropics, particularly Southeast Asia and South America. In Southeast Asia, Indonesia usually has drought although the warm Pacific should ameliorate the severity. The tropical regions of South and Central America have drought, hurting sugarcane, coffee and cocoa.
- Europe usually has a cold winter and a large Icelandic eruption is making this more likely.
- In the Southern Hemisphere, Australia faces dry conditions, but the grain growing areas of Brazil and Argentina, as well as the drought stricken area around Sao Paulo, normally have good rainfall.

CONTENTS

SUMMARY

El Niño conditions are back and should linger through winter. There is a 60 – 65% chance this will evolve into an El Niño event that will shape springtime weather. This, combined with the unusually cool Arctic air mass should create a cool winter in Central and Eastern North America and a warm winter in the West that will bring needed rain to California and the Southwest.

The peek-a-boo El Niño conditions of 2014 are back!

The best way to describe this year's El Niño conditions is "Now you see them and now you don't." This has been very frustrating for scientists. Just when they see an El Niño developing, it disappears. The waters in the Tropical Pacific cool and conditions become neutral. (Some scientists call this La Nada which is Spanish for "the nothing").

So what does this mean? Will these conditions fade, just as the El Niño conditions of May did? If they linger, how does it affect global weather? Will there be a predictable economic impact?

The Return

Currently, the average for the whole of the Central and Eastern Tropical Pacific is more than 0.5°C (0.9°F) warmer than average. At the same time, most of the Northern Pacific, particularly the areas off the West Coast, is warm. This means that there are unofficial El Niño conditions and enough warm water to carry the weather patterns produced by these conditions into North America. Sometimes official definitions blur analysis – the El Niño style weather will arrive before the official recognition of the conditions.

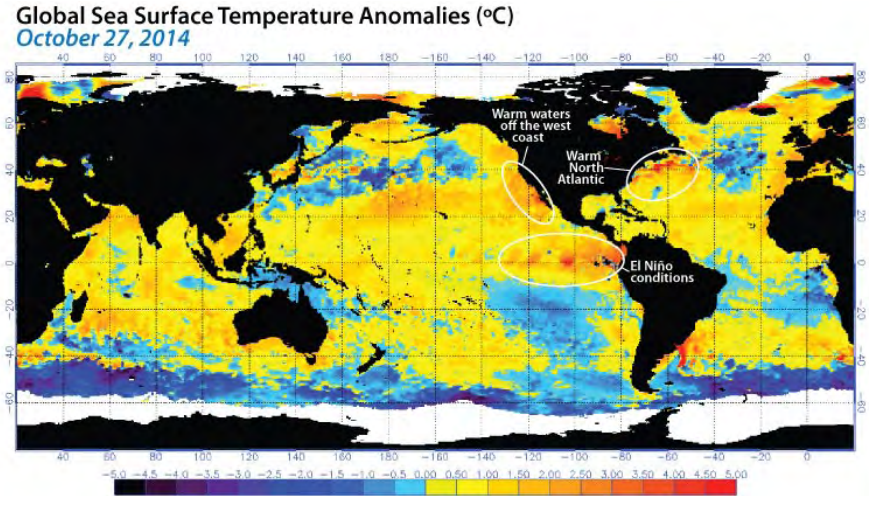

fig. 1 **El Niño conditions have unofficially returned and ocean temperatures will magnify the impact of these conditions.**
http://www.ospo.noaa.gov/data/sst/anomaly/2014/anomnight.10.27.2014.gif

This newsletter contains articles, observations and facts to support our contention that humanity is significantly influenced by changing climate.

Our calculations show the climate, over the next term, will cause dramatic changes in our social and economic patterns. We feel that readers, attuned to the changes that are occurring, may develop a competitive edge; and, by understanding their current and future environment, can use the momentum of change to their advantage.

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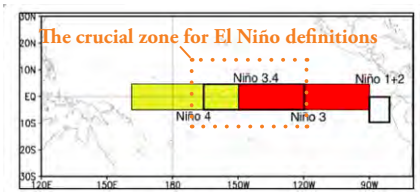


figs. 2A-B **Scientists give a 60 – 65% chance of the temperatures in El Niño 3-4 remaining warm for 7 consecutive months.** *two images: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf*

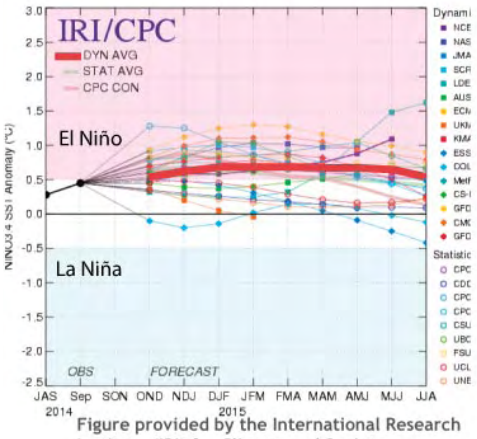


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 16 October 2014).

