

The Cold of Winter

IN THIS ISSUE

- This December saw almost 3000 cold and more than 6,800 snow records broken in the US alone. Unfortunately, the Western states, particularly California, remain in drought.
- Scientists show that the Arctic Oscillation will weaken, allowing more record cold Arctic air to surge south, creating a very cold mid and late winter for the US and most of Canada.
- Spring should be volatile, but in 60% of similar years early springtime was warmer than average. Rainfall was normal except in large parts of California that remained dry.
- Most international dynamic models indicate an El Niño will develop in early summer.
- 0 The big question is what type of El Niño will develop - a normal or a Modoki event. If it is normal, that is excellent for US and Canadian agriculture and bad news for many agricultural competitors. If it is a Modoki, the Western US drought will continue and global agriculture would have a good production year with lower food prices.

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A number of climate and oceanology labs predict an El Niño this summer – but what type would it be? The type of El Niño, a normal or Modoki event, will make a huge difference to both the US and global economy

8 **NEWS NOTES**

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

Based on historical patterns, winter will get colder but early spring shows sign of warmth and normal rainfall in most of the Midwest, as well as the Northern and Central Plains states. The California drought will continue

It's midwinter. The good news the days will be getting longer. The bad news - the nights will be getting colder.

We have already been experiencing record cold and snow in North America. Over 6,300 snowfall and 3,000 cold temperature records were broken in December. Even San Diego, California and Orlando, Florida have seen traces of snow! Historically, this pattern is an early indicator of an even more intensely cold and stormy midwinter. This is great news for energy producers and suppliers. Unfortunately, it is terrible news for sectors of the economy depending on discretionary spending. As consumers are forced to spend more money on necessities, such as heating (and higher taxes), they have less money available for other purchases. Expect this to affect sales during the entire first quarter.

US Daily Lowest Maximum Temperature Records: December 2013 US Temperature records broken = 921

US Daily Lowest Minimum Temperature Records: December 2013



US Temperature records broken = 1,155

US Daily Snowfall Records: December 2013

The Storms of December

In the first week of December, Browning Newsletter subscribers received an alert.

"Prepare for another blast of cold starting in mid-December. Another Russian volcano erupted.

On December 2, Mount Sheveluch on Russia's Kamchatka Peninsula be-



US Precipitation records broken = 6,877 figs. 1A-C The US has seen record-breaking low daytime (top) and nighttime temperatures (middle)

and snowfall (bottom) this December. http://www.ncdc. noaa.gov/extremes/records/daily/lomx/2013/12/00?sts[]=US#records look up

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. BrowningNewsletter.com

gan erupting. By the next day, Russian volcanologists were issuing RED alerts for air traffic as the plume reached 10 km (6 miles) high. It has since dropped to 5-6 km (3 miles) high. . . . The impact of the early December eruption of Mt. Sheveluch will be felt in the Midwest and the Northeast in mid-and –late December. Meanwhile, some smaller eruptions of Kamchatka volcanoes are feeding Pacific storms."

Consider this blast from Russia the weather equivalent of a "cold war". When Russian volcanoes are large enough, they alter Arctic air currents and aim them at the US.

The Arctic air mass of 2013 was the coldest on record – allowing the amount of Arctic sea ice to grow by 60%. During wintertime, the polar air mass expands. Winds determine how much cold air escapes and where it goes.

If a volcano eruption is large enough, it can affect these winds. A large eruption enters the stratosphere, a quiet layer of air, where the ash and debris can linger for years. The ash blocks out incoming sunlight, which cools the surface below. At the same time, chemical aerosols (solid and liquid particles) collect water and form gigantic clouds that also block out sunlight. As the dim air cools, it changes pressure, which, in turn, changes wind patterns. Given the prevailing global air patterns, most of the debris from Arctic volcanos remains in the Arctic air mass. Some of this is the lingering debris from the 2011 eruptions of Iceland's Mt. Grimsvótn and Russia's Mt. Sheveluch. More recently, several more Russian volcanoes including Sheveluch and Mt. Klyuchevskoy have exploded with small and medium-sized eruptions. The Arctic air mass has been severely cooled. No wonder it has produced such a chilly December.

