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World Reports Covering Climate, Behavior, and Commodities – Original Papers – Historical Perspectives – © Evelyn Browning Garriss

In Hot Water Now!

IN THIS ISSUE

- The hot water off the East Coast will combine with the colder than average Arctic air mass to create a colder, stormier late winter and early spring for the Midwest, Northeast and Mid-Atlantic States as well as the Eastern Provinces.
- The negative trend of the PDO and cool MJO oscillations are creating a stutter in the El Niño conditions which reduced California and Western rainfall in January – but most experts expect the stutter to end and another period of El Niño warmth and rains. It will not be enough to end the California drought.
- Years similar to this had a cool early spring in eastern North America, followed by a warm spring and average to above average growing season.
- The El Niño conditions weakened South America's northern and southern monsoons. While the major Brazilian and Argentinean areas will get good rain, the sugar cane and coffee crops as well as urban water supplies and hydroelectricity have been hurt.
- The conditions in the Indian Ocean have blunted the El Niño conditions impact on Southeast Asian and Australian agriculture.
- Storms and cold have begun their impact on Europe.

SUMMARY

North America is surrounded by hot water which normally creates a colder and stormier late winter and early spring from the Great Lakes to the East Coast and hotter conditions with rainfall extremes in the western portions of the continent.

There is a reason North America is in trouble if it is surrounded by hot water. It's because this means winter will be really cold!

Huh?

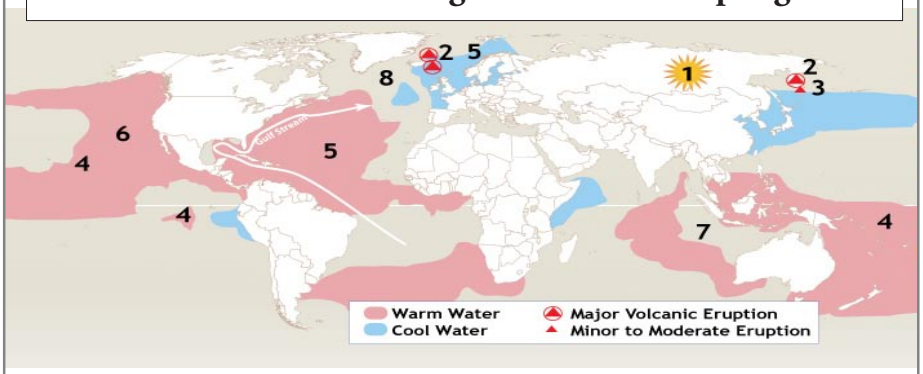
When the continent is surrounded by hot water, as it is now, the western regions are typically hot and cold Arctic air slams deep into the central and eastern potions of the US and Canada. The majority of North America experiences colder weather and the West Coast experiences floods, heat and, in some areas, droughts.

Hot Atlantic Waters

Most of the North Atlantic waters are warmer than average, with the waters off the East Coast ranging from 2 – 7°F (1 - 4°C) above normal, with the warmest waters off of the Northeast states and Atlantic Provinces. This produces extremely variable temperatures.

In December, the warmth from these waters wafted inland, warming temperatures from the East Coast to the Midwest.

Natural Factors Affecting Late Winter and Spring



1 Solar activity has peaked.

2 The last effects of the 2011 eruptions of Grimsvôtn and Sheveluch are affecting winter in the Northern Hemisphere.

3 Small and moderate eruptions continue in Russia.

4 The Tropical Pacific is officially neutral with warming El Niño conditions in the Central Pacific and a cool MJO cooling waters off the west coast of South America.

5 Most of the North Atlantic is warm with hot water off the East Coast.

6 Hot to warm water off the West Coast

7 A negative Indian Ocean Dipole

8 The great mystery - how will the huge amount of sulfur gas from Iceland's Bárðarbunga affect climate?

fig. 1 © Evelyn Browning Garriss

CONTENTS

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.

However, when the cold air from the Arctic plunged south, it hit this warm, wet air and the moisture precipitated out in a strong storm. The wind chill impact chilled the already cold air, creating a spectacular storm. Just ask Boston.

Don't expect a repeat of last year's "Polar Vortex" winter. The weather is following the typical pattern for weak El Niño conditions. Hot waters off in the tropics are spreading up the West Coast. As winter evolves, the frozen Arctic air mass cannot drop south over the warm Pacific/Western North America, so it plunges deep into the Midwest and Great Lakes area. The prevailing westerly winds carry the cold air east until it collides with the warm, moist Atlantic air. From mid-December to mid-January, the East was so warm that the stormy collisions were mostly in the middle of the continent. As winter progressed, the cold moved east and the storms stretched in a band from Texas to the Northeast and Mid-Atlantic states.