As noted in previous issues of the *Browning Newsletter,* these warm waters will not officially be declared El Niño conditions, because there are very precise scientific definitions of what an El Niño is. Officially:

EL NINO CONDITIONS – Waters in the Tropical Pacific zone El Niño 3,4 must be 0.5°C (0.9°F) warmer than average for 3 consecutive months (one season).

EL NINO EVENT – Waters in the Tropical Pacific zone El Niño 3.4 must be 0.5°C (0.9°F) warmer than average for 7 consecutive month (five seasons).

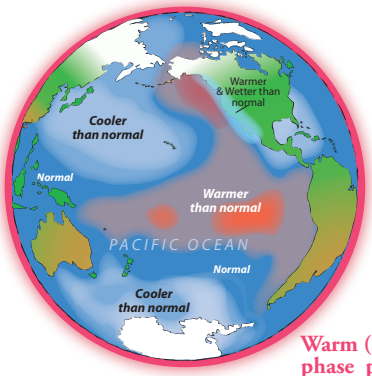
This definition is quite narrow. The El Niño 3.4 area is currently 0.5°C warmer than average and the rest of the region is hotter than that. However, even though the temperatures meet the definition of El Niño, they have to continue longer for people to receive an official warning. The current conditions will have to last until early December for the scientific community to declare El Niño conditions. They will have to last until mid-to-late spring 2015 for it to be declared an El Niño event. Meanwhile, they will be creating El Niño weather before the official declarations are issued.

The unofficial conditions have lasted 2 weeks and experts have said that there is a 60 – 65% chance they will linger 7 months, shaping global weather throughout winter and spring.

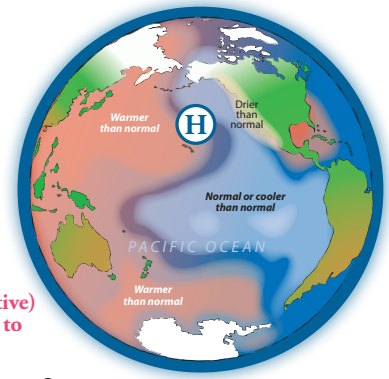
As previous issues of the B*rowning Newsletter* have noted – the large-scale pattern for the Pacific, the 50 – 60 year long Pacific Decadal Oscillation is trending negative. This means the trend is for the tropical and eastern Pacific to be cool. This conflicts with the El Niño, which heats the tropical and eastern Pacific. History shows us that the El Niño is dominant – that is, when it is present it makes the PDO temporarily positive. However, since this warmth is fighting the long-term cooling trend. El Niños tend to be weaker and not last as long.

For this reason, we have seen weaker El Niños since the PDO began to trend negative in 1999 and tipped to being predominantly negative in 2006. We have seen in 2012 and this summer, for example, El Niño conditions start and not last long enough to be an official event.

What this seems to mean, is that we will have El Niño conditions shape this winter. There is, officially, a 60 – 65% chance that these conditions will last through spring. Here at the Newsletter, we feel there is an 80% chance it will shape early and middle springtime weather. Because the El Niño is battling a cooling trend in the Pacific, the El Niño conditions should be weak to moderate, not strong.



Warm (Positive) phase prior to 1999



Cool (Negative)phase 2006-present

© Evelyn Browning Garriss

figs. 4A-B **The long-term trend for the Pacific since 2006 is a Negative Pacific Decadal Oscillation** *(right)*, **but this year's evolving El Niños have temporarily made the PDO positive** *(above)*.

The Global Impact of El Niño Conditions November Through March

The Pacific is 30% of the global surface and when an El Niño develops, it heats up an area that is almost 10% of the Earth's surface. The warmer waters heat the overhead air mass, which alters air pressure. Air pressure shapes wind strength and direction. An El Niño alters wind patterns which shifts weather patterns. While the entire globe is affected, the major impact tends to be focused on the tropical latitudes and the Pacific Rim.

The second article in this issue will focus on the impact this should have for the planting and growing seasons of the Southern Hemisphere. This article will examine the impact of the event in the tropics and Northern Hemisphere.

Historically the nations most affected by the El Niño have been tropical regions from India, through Southeast Asia to the west coast and northern nations of South America. While these nations can show altered temperatures, what is critical is precipitation. Changes in precipitation can have a dramatic impact on agriculture. These regions, especially in Asia, have dense populations and changes in food production and prices can create unrest. For many of these areas, El Niños mean floods or drought.