The chill air has altered air pressure and we are beginning to see a change in the Arctic wind patterns. Through most of December, the circumpolar winds were strong. Scientists call this a positive Arctic Oscillation (AO). The strong winds trapped most of the polar winds north, with only a few breakouts. The eruption of Sheveluch helped to alter this pattern and since the third week of December, the circumpolar winds have been weakening and cold storms have cascaded south. (Sorry, Christmas travelers!). The cascade is becoming a torrent and it looks as if January will see a negative AO and some even colder weather pouring through North America.

This, however, is only part of the picture. While the US broke or tied over 3000 cold temperature records, it has tied or broken over 5,500 snow records. This is because the cold, ashy volcanic air has been interacting with warm, wet air from the Gulf and Atlantic.

As the Browning Newsletter has noted for more than a decade, the currents in the Atlantic Ocean, including the Gulf Stream, are in the middle of a long-term phase of flowing very rapidly. This is rushing warm tropical waters into the Gulf of Mexico and along the East Coast. The waters are warming the atmosphere and this warm, wet air is wafting inland. Indeed, on December 23, New York City reached a recordbreaking 71°F (21.7°C) and Washington DC was 40°F (22°C) hotter than average. Throughout early winter most of the South and Mid-Atlantic states were near normal and the Southeast Coast was 3° - 6°F (1.6° -2.7° C) warmer than normal.

When cold Arctic air, crashes into wet air, the cool air causes moisture to condense and precipitate out. Since volcanic ash and aerosols filled polar air, there are more particles for the moisture to condense around, causing heavier rains and snows. As a result, we have seen record-breaking snowfall from the Rockies to the East Coast.

Unfortunately, this moisture has not penetrated the West. Cold dry polar air swept the Northern Pacific and Western States. The waters off the West Coast are cool, meaning the marine airs that the prevailing westerly winds have blown inland have held less moisture than usual. As a result, California is ending one of its driest years on record. Despite the fact that October through March are supposed to be the region's wet season, California has





Negative Arctic Oscillation

received little rain. Similarly, almost all of Oregon and Washington are dry or in drought. Only the Northern and Eastern Rockies are receiving near normal snow and moisture.

In other words, we are still seeing a distorted pattern of US precipitation. Although the US has been wetter in 2013 than it was in the hot dry year of 2012, most of the contiguous continent remains in dry or drought conditions. The year started with 72.8% of the lower 48 states dry and as it draws to a close, 53.7% is still

US Drought Monitor January 1, 2013



US Drought Monitor December 24, 2013



figs. 4A-B After a year, over half the contiguous US is still dry or in drought.

http://droughtmonitor.unl.edu/DataArchive.aspx

dry. The only good news is that only 31% of the nation is in drought, compared to 61% twelve months ago.

The Chill of Mid-Winter

This December has shown an 80% similarity with past years that displayed the same alignment of natural climate factors. It is probable that winter will continue to follow this historic pattern.

In the past, early winter was a time of clashing

southern warm, wet air and cold Arctic air – a time of heavy snow and storms. As westerly winds blew the storms out to sea, they disturbed the surface of the Atlantic, cooling the water. Eventually most of the Northeast Atlantic had cooled to normal or even below normal winter temperatures, while the Northwest remained warm. This would shift atmospheric temperatures and air pressure, changing Arctic winds.

The circumpolar winds blowing around the Arctic are visibly weakening. Experts are projecting that the winds could be as

much as 3, even 4, standard deviations weaker than usual, allowing the cold Arctic air to pour deep into North America. At the same time, the cooled Atlantic has stopped creating as much warmth throughout the South. In 80% of similar years, this created a cold US from the Great Plains to the Atlantic, the Great Lakes to the Gulf. Typically, the East see rapidly moving storms in mid-winter, including multiple Nor'easters that rip up the coast, leaving heavy ice behind. In 60% of similar years, the late winter saw the movement of storms slow in late winter, increasing the cold westward through the Rockies. In 40%, but only 40%, of these years the cold spread from coast to coast.