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In late January, models were predicting winter storm Juno, a Nor'easter that brought rain and snow up the East Coast, experts claimed would threaten 60 million people. The storm's impact was east of the predictions, missing Washington and New York City and, therefore dismissed as a Snor'easter, but it brought record-setting storms from Long Island through Boston and the Atlantic Provinces. At least 7,500 airline flights were cancelled. New York City lost roughly $200 million, Massachusetts

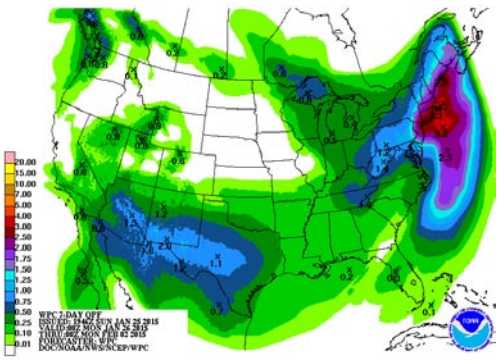


fig. 2 El Niño style rainfall and the Nor'easter *courtesy NOAA*

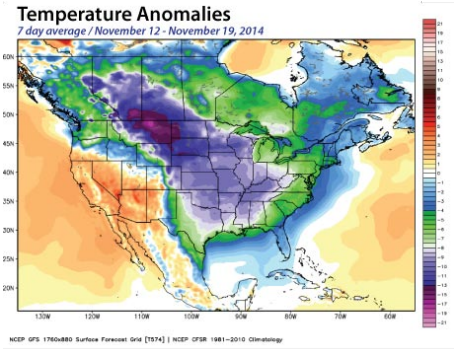


fig. 3A The volcanically induced November cold spell delayed typical El Niño conditions weather by two weeks.

more than $500 million and the East as a whole, an estimated $1.5 billion.

Basically, it is as if the cold spell that plunged through North America in mid-November set the weak El Niño pattern back by two weeks. Normally late fall is warm – this year the warmth that followed the volcanically triggered Mid-November cold spell lasted through most of December. Early winter condition in these types of years chill the center of North America and we saw this pattern from late December to mid-January. The second half of January saw the colder weather shift east. If this pattern continues, it will lead to a cold late winter and cool early spring throughout the metropolitan Midwest, Northeast and Mid-Atlantic States as well as large portions of Eastern Canada potentially raising heating prices.

Expect the weak El Niño pattern to continue through winter into early spring. Typically the Great Lakes have above average ice cover and help keep the Great Lakes regions as well as much of the Midwest and Northeast cool in early spring. This normally leads to the warm waters of the Atlantic reheating the land and springtime ends with unusually warm weather. Typically this forms a good start for Midwestern and Great Plains croplands and pastures, with some planting delays compensated for by warmer late springtime temperatures.

Hot Pacific Waters

The western portions of North America are being shaped by the El Niño conditions in the Pacific. The warmth is flowing from the Central Tropical Pacific eastward and

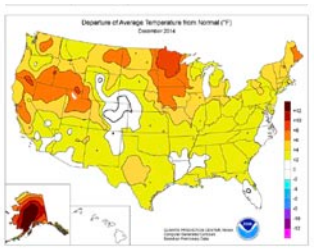
Expected:

Mid November to Mid-December

Mid November- Mid-December

Actual:

By December, El Niño conditions resumed



http://www.usda.gov/oce/weather/pubs/Weekly/Wwcb/

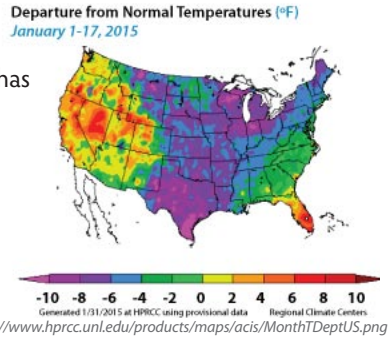
Expected:

Mid December to Mid-January

Mid December- Mid-January

Actual:

The pattern has resumed its expected course



http://www.hprcc.unl.edu/products/maps/acis/MonthTDeptUS.png

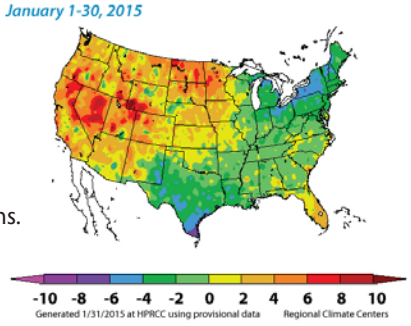
Expected:

Mid January to Mid-February

Mid January- Mid-February

Actual:

So far, the pattern is following predictions.



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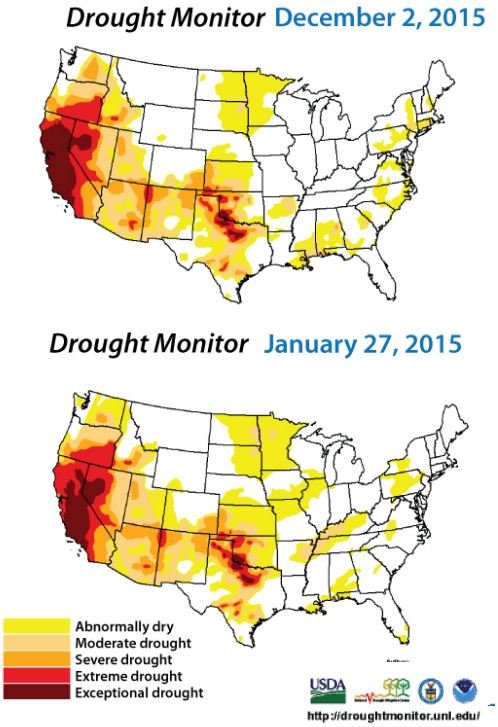


figs. 4A-B El Niño conditions rainfall did not eliminate widespread Western drought, but it has reduced the intensity.

then up along the western coasts of Central America, Mexico, the US and Canada. Westerly winds are carrying the heat inland. Tropical moisture is carried unusually far north and typically brings above average rainfall to parts of California and the Southwest. Usually this also means there is less rainfall in the Pacific Northwest and parts of British Columbia.