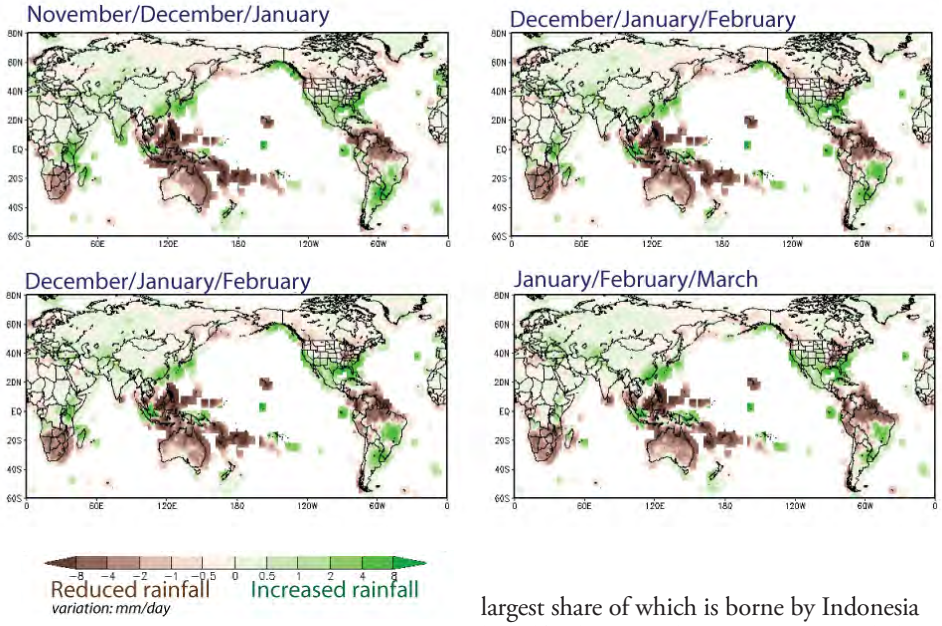


fig. 4A-D **Typical evolution of global precipitation during a winter to mid-spring El Niño.**
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ENSO/regressions/geplr.shtml

The most dramatically affected area is Southeast Asia, from the Philippines to Indonesia and New Guinea to Malaysia. As warm water is shifted east, this area is left surrounded by cooler water and cooler, drier air. For areas like Indonesia, which grow three rice crops a year, this can be disastrous. Often both Indonesia and the Philippines have problems with rice production. The problems can extend to palm oil as well, although parts of Sumatra and Malaysia usually escape the worst of the drought.

Frequently, El Niño droughts combine with Indonesia's slash and burn agricultural practices and create massive wildfires with the smog spreading to neighboring countries. In the 1998 El Niño, for example, the wildfires burned an estimated 25 million acres (10 million hectares) of land. They released between 0.81 and 2.57 gigatons of CO2 into the atmosphere, as much as 40% of the annual carbon dioxide emissions from burning fossil fuels. The total economic value of the damages are conservatively estimated to be US$ 4.47 billion, by far the largest share of which is borne by Indonesia herself. The United Nations estimated the smog damaged the health of at least 20 million people.

Southeast Asia has already been battling haze since September. and is very concerned that the upcoming El Niño will make it much worse. The one relief that the area can expect is that the Indian Ocean is warming. This warmth will modify the cold waters from the Pacific and reduce the severity of El Niño's cooling, particularly for the western portions of Indonesia and Southeast Asia. These areas can expect dry weather but not severe drought.

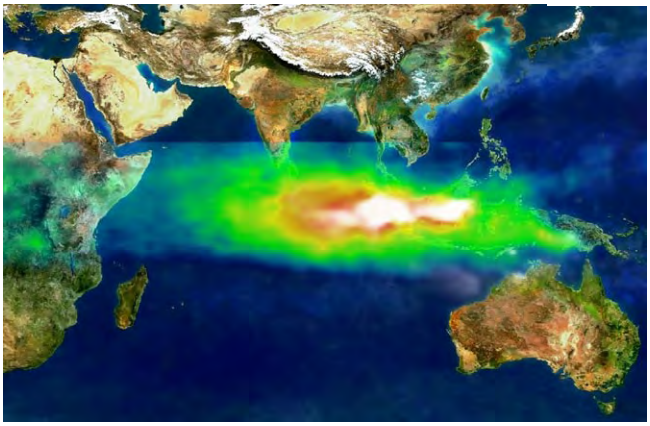


fig. 5 **The 1997 Indonesian Haze** *source: NASA*

Across the Pacific, South America is equally affected. However, the impact is harder to study. The warm waters off the west coast of the continent concentrates heavy rains along the narrow coastline and less of the moisture is carried up into the mountains and through the northern portions of the continent and portions of Central America. The impact is particularly severe in Columbia, Northern Brazil and parts of the Amazon jungle. From an agricultural point of view, this affects sugar, cocoa and coffee productions as well as some of the newer grain production regions.

A third tropical region heavily influenced by El Niños is India. South Asia depends on monsoons which are strengthened and weakened by the difference in temperatures on the land and in the ocean. The slight temperature changes produced by El Niños can weaken or strengthen monsoons. In the case of India, the effect is usually to weaken the monsoon. This means a drier wet season and a wetter dry season. In fall and early winter, the El Niño usually produces wetter weather for the subcontinent. As winter continues, drier weather begins to affect Sri Lanka and moving north towards springtime. This is good news for second season crops, but we do see some problems with tea production.