Other factors shaped conditions in the West. The Pacific has become increasingly neutral, in both the tropics and the oceanwide Pacific Decadal Oscillation:

- The majority of international climate and oceanological organizations project a neutral Tropical Pacific, with neither an El Niño nor La Niña through this winter and early spring. A total of 80 – 90% of all organizations agree.
- At the same time, the ocean wide pattern of the Pacific Decadal Oscillation, which has been trending negative since 2006, is weakening. On a scale that theoretically could range from +3.0 to -3.0, the measurements have dropped from -1.25 to -0.11. What this means is that the ocean is going from a pattern of colder than average temperatures in the Tropical and Eastern Pacific and warmer waters in the west and Polar Regions to a pattern where most of the waters are near normal. [See Figure 9]

These changes in the Pacific means the Pacific will not increase and may decrease the amount of moisture along the West Coast. Indeed, the constant small



figs. 5A-B Most models expect a negative Arctic Oscillation in early and mid January, which will let Arctic air pour into the US.

http://www.cpc.ncep.noaa.gov/products/precip/ CWlink/daily_ao_index/ao.sprd2.gif



10 The Arctic had an unusually cold summer and the cold storms are escaping south.

© Evelyn Browning Garriss

eruptions of the active volcanoes on Russia's Kamchatka Peninsula are pouring their debris into passing cold fronts, cooling the air. The cold air hitting the coast holds less moisture than normal resulting in 3 - 12inches (7.6 - 30.5 cm) less precipitation through Washington, Oregon and Northern California.

There is nothing on the horizon that seems likely to change this Western scenario. The drought in the West will probably continue and intensify. This will present some real problems for California's winter crops and spring planting as well as western hydroelectricity. The reports from California's snow stations show that the moisture in the Northern Sierras is 4 - 12%of normal, while the Central and Southern mountains have 8 - 24% and 10 - 34% of normal respectively.

There is some indication that an El Niño may arrive in late spring or early summer. If so, then spring is a time of transition, presenting a very conflicting picture. The only trend that is visible for 80% of these types of transitions is that California, particularly Southern California remains dry. In most of these similar years, without more volcanic eruptions, the East and Southern Plains show signs of early warming and the Midwest gets normal moisture. The picture should come in better focus as the Pacific continues to change and we see whether the current warming is merely the movement of small weather patterns or an ocean-wide evolution.

For energy suppliers, the winter looks delightful. For consumers, bundle up - figs. 9A-C * Pacific volcanos may bring more but prepare for a much more normal and moisture to the Northwest © Evelyn Browning Garriss comfortable spring.



EARLY SPRING

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

Departure from Normal Precipitation (inches) December 1-29, 2013 fig. 7, far left Generated 12/30/13 at HPRCC using provisio Regional Climate Centers

Most experts expect the **Tropical Pacific** to be neutral through winter and spring. http:// www.cpc.ncep.noaa.aov products/analysis_monitorina/lanina/enso evolutionstatus-fcsts-web.pdf

fig. 8, left The West Coast drought is intensifying

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

Early December CPC/IRI Consensus Probabilistic ENSO Forecast



El Niño – Maybe

SUMMARY

A number of climate and oceanology labs predict an El Niño this summer. The type of El Niño, a normal or Modoki event, will make a huge difference to the US and global weather, agriculture and economy.]

One of the most hopeful signs for North American climate is that there are trends that suggest the Pacific may produce an El Niño. Both the Tropical Pacific and the entire Pacific Decadal Oscillation are currently neutral but warming up. If they evolve into an El Niño, the continent will receive much needed moisture. Indeed, a strong El Niño could end the widespread drought that has plagued the US for years.

However, a warming El Niño presents two questions:

- 1. Will the warming continue and linger long enough to become a full scale El Niño?
- 2. If the event does become an El Niño, will it be the right type of El Niño? Recently many of these potential evens became El Niño Modokis instead – which was very bad news for both the East and West Coasts.

The Warming Pacific

There is no doubt that the Pacific is changing. There is widespread disagreement, however, among the different climate and oceanological laboratories, on what will happen in the Tropical Pacific.



fig. 10 http://www.cpc.ncep.noaa.gov/products/analysis_ monitoring/lanina/enso_evolution-status-fcsts-web.pdf The main disagreement is between those models that use pure statistics and those that observe the dynamic development trends of the ocean. Based on pure statistics, the year after a neutral year is neutral. Based on the observed warming in the tropical Pacific, most dynamic models project an El Niño by summer.