Remember – once the Pacific changed to the cooler trend of the negative PDO – the nature of El Niños in the ocean changed. They tend to flicker more and don't last as long. Since much of the science of El Niños was established when the PDO and Pacific was warmer, some of the old definitions no longer work. We can have El Niño temperatures and weather without the scientists warning us, because the conditions don't meet their old definitions.

We saw widespread rain in California and areas west of the Rockies in December. Then January came and the West Coast rainfall stuttered. Parts of Southern California had above average rainfall, but Northern California, where the most important reservoirs are located, had between 2 to 10 inches (5 – 25 cm) less rainfall than normal. The state's reservoirs are at only half their normal levels. The state needs an estimated 11 trillion (trillion!) gallons to recover from the long-term drought.

The problem is that the Tropical Pacific may have El Niño temperatures, but it also has small Madden Julian Oscillations that flow through the region. Currently a cool MJO has been flowing through the eastern portion of the Tropical Pacific and cooled the waters. With the heat concentrated in the Central Pacific and not in the eastern or western regions, the Tropical Pacific is currently in a configuration similar to an El Niño Modoki or Central Tropical Pacific.

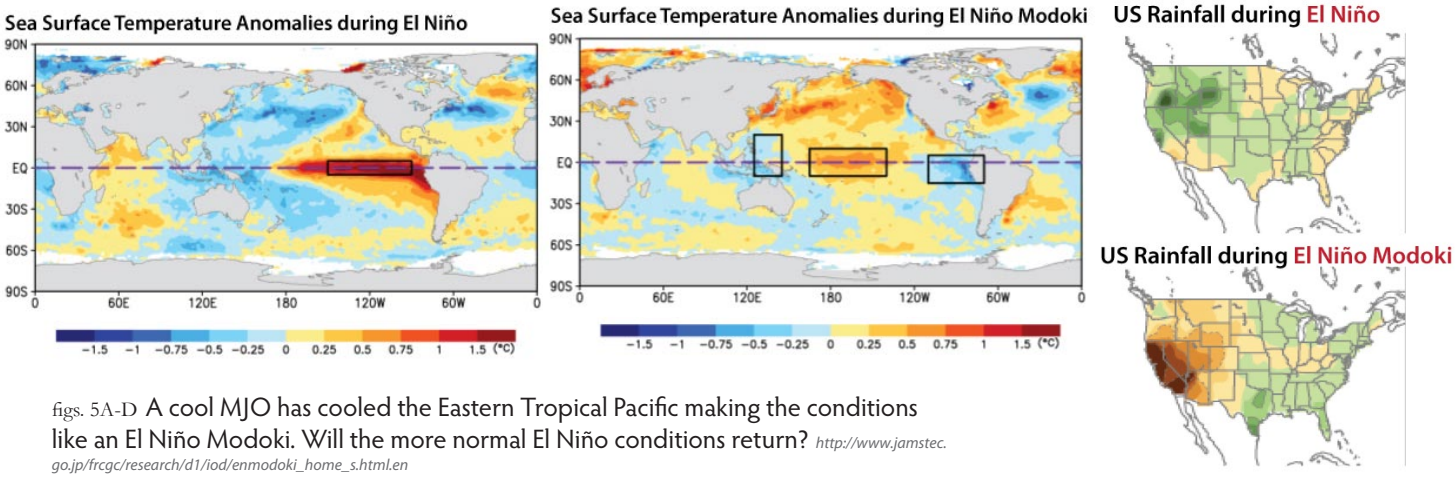
The Japan Agency for Marine-Earth Science and Technology predicts these Modoki-like conditions will continue through spring. The majority of international agencies predict a return to normal El Niño temperature patterns as the warmer MJO in the central waters flows east. Most agencies expect the El Niño to last through spring. If so, then the rains would return to California and a probable Pineapple Express would create a Fabulous February or Miracle March.

Here at the *Newsletter,* we expect the Eastern Tropical Pacific to re-warm and El Niño conditions to dominate the rest of winter and early spring. When the event starts to fade however, it will once again create severe dry western conditions for most of 2015. In other words, California will get rain and some relief now– but – the drought is long-term – and it will not end.