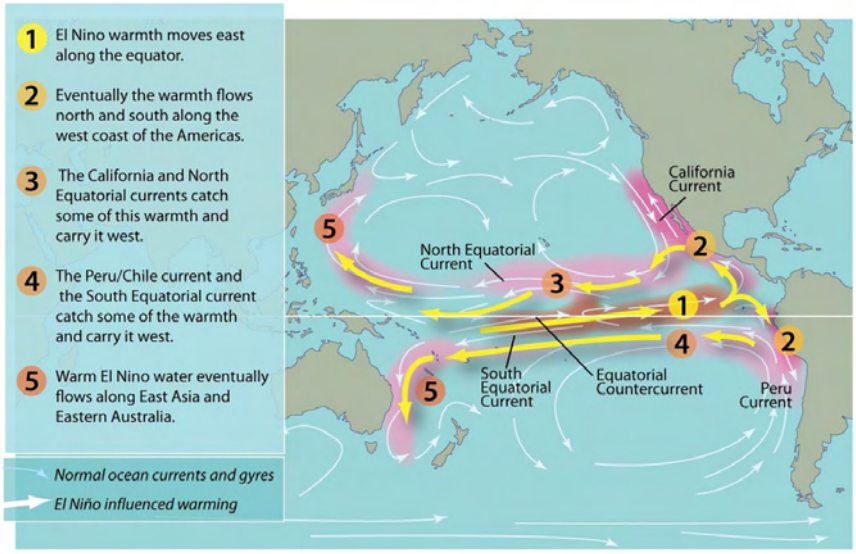


fig. 6 **The path of El Niño warmth**
© Evelyn Browning Garriss

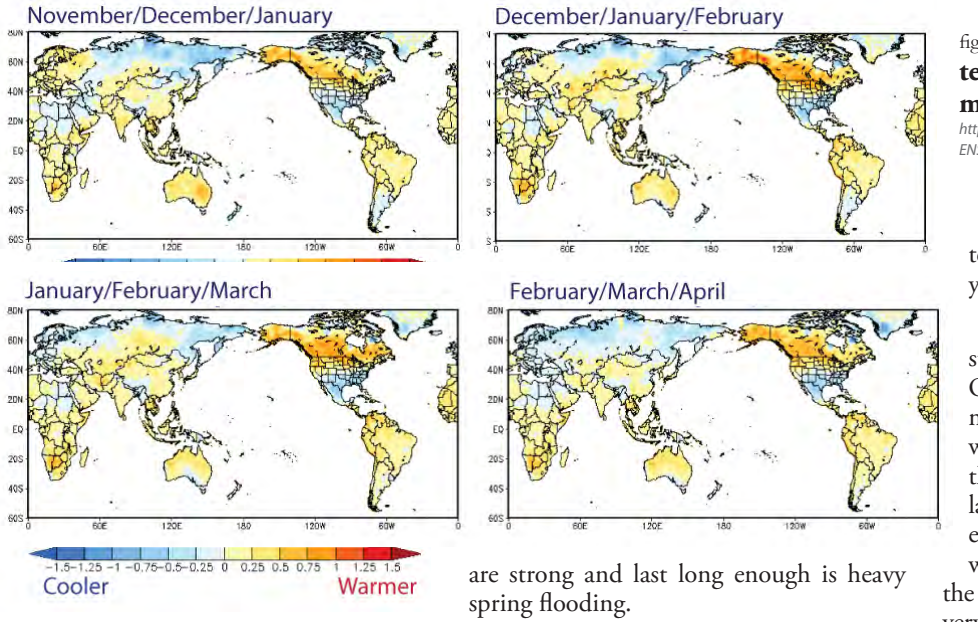


fig. 7A-D **Typical evolution of global temperatures during a winter to mid-spring El Niño.**
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ENSO/regressions/geplr.shtml

The Impact on Higher Latitudes

The warm waters of the El Niño do not stay in the tropics. As they flow against the west coast of South America, they accumulate and split. Due to the spinning of the Earth, the Coriolis force forces this water towards the poles. The warm waters north of the equator flow north along the West Coast and, this year have warmed the California coastline. The warm waters south of the equator veer south and flow along Chile.

Multiple currents catch this warmth and carry it through the Pacific. Some of the anomalous warmth gets carried back towards East Asia and Australia, changing weather and precipitation patterns there as well.

In North America, the El Niño can have major impacts on not just the precipitation of the continent, but the temperatures as well. The phenomenon brings increased moisture to California and the Southern tier of states and warmer conditions to Western Canada and the northern tier of states. Unfortunately, with the warmth, El Niño frequently brings drier conditions to the Pacific Northwest and, even more frequently to the Great Lakes/Midwest/Ohio Valley area.

Across the Pacific, wintertime El Niño creates a warmer, wetter winter for most of China and Japan, although, in volcanic years, Northern China and Central Asia experience sharp cold. The main problems El Niños create in Asia, particularly if they are strong and last long enough is heavy spring flooding.

Europe, furthest away from the El Niño event, has the weakest weather correlation with the phenomenon. The El Niño triggers cooler conditions in Central and Eastern Europe and Russia. These regions, as well as the Middle East sometimes have wetter, stormier winters. It should be noted that this is a weak correlation and usually only happens in moderate-to-strong events.