Lately the dynamic models have been more accurate than the statistical ones. Most of our most accurate understanding of the tropical Pacific has come since the 1980s, when international scientists started making intensive measurements and satellite observations. Unfortunately, most of those observations were during one phase of the giant Pacific Decadal Oscillation (PDO). From 1976 to 1999 or 2006, (scientists disagree on the exact timing of the phase change) the PDO was in its warm phase, which enhanced the warming of the Tropical and Eastern Pacific. Starting in 1999 and tipping in 2006, the PDO changed to its cool phase. This has not only shifted the temperatures of the North Pacific, cooling the Eastern and Tropical Pacific, but it may have also affected the El Niño/La Niña cycle.

We certainly saw it magnify the impact of cold tropical La Niñas. Since 2006, La Niñas have had created more extreme droughts and flooding. A scientist also projected an El Niño that did not appear. The Tropical Pacific is acting slightly differently.

One of the problems is that the impact of a Madden Julian Oscillation (MJO) can sometimes be mistaken for developing El Niños. These MJOs are localized tropical wind and water climate patterns that flow eastward around the tropics. They typically linger in any one area for about 4 - 8 weeks and can produce warmer or cooler conditions. If a warm MIO is strong enough, it can have the impact of a mini-El Niño. For this reason, most scientists wait for three months after El Niño conditions begin before officially declaring an El Niño event. We are currently seeing most dynamic models predicting an El Niño to arrive this summer, but it is too early to be sure whether the models are merely reflecting

Cooler than normal PACIFIC OCEAN Normal PACIFIC OCEAN Normal Cooler than normal Normal or cooler than nor

the flow of more short-term MJOs. Here at the *Browning Newsletter*, we do expect El Niño conditions to evolve in early summer – but the big question is – what type of El Niño will it be?

The Two Types of El Niños

since 2006

© Evelyn Browning Garriss

Recent science has shown that there are many varieties of El Niño events. In 2004, Dr. Toshio Yamagata of the University of Tokyo noted that the global observations were really observing two different events – El Niños and El Niño Modokis. (Modoki is a Japanese word for "similar but different".) Both of these involve warm water in the Pacific, but they create very different weather. El Niños normally produce excellent weather for North America with warmer winters, few hurricane landfalls and excellent rainfall for US agriculture. Modokis do not.

It makes a huge difference which event develops this summer.

The difference depends upon the location of the warm water in the Tropical Pacific. Scientists monitor four areas in the Pacific to detect an El Niño. Areas 1 and 2 are off Ecuador and Peru. Area 3 is the equatorial East Pacific and 4 is the equatorial Central Pacific.

The traditional El Niño, also called Eastern Pacific (EP) El Niño, involves unusually warm water in the Eastern Pacific.



fig. 12 © Evelyn Browning Garriss

However, over the past two decades, scientists began to observe a new type of El Niño that did not warm Areas 1 and 2. The Central Pacific warmed but the warmth did not extend all the way to South America. Scientists have named this new phenomenon a Central Pacific (CP) El Niño or El Niño Modoki. While scientists debate on whether there should be distinctions between the two, they do have some very different impacts on weather.

The difference in the location of warm and cool water determines where higher and lower air pressures are and these in turn shape wind and weather patterns. An El Niño, for example is so huge that it creates unfavorable wind conditions for tropical storms to develop or survive in the Gulf of Mexico or Caribbean Sea. The smaller Modoki only limits storm development in the Eastern Pacific and allows tropical storms and hurricanes to rage through the Atlantic.

Much of the work on Modoki or Central Pacific El Niños has been done by the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). This is hardly surprising, since some of the most negative impacts of El Niños are in Asia and it is valuable for Asian societies to know whether they are facing a full-fledged El Niño or a less harmful Modoki.

JAMSTEC scientists, working with Professor Yamagata have generated a number of valuable maps that show the differing impacts of the two types of events. The Newsletter will present some of these maps from Jamstec's "Enso Modoki (Pseudo-Enso) And Its Impact On The World Climate", by T. Yamagata, K. Ashok, S. K. Behera, S. A. Rao, and H. Weng. Any reader who wishes to learn more should visit the JAMSTEC website.