In Hot Water – The Resulting Outlook

In 60 – 80% of similar years, we saw the following weather patterns:

The result in these years was high heating demands in late winter and early spring. At the same time, the cold Great Lakes created cool conditions that delayed much of the Midwestern plantings. However, in 60% of similar years, warm air from the Gulf and Atlantic heated conditions enough in mid-to-late spring that the overall region had a warm planting season and early summer. Just as 2014 was similar, in many ways, to 2009, this upcoming years should be similar to 2010.



figs. 5A-D A cool MJO has cooled the Eastern Tropical Pacific making the conditions like an El Niño Modoki. Will the more normal El Niño conditions return? *http://www.jamstec.go.jp/frcgc/research/d1/iod/enmodoki_home_s.html.en*

If there are no more large volcano eruptions and El Niño conditions last until mid-spring ***then*** the US would probably have a near normal summer. 80% of similar years had greater warmth in the South with dry weather returning to California and a good growing season in the Midwest and most of the Great Plains. Southern Canada typically has near normal growing conditions from the Rockies to the Atlantic. In most similar years the crop production was average to slightly better than average.

Hot 2-4˚C or more higher than normal temps.	**Warm** 2-4˚C or more higher than normal temps.	**Cold** 5˚C or more lower than normal temps.
Cool 2-4˚C or more lower than normal temps.	**Dry** 75% or less of normal moisture.	**Wet** 125% or more of normal moisture.

Mid January- Mid-February

Mid February - Mid March

‡ A moderate Russian volcanic eruption will make this region colder. *If El Niño conditions continue.

figs 6A-D © *Evelyn Browning Garriss*

Climate Potpourri

Evelyn Browning Garriss
James Garriss

SUMMARY

Water problems for South America outside of Argentina and Brazil's southern corn and soybean areas, good prospects for Southeast Asia and Australia and was 2014 really the warmest year on record?

South America - El Niño Warnings and Two Weak Monsoons

South American agriculture has beer plagued by not one but two weak mon soons. Both its northern and southern monsoons were affected by El Niño con ditions. The result has been problem throughout the continent, particularly in Venezuela and Brazil.

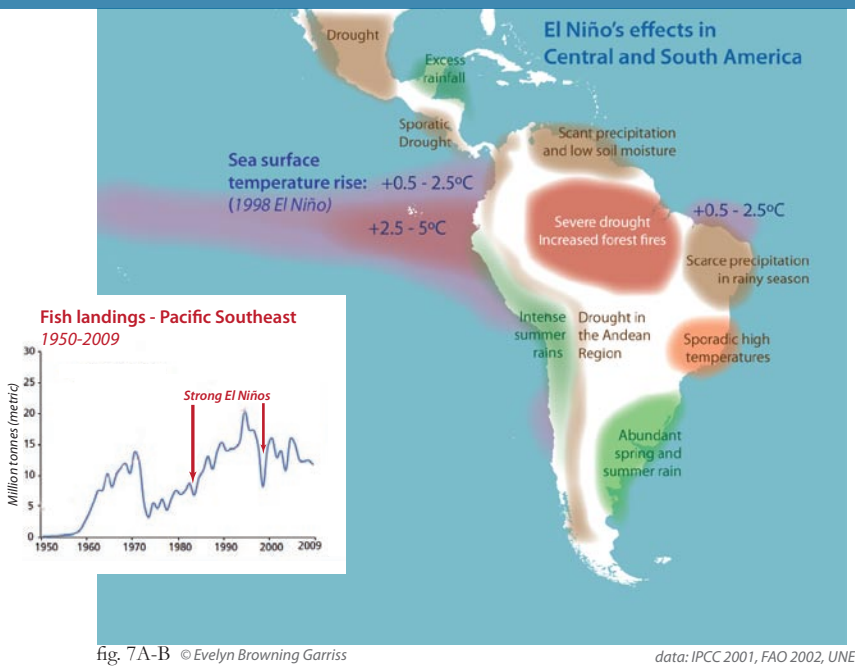


fig. 7A-B © *Evelyn Browning Garriss* *data: IPCC 2001, FAO 2002, UNEP*

Most analysts don't think of South American monsoons, but recognize that certain areas have wet and dry seasons. These seasons are shaped by monsoon winds. In summer, hot air rises in the land and cooler wetter air flows in from the oceans. Since the equator goes through the middle of South America, it means Northern South America has it's wet season in the middle of the year, the northern hemisphere summer, while southern countries have their wet season at the end of the year, the southern hemisphere summer.

Unfortunately, early in the Northern Hemisphere summer, the Pacific experienced El Niño-type conditions. It didn't evolve into a full-scale El Niño event but it affected the winds in the Caribbean and weakened the wet season rainfall. This reduced rainfall from Southern Mexico to Central America (particularly the western lands) and Venezuela. While these shortfalls were not widely reported, we are seeing their impact.

- Venezuela is experiencing food shortfalls, long lines in stores and severe social unrest.

fig. 7A-B A normal South American wet season. © Evelyn Browning Garriss

A weaker wet season

Less temperature differential between land and sea = a weaker monsoon

- Nicaragua, El Salvador, Honduras and Guatemala have seen widespread maize and bean crop failure and the price of food has gone up as much as 129%.
- There has been a population outflow from these drought affected areas. The most publicized example is the inflow of Central American children and youth along the US southern border.

The El Niño conditions started to fade in June, when the first of two cold Madden Julian Oscillation surges flowed through the warm pool of El Niño water in the Central and East Pacific. This allowed some rainfall, but the wet season was reduced and portions of South America experienced severe drought conditions. Indeed, for parts of Brazil, including the area around the industrial heartland of Sao Paulo, it was the driest conditions in 60 years.