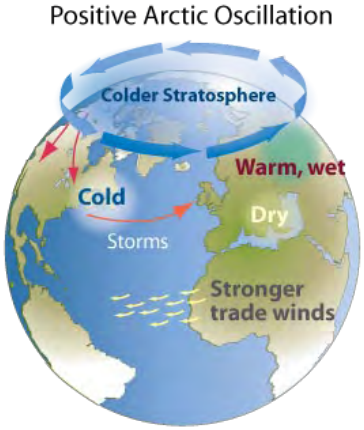
Beyond El Niño

No single factor controls global weather. El Niños are powerful, but in wintertime, they interact with the patterns of the Arctic air mass. As noted in previous issues, the Arctic air mass has had a cold summer and fall and will probably pour south and chill the upcoming winter in the Northern Hemisphere as well. We have already seen a temporary rally in grain prices due to this years delayed and wet harvest conditions.

The key to this will be a poorly understood weather pattern called the Arctic Oscillation **(AO)** . This index is used to measure the strength of the circumpolar winds. When they are extremely strong, they can pin all the Arctic cold in the polar regions, allowing most of the Northern Hemisphere to have a warm, cozy winter and spring. When they are weak, the cold plunges south. In 2012, they were very strong and spring arrived six weeks early. They have shown no sign of being very strong this year. Expect the cold Arctic air to visit a town near you this winter.

The big question is where this cold Arctic air will descend. Typically, the strength of a Pacific El Niño has a strong impact on how much of the North American continent is buried in Arctic cold. A strong El Niño produces a warm winter for most of Canada and the northern tier of states, as shown in Figure 7 A – D. A weak El Niño protects only Western Canada and the Pacific Northwest, allowing cold air to plunge south east of the Rocky Mountains. These weak El Niños produce weather patterns similar to the winters of 2009/2010 and (although not as cold) 2013/2014. Brace yourself to hear the clichéd term "Polar Vortex" again.

The major difference between 2009/2010 and this year may be the size and nature of the El Niño. The 2009 event was very weak and small, with the Japanese scientists at JAMSTEC (Japan Agency for Marine-Earth Science and Technology) identifying it as an El Niño Modoki or a Central Pacific El Niño. This means the heat in 2009/2010's



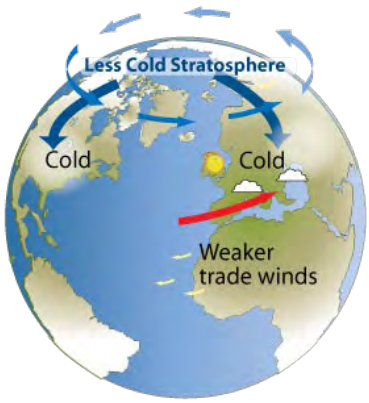


fig. 8A-B The Arctic Oscillation can trap cold air at the pole *(above)***, or release it to inflict misery further south** *(right).*

*If El Niño conditions continue..

† A moderate Russian volcanic eruption will make this region colder

figs 9A-C © Evelyn Browning Garriss

Cool	Warm	Dry	Wet
2-4˚C or more lower than normal temps.	2-4˚C or more higher than normal temps.	75% or less of normal moisture	125% or more of normal moisture

event was mostly in the Central Tropical Pacific and its impact on the Americas was limited. Currently, the heat from this event has been stronger in the Eastern Tropical Pacific, and its impact on the US should be stronger. History indicates this normally concentrates more of the cold in the Midwest and Eastern states. (It should be noted that JAMSTEC predicts the current El Niño conditions should evolve into more of a Central Pacific event early next year.)

In the five most similar years, we saw the following weather patterns:

LATE AUTUMN – In 60% of similar years, November was a relatively warm month for most of the US and Southern Canada. While the Northwest and British Columbia had wet conditions 80% of the time. The most of California and the southern tier of states were drier than normal 60% of the time. With El Niño conditions in place, the Atlantic Hurricane Season should have an early end.

EARLY WINTER – By mid-December, in 60% of similar years, cool Arctic air entered the Great Plains and Great Lakes region, dropping temperatures below normal. In 80% of similar years, the Southeast and Central Plains experienced above average precipitation, much of it in the form of severe snowstorms.

MID-WINTER – January usually saw the cold shift east to envelope the Midwest, East and Mississippi in 60% of similar years. At the same time, the Pacific jet stream carried storm after storm through the southern tier of states. This is the time that California starts to see some precipitation relief, although not enough to end the drought. In 80% of similar years, Western Canada and the Pacific Northwest have warmer than average temperatures and in 60% of similar years this warmth extends to the Northern Plains and Southern Prairie Provinces.

The Wild Card

There is one major wild card in this scenario – the giant eruption in Iceland's Holuhraun lava field.

fig. 10 **Iceland's Holuhruan lava field may serve up a climate bending surprise this winter. If the eruption remains low-lying, this will add to cooling and acid rain, particularly in Europe**
http://en.wikipedia.org/wiki/Bárðarbunga

Not all volcanic eruptions are explosive. In Hawaii, for example, volcano eruptions are usually relatively quiet lava flows. (There is currently one that is threatening the Pahoa subdivision. Ironically the greatest damage the community is enduring is from looters, not lava.) Similarly, the Holuhraun eruption is a low-lying eruption, with relatively small explosions (about the size of the Statue of Liberty) and lots of oozing lava and gas.

The volcano has been erupting since August and emitted between 20,000 -- 60,000 tons of SO2 per day (compared to all of Europe which emits 14,000 tons per day). Scientists are reporting that this is not high enough to affect climate, but this much low-lying acidic fog is affecting the daily weather. No one has died, but the Icelandic air is blue with an eye-stinging haze.

Scientists report that, given the amount of debris this volcano has emitted, it is the largest Icelandic eruption in centuries. Historically, eruptions like this add to cooling and acid rain as far south as Great Britain and Central Europe. This is one more sign that Europe has a very high probability of a cold winter this year. If the cold affects the jet stream, then the ripple would allow colder air to penetrate downstream as well, in Siberia and portions of Northern China.

Of course, if the explosion grows more violent, penetrating the stratosphere, then it would affect the Icelandic Low semi-permanent air pressure region and the impact would be huge. No one expects this to happen.

However, stay tuned. There is a wild card in Iceland.

The Outlook for the Southern Hemisphere

SUMMARY

El Niño conditions should bring good rainfall to Argentina and Southern Brazil, bringing some relief for Sao Paulo and good growing conditions for rain and soybeans. Similarly India's dry season should be wetter. Australia is facing a hot, dry growing season

Now that El Niño conditions are in place, albeit unofficially, the outlook for the Southern Hemisphere's growing season has become clearer. The El Niño is excellent for oilseed and grain production in South America and parts of Africa. It creates severe drought problems in Australia as well as throughout the tropics.

South America

South America has already been affected by the strong mid-year El Niño conditions, as well as the abnormally warm Atlantic conditions off the coasts of Southern Brazil and Argentina. The result has been severe moisture shortfalls throughout Brazil that have damaged the coffee crops and left Sao Paulo area of 44 million people (greater than the population of California) facing a severe water shortage.

The worst local drought in 80 years has left South America's largest and most productive metropolitan area with only a two week supply of water. Key reservoirs throughout the region are down and the Cantareira system, the main water reservoir feeding the region, dropped to just 3.4% of its capacity on Oct. 21, Forty million people are affected with fourteen million having their supplies rationed. In the words of Vicente Andreu, president of Brazil's National Water Agency "If it doesn't rain, we run the risk that the region will have a collapse like we've never seen before."

This is the environment Brazil is facing during its planting season. Key crops such as coffee, sugarcane and oranges, some of the country's top exports, are expected to be severely hurt this year. Reports indicate sugarcane production will be at least 15% lower. These dry conditions have delayed planting of the 2014-2015 soybean crop.

Now El Niño conditions have begun. Normally this is good news for Argentina and Southern Brazil, although Northern and Central Brazil, particularly the Amazon will continue to endure drought throughout the growing season.

With the arrival of the El Niño conditions, Brazil's key center-west growing region has scattered showers, helping improve moisture for seeding after a very slow start to planting. Between the widespread dry conditions, the welcome but work-delaying current rainfall and the projections of lower prices, expect overall plantings to be late and reduced. Expect most of the problems with this year's soybean crop to be with the planting, not the growth. Normally, with El Niño conditions, the precipitation and overall growing conditions for most of the southern and center-west should be good.

While conditions for Sao Paulo and southern Brazil should improve, this year's drought highlights a severe regional problem. When Brazil was experiencing La Niña overlying the cool PDO, it had optimum precipitation conditions and expanded its agriculture and land clearing at an explosive rate. Much of this expansion spread to marginal lands, lands that suffer during El Niños. At the same time, the urban population ballooned without sufficiently investing in infrastructure. The current demand now exceeds the reliable supply of water. This crisis may (note, this is a qualified may) improve as the El Niño progresses, but it will reoccur with increasing severity.

The worst local drought in 80 years has left South America's largest metropolitan area [Sao Paulo] with only a two week supply of water.

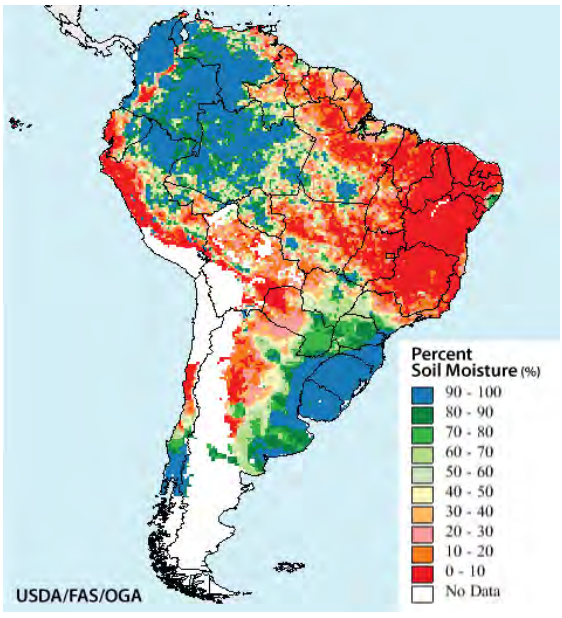


fig. 11 **The Current Condition of South America**
Soil Moisture Percentages-October 11-20 http://www.pecad.fas.usda.gov/cropexplorer/continentview.aspx?regionid=samerica&startdate=10%2f11%2f2014&imenddate=10%2f20%2f2014&ftypeid=25&fattributeid=9