The reappearance of El Niño-like conditions over the past few months is now affecting and weakening South America's Southern monsoon, creating a delayed and weaker wet season. At the same time, the warm water in the South Atlantic is both weakening the monsoon and causing more evaporation, increasing the demand for water.

This is affecting both the rural and urban fortunes of South America. A weaker monsoon has kept the rainfall from moving inland at its normal rate. This especially affects Western Brazil and Argentina. Even Chile, which has been fighting droughts, got less than normal rainfall.

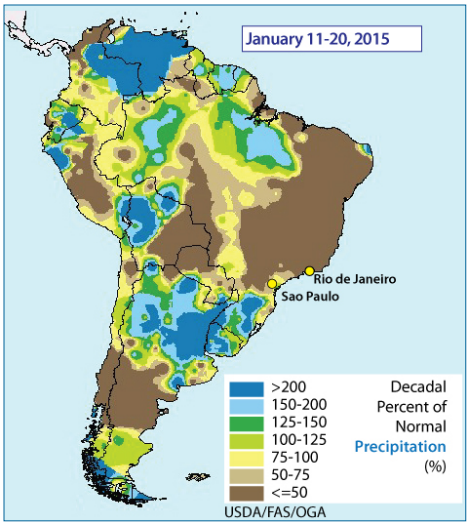
Weaker monsoons typically bring heavy rainfall to coastal areas and less rain further away. This has been good news for rainfall in Argentina which is recovering from many seasons of mild to medium drought. It is Brazil that has experienced problems. As the rain came into contact with the middle and eastern Brazil, it encountered heat from the hot water off the Atlantic. This caused increased evaporation as well as reduced rainfall.

This has created serious problems for Brazil's major cities, particularly those in the heated Southeast. The shortages have expanded from Sao Paulo and more than 93 urban areas are now imposing rationing. Seventeen of the nation's eighteen major reservoirs are lower than during the nation's last water crisis in 2001, with the four major reservoirs that supply Rio de Janeiro's water down to 1% capacity. Unfortunately, the reservoirs ran low during the nation's dry season and the monsoon is too weak to refill them.

With low reservoirs comes severely reduced hydroelectricity and rolling blackouts. (Indeed, the nation is having to import electricity from Argentina.) Internet service and power has been cut off from some regions for days at a time. This, in turn, has cut production and jobs at the same time food prices are rising and protestors are demonstrating in the streets. Remember – this is happening to the world's seventh largest economy with a population of over 200 million .

The monsoon rainfall that did occur, came after planting time, therefore many growers switched from safer crops such as sugar cane to more volatile yet potentially profitable crops like soybeans. However the demand has gone down and sales are slowing. South America has only sold 40% of their soy crops, and some other crops are experiencing the same problems. Ironically, sugarcane is now more profitable for farmers since Brazil levied a major gasoline tax, making sugarcane ethanol a cheaper and more attractive alternative. These taxes were levied, in part, to help with the struggling major cities such as Sao Paolo with their rolling brown outs and energy shortages.

With all these problems, the rainfall is sufficiently abundant in Argentina's and Brazil's main soybean and corn regions that the prospects for these crops promise to be healthy. If the El Niño conditions continue through winter, as most experts expect, the crops in these regions should continue to do well, keeping prices low for the next few months.



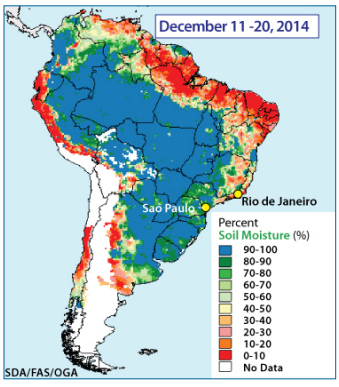
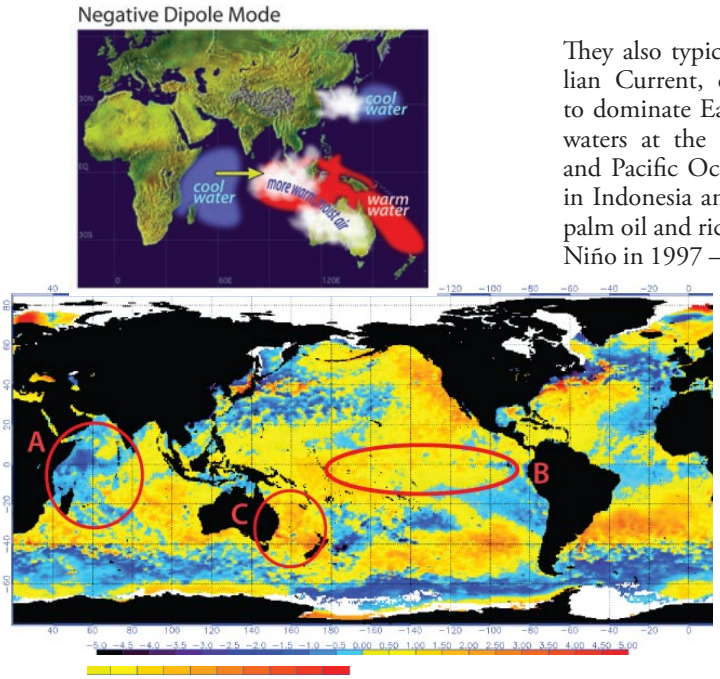


fig. 8 A-B January, normally the height of the Southern Monsoon, was weak and missed most of the heavily populated areas around Rio and Sao Paulo. The soil moisture deficits, *right,* have lessened in many parts of Brazil.