Australia

Unlike South America, much of Australia's cropland is affected by polar weather, just as growing areas in the US are. Therefore, one cannot talk about Australian weather without reviewing one of the most striking events in the Southern Hemisphere – the Antarctic icecap has been growing

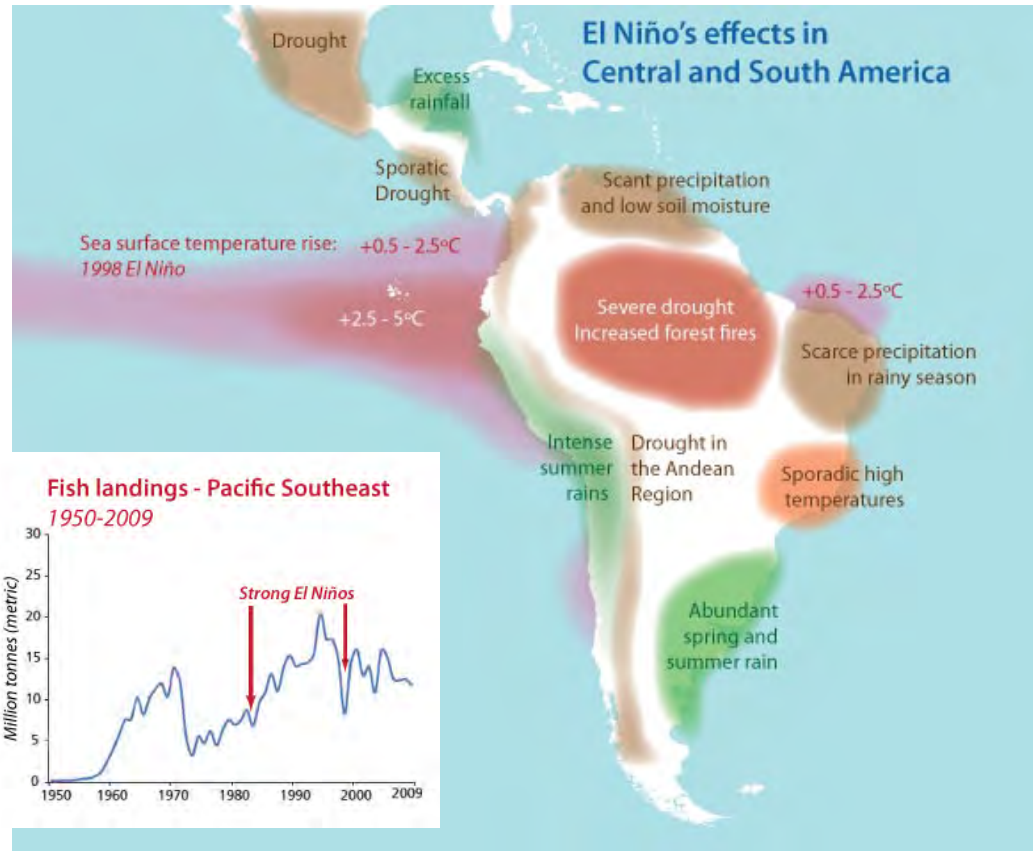


fig. 12 *© Evelyn Browning Garriss source: IPCC*

to record amounts for the last three years in a row. This year's Antarctic sea ice maximum was 1.54 million square kilometers (595,000 square miles) above the 1981 to 2010 average maximum extent, almost four standard deviations above average. It is cold and its impact is expanding.

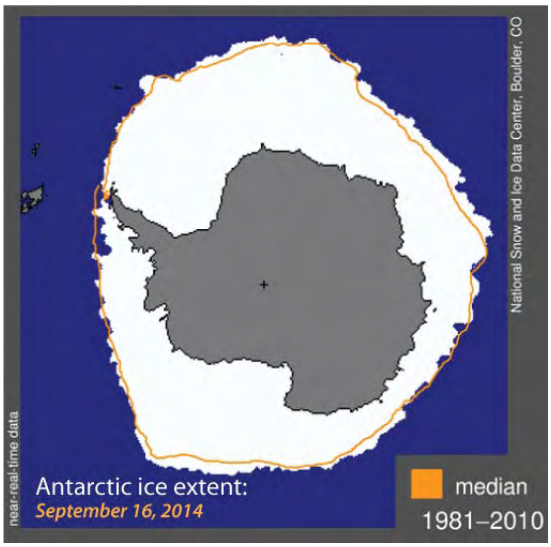


fig. 13 **The Antarctic ice has grown to record levels for the last four years in a row.**

courtesy: National Snow and Ice Data Center

Just as the US is affected by the Arctic Oscillation, the winds that contain the polar air mass, so Australia is affected by the Antarctic Oscillation (AAO) or, as some journals describe it, the Southern Annular Mode. When the AAO is positive, the winds are strong and the cold stays south. When it is negative, the cold expands north and southern Australia has storms. With the current cold Antarctic, we have seen some very negative AAO winds.