http://www.pecad.fas.usda.gov/cropexplorer/continentview.aspx?regionid=samerica&startdate=1%2f11%2f2015&imenddate=1%2f20%2f2015&ftypeid=25&fattributeid=9



A Negative Indian Ocean Dipole (IOD)
B El Niño-like warmth
C Unusually warm East Australian Current (typical of El Niños)

fig.9 A-B *top: http://www.jamstec.go.jp/frsgc/research/d1/iod/e/iod/about_iod.html bottom: http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/index.html*

Southeast Asia and Australia

While the Americas have been hammered by El Niño conditions, Australia, Malaysia and Indonesia have had a break. The El Niño-like Pacific conditions are combining with climate elements from the Indian Ocean to create an odd but not hostile environment for agriculture. The warmth from El Niño conditions has combined with a good monsoon, typical of a negative Indian Ocean Dipole (IOD).

The Indian Ocean, like other oceans, goes through cycles of shifting warmer water. When the waters are warmer on the western half of the ocean, a positive IOD, the monsoons in Africa and India are strong. When they are warmer in the east, the Indian and African monsoons weaken, but the Australian and Southeast Asian ones are stronger. Currently the IOD is negative.

While El Niños are typically warm in the Central and Eastern Tropical Pacific, they are normally cool around Indonesia, southern South East Asia and Northern Australia. They also typically speed the East Australian Current, causing high temperatures to dominate Eastern Australia. The cooler waters at the intersection of the Indian and Pacific Oceans usually cause drought in Indonesia and Southeast Asia, affecting palm oil and rice production. (The giant El Niño in 1997 – 1998 destroyed Indonesia's entire third rice crop, causing soaring food prices and widespread unrest.) It also usually reduces the Australian monsoon and causes increased evaporation and drought in Eastern Australia.

Now, however, the Indian Ocean is positioned to enlarge monsoons and the weak El Niño conditions are slightly reducing the monsoons and raising East Australia temperatures. The result has been a delayed but good monsoon and normal crop expectations. Indeed, in December, Australia received 24% more rainfall than expected, with the Northern Territory getting 66% more rainfall than average and New South Wales wallowing in 36% more moisture.

Initially, El Niño concerns drove up price expectations for the crops for these regions. However, the late rainfall from the negative IOD in Indonesia, Malaysia and Australia meant that many crops, though late, were eventually developed and harvested. Anticipated high prices drove down demand and the current abundance has driven down the prices farmers can expect to receive for their late harvest. This is particularly causing problems for Southeast Asian rice producers. The future optimistic outlook for the current crops reduces the prospects of any dramatic price increases. Australia is pushing a "Buy Local" campaign to lower their importing costs while battling the loss in potential exporting. At the same time, Malaysia and Indonesia are pulling away from palm oil and looking into a higher yield of rubber for their next planting cycle.

The Hottest Year

It's official! 2014 is the "Hottest Year on Record!"

Or is it?

There is no question – 2014 was a very hot year. It is one of a series of very warm years. Since official records began in 1891, 2014 has the highest global temperatures according to two (the Japan Meteorological Agency (JMA) and NOAA/NASA) of the world's four major global temperature record-keepers.

Ironically for many scientists, these findings are a relief. Since 1998, the year of a giant El Niño, there has been a lull in global warming. Nine of the 10 warmest years in the instrumental record have been since 2000, but until now, none have been warmer than 1998. This lull has mystified man-made global warming supporters and has been focused on by climate skeptics. Indeed, more than 52 theories have been published to explain the pause. Now the

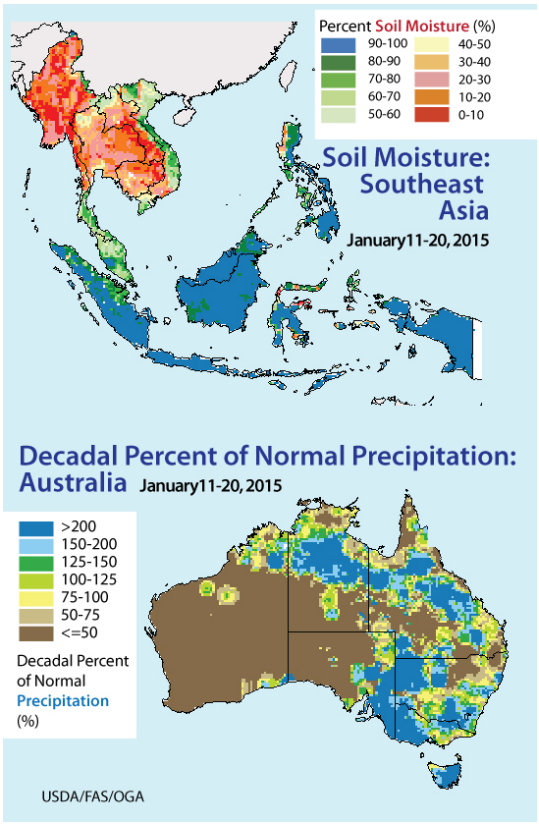


fig.10 A-B Despite El Nino type conditions, Palm oil and rice regions have received some timely rainfall. Similarly, Australia received good monsoon rains in December and January. *http://www.pecad.fas.usda.gov/cropexplorer/imageview*

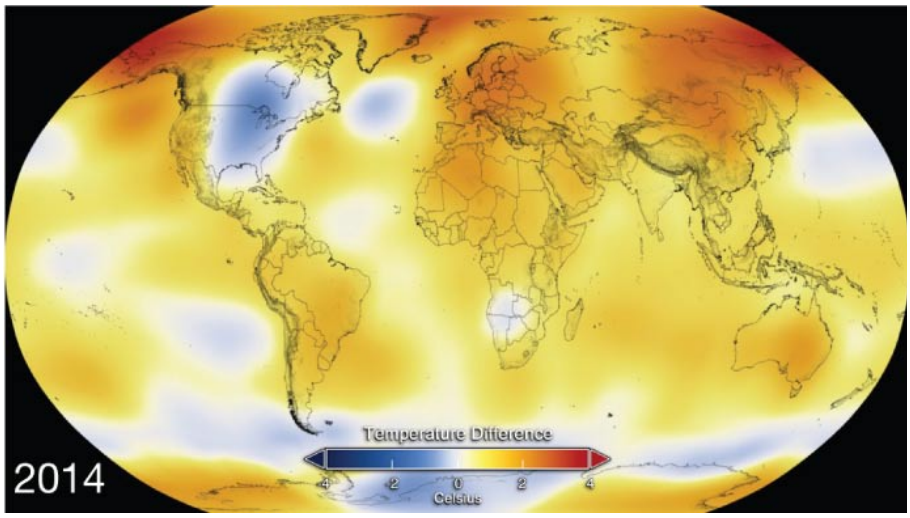


fig. 11 2014 was a very warm year, unless you were under the Polar Vortex.
image courtesy: NASA's Goddard Space Flight Center

pause is officially over and the relief for some is almost palpable.

While North America endured the notorious Polar Vortex and a cooler growing season, most of the rest of the world was quite warm, especially the oceans. The Pacific had not one, but two series of El Niño-like warmth that never quite met the official definition of an El Niño event. Currents circulated this warmth, which first began in March, throughout the Pacific, resulting in extremely high temperatures ocean-wide. Further away, the Gulf Stream poured tropical heat north and Europe officially experienced its hottest year on record. Similarly Western North America and Australia experienced drought-inducing heat waves. Added together, the average global temperatures were 1.1°F (0.6°C) warmer than the 20th Century average. It edged 1998, the previous warmest year, by about 0.1°F (0.06°C) according to the JMA. NASA, which denied a pause and claimed that 2010 was the previous warmest year, reported a temperature increase of 0.04°F (0.02°C). It wasn't much, but it was an end to the worrisome "lull".

Of course, in an age of politicized science, the announcement was hyped. Just as predictably, the announcement has been dismissed as inaccurate by skeptics. Here are the main arguments:

- As noted above, the increase of temperature was minute – 0.06°C according to Japan and 0.02°C according to the joint US NOAA/NASA report. According to scientists, the margin of error is approximately 0.1C – several times as much. This meant that NOAA and NASA were not certain, but felt that 2014 was probably the warmest year. They put a probability chart on slide 5 of their detailed power point that explained their findings. Notice, NASA declared a 38% probability that 2014 was the warmest year on record and NOAA showed more confidence, giving a 48% probability. Both agencies found their highest probability was that 2014 was a global record-breaker.
- This statement is based on land-based temperatures which are different from satellite temperature records which show a clear and continued lull. There has been a prolonged argument over which set of records is more accurate. The satellite records measure atmospheric temperatures and many claim that temperatures taken on the surface, where people live, are more relevant, therefore, more accurate. Satellite record supporters note that these records are global while land temperatures are limited in number and, being mostly located in cities and airports, distorted by the Urban Heat Island effect. Both sides are partially right. (Sigh!)

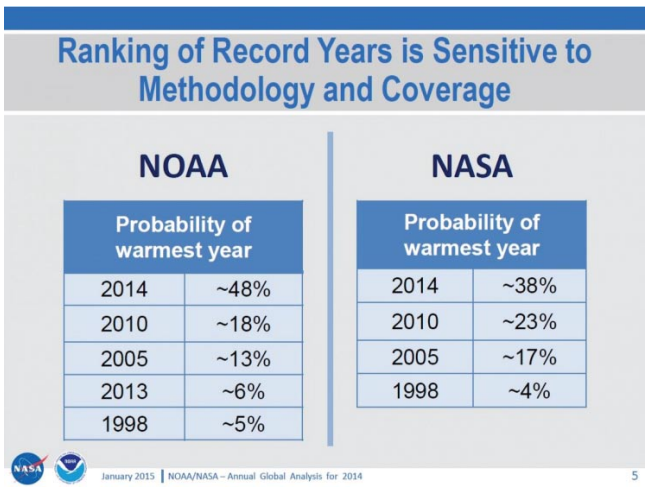


fig. 12 *courtesy: NASA and NOAA*

For the record, we at the Browning Newsletter find some good science on both sides of the argument, but find the political bickering unproductive. The statement "2014 was the warmest year on record" may be accurate for the 125 years of record-keeping, but there is enormous room for error. It was, certainly, one of the warmest years in a century for the globe as a whole, but fortunately this increased heat did not affect or injure most of last year's US crop production. The announcement was certainly well timed for the President's State of the Union address.