Toward the end of October, the AAO became so negative that it was 3 standard deviations below average. As a result, cold air hit Australia generating frost, flooding storms and hail in the nation's wheat fields right before harvest. When added to frost damage the fields endured in August, Australians are estimating 2.5 to 3 million tons less than the 25 million estimated by the USDA.

The cold created problems, but overall, the previous months benefited from a neutral Pacific. The growing and grazing season should be shaped by the upcoming El Niño, which typically brings hot, dry summer weather. Fortunately, the warm temperatures in the Indian Ocean should modify the El Niño impact. This means the summer should be warmer and drier than normal but not the disastrous drought so familiar during the bleak years of "The Big Dry".

Historically, in the Southern Hemisphere, the gains for grain and oilseed crops in South American override the losses in Australia. While southern continents will see problems with their tropical crops, particularly sugarcane and coffee, it should be a good season for corn, soybeans and wheat planting.

News Notes

If the chemical haze from the giant eruption in Iceland's Holuhraun lava field has its normal historical impact, it could create energy problems for Europe this heating season.

Not only does this type of eruption historically produce colder weather increasing demand, but it creates haze that affects sources of renewable energy. It produces heavy clouds, which interfere with solar energy and acidic moisture which can be damaging to the exposed elements of wind generators.

A recently released European Energy Markets Observatory report has warned that the risk of blackouts in Europe will grow in the coming winter as thermal power-generating capacity has been shuttered amid the region's economic slump and a greater reliance (23.5%) on renewables.

A cold winter would exacerbate the problem. The report noted growing share of renewable energy is pushing out conventional sources of power, reducing the "electricity system's margin to meet peak demand in specific conditions such as cold, dark and windless days,"

In particular, the study noted that **3 nuclear reactors in Belgium have been halted because of damage and safety concerns. France usually relies on Belgian power imports on cold days because of the relatively large number of homes in the larger country that are equipped with electric heating.**

Add to this the growing difficulties with Russia over the Ukraine. Russia's Gazprom is a major provider of gas and has used gas supplies as a negotiation tool in the past.

Great Britain's National Grid has warned that its capacity to supply electricity this winter will be at a seven-year low due to generator closures and breakdowns. Its spare energy capacity is currently at 4%, compared to 17% three years ago. Since then, 15 power plants have been closed or partially closed, taking out a large chunk of the UK's energy-generating capacity.

The nation's Energy Minister Matt Hancock noted that the UK does not receive any gas directly from Russia, but if there are supply problems to other nations, gas flows to Europe could be affected, which would in turn affect supplies to the UK. Officials report that the nation would then have to import more expensive liquefied natural gas from other sources which would raise energy costs.

Meanwhile authorities are reassuring people that they have made adequate contingencies plans. It should be noted the plans are based on assumptions that this winter will have the same demand (and similar temperatures) as last year.

Mount Sheveluch in Russia remains restless. On October 28 and 30 the volcano erupted, with the ash plumes rising 11 km (6.8 miles) high. This is not large enough to affect climate, but it is large enough to enter the next passing cold front and bring a freeze around the second week of November.

Did you see the zombie hurricane that attacked Washington and British Columbia? This is the Halloween appropriate nickname some weather watchers are giving the still dangerous remnants of hurricane Ana. The problem is that a hurricane may lose its name, its structure and even its place on National Hurricane Center tracking maps, but remain dangerously strong, even deadly.

The Atlantic is so hot that we saw two "zombies" cross the ocean and hit Europe – the remnants of Bertha in August and Gonzalo earlier in October. However the warm El Niño has pushed so much warm water north that a rare Pacific event hit the West Coast. The Central Pacific Hurricane Ana swept past Hawaii. Then the notorious Pineapple Express, the stream of moisture that occasionally brings tropical rain and weather from Hawaii to the Pacific Northwest, grabbed the remnants of Ana and took it for a ride.

The storm drenched the region but did little damage. Its last moisture reached as far inland as Montana. You know the weather is turning weird when Montana and Southern Alberta get rain from Hawaii!

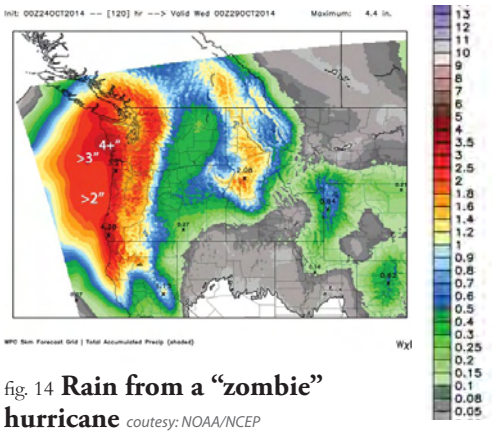


fig. 14 **Rain from a "zombie" hurricane** *coutesy: NOAA/NCEP*

The opinions expressed are those of the writer, and although they are based on extensive studies of physical data and phenomena, many statements published here are not entitled to be regarded as rigorously proved in a scientific sense. Some decades must pass before these issues are resolved.

Meanwhile, decisions must be based on the best available information and estimates.

This newsletter will **not** contain:

- *Analysis of, or recommendations concerning, any investment possibilities.*
- *Recommendations on any particular course of action.*

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