When examining the overall trend, this much seems to be certain:

1. Overall, global temperatures have risen since 1800, the end of "The Little Ice Age". This rise in temperatures has not been smooth, but instead filled with surges and lulls.
2. We currently are in a period of high temperatures with minute variations, a lull. If history is any guide, at some point, the lull will end.
3. If history is a guide, this warm period will be a long period, like the Medieval Warm Period and the Early Bronze Age with a great deal of variability over two or three centuries.
4. Science indicates that human activity will make this variability more extreme, especially around urban areas. Whether 2014 was really the hottest year on record or not, it was for many, an extreme and uncomfortable year!

News Notes

Just as the warmth faded in the Eastern US and late winter storms poured through the region, so we are seeing cold storms pound Europe. Across the 'Pond", England has been slammed with thundersnows, blizzards that both freeze and zap with lightening! Expect these conditions to continue into early February. The positive North Atlantic Oscillation that raced storms away from the Atlantic rim countries is becoming more negative, and that means more storms in late winter weeks.

Scientists warn that the decay and failure of several key satellites will leave major gaps in US weather coverage starting next year. GAO reports issued in January show that NASA is still facing massive technical issues and delays for both of its main weather satellite systems. These problems have reached the point where they are delaying the 2015 test schedule needed to replace the satellites and avoid gaps in crucial weather information starting in 2016. As the delays continue, costs are rising and budget problems are increasing. Weather warnings save lives and property, so the failure of these satellites, if not replaced, will be measured in both lives and money.

One satellite that NASA has successfully launched this month is a new drought observing vehicle that will monitor soil conditions in the US and around the world. These soil moisture readings are expected to help farmers with crops and irrigation as well as warn local regions of soil saturation and flooding hazards. Researchers hope to examine links between soil moisture and weather, such as rainfall and temperature. Soil moisture affects the weather through evaporation, because when the sun's energy bakes water out of the soil, it cools the surface — the same cooling effect sweating has on the body.

The Browning Newsletter heavily covered the fact that the amount of Arctic sea ice left after the summer melting season has increased by 1.5 million km (more than 570,000 square miles) over the last two years. How is the ice faring now during winter? The latest reports show that it is substantially below the average area it used to cover between 1979 and 2008 (the 30 year mean). The area of "lost sea ice" is roughly half the size of Hudson's Bay, or Alaska and California combined. However it has been increasing over the years and is now greater in area now than any time since 2005.

Volcanoes erupt and snowy owls irrupt. Who knew? That's what a mass migration of snowy owls is called and currently the birds are irrupting all over the Great Lakes. While these birds normally hunt in Northern Canada, the last two years have been really cold. At the same time, the huge growth of the Lakes' ice cover, particularly in Lake Erie has produced smaller pools of open water, concentrating the water fowl populations. Further south, the owls have discovered the luxury of airports offering large clear view of scampering rodents. You may find it cold, but for snowy owls, the Great Lakes are becoming the "Happy Hunting Grounds"!

Let's break this stream of cold stories with some hotter items. A new report issued by Environmental Research Letters on January 30 shows that heat waves are increasing in urban areas. Over the past 40 years studies show that more than 200 cities around the globe are having both longer and hotter heat spells. Half the cities are showing increases in "extreme" hot days and two thirds show increases in "extreme" hot nights. Even worse, of the five years with the largest number of heat waves, four were the most recent years on record (2009, 2010, 2011 and 2012). At the same time, the study showed declines in cold waves and extreme windy days and very little change in precipitation rates.

As noted by lead author Dr. Vimal Mishr, "Urban areas make up a relatively small part of the global land area; however, they are the center of wealth, so damage to urban infrastructure could result in potentially large economic losses. Surprisingly, there have been few studies that have focused on changes in climatic extremes in these areas."

Finally, scientists are finding an answer to that vital question – why do zebras have stripes? It turns out that temperature counts! Researchers from UCLA discovered that zebra stripes vary with the temperatures of the animals' territory. Zebras in hot lands tend to have dramatic stripes while those in cooler ranges, like South Africa have fainter stripes and none on their legs. Published in the Royal Society's online journal, the study showed that, after studying 16 locations and more two dozen environmental factors, the researchers found that temperature was the strongest predictor of zebras' striping. The authors' cited separate (and still unpublished) research by Dr. Daniel Rubenstein that found boldly striped zebras have external body temperatures about five degrees Fahrenheit cooler than other unstriped animals of the same size -- like antelopes. So who knew – stripes are the ultimate cool fashion statement!

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

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