The difference in the location of warmer water in the Pacific, not surprisingly, affects the temperatures of landmasses. Correlation studies indicate a summertime (June, July, August and September) El Niño has little impact on most of North America but hits Japan, Korea, and parts of Central and Northern China with cooler temperatures. By contrast, Central and South America are warmer.

Compare this with the Modoki, which correlates with cooler temperatures throughout Southeast Asia, parts of Canada and the Midwest, Northern Australia and northern South America.

While temperatures are important, some of the costliest impacts are on precipitation. While El Niños correlate with droughts in Northern Brazil and Indonesia, Modokis bring droughts to India and the Western US.

A closer examination shows the summertime El Niño brings normal to increased rainfall to most of the US, while the Modoki produces Western drought. The increased moisture in the Gulf is historically associated with more tropical storm landfalls. The El Niño has little impact on Japan and drought to some of China's corn, soybean and winter wheat regions as well as headwaters of the Huang Ho. Modokis shift the rainfall patterns so that drought affects Southern Japan. Northern China agricultural lands and rivers are less affected while dry conditions have more impact on Central China and the Yangtze River and Southern China experiences flooding.

Historically El Niños have been associated with good agricultural years for both the US and Canada and less productivity by many North American competitors. Modoki years usually see strong productivity of Midwestern and Southeastern crops, but more production difficulties in California and Canada's western Prairie Provinces. Given the current western drought, especially in California, a Modoki could be very bad news. Worldwide, however, grain production has been stronger in Modoki years, correlating with lower global food prices such as we saw in 2009.



fig 13 **Temperatures from four zones determine the existence of an El Niño.** http://en.wikipedia.org/wiki/FileEfnso-index-map.png

Starting last November, JAMSTEC warned that their models were projecting a Modoki El Niño rather than a standard event.

Over the next few months, the Pacific needs to be carefully watched. The impact of where the Pacific warms this summer, in the east (El Niño) or just the central region (Modoki) will affect global weather, global weather and the worldwide economy.



http://www.jamstec.go.jp/frcgc/research/d1/iod/enmodoki_home_s.html.en

News Notes

The UN's International Panel on Climate Change keeps being hit by irony. An unusually harsh and frigid winter in the Northern Hemisphere chilled the December 209 Copenhagen Conference that discussed global warming. This year's Warsaw Conference focused on the growing number of extreme weather events. Unfortunately, for the organizers, 2013 was not only low on extreme events; it set records for quiet weather. In just the US, we saw the following records:



Extreme Heat – The number of 100 °F (37.7 °C) days is the lowest in about 100 years of records.

Hurricanes – The 2013 Atlantic Hurricane Season was the 6th quietest season on record, with only 2 hurricanes, neither of which lasted a full day or reached even a Category 2 level of strength. The ACE(Accumulated Cyclone Energy) of the season was 67% below normal. This is the longest period (8 years) since the Civil War Era without a major hurricane strike in the US (i.e., category 3, 4 or 5).



Tornadoes – 2013 had the fewest number of tornadoes on record, 15% lower than the previous quiet year. This spring was too cool to generate many storms.

Wildfires – This year had the fewest US wild fires in 30 years. The cooler weather and the rain, including the good Southwestern monsoon, quelled fire activity.

The sun – Even the sun was part of this pattern with scientists reporting that this solar cycle is the quietest, radiating the least energy, in over a century.

Ironically, the records that this year has been breaking are cold temperatures and snow, which is hardly the problem that the Warsaw Conference was discussing.

It snowed in the Middle East. Cold weather swept the Middle East, snowing in Cairo, Damascus and Jerusalem, even parts of Saudi Arabia. Farther south, deserts saw welcome rainfall. A number of children and old people died from the cold and shepherds scrambled to save their livestock, particularly their lambs. Among the grim stories were photographs of joy – soldiers laughing and exchanging snowballs, not bullets, and refugee center workers showing wide-eyed children how to make snowmen.



2013 was a year of scientific exploration and discoveries. Literally hundreds of new plant and animal species were found. Some of the more intriguing discoveries were:

- ▲ A real chocolate frog Yes, Harry Potter fans, there are chocolate frogs. Named the cocoa frog for its milk chocolatecolored skin, this hopper is only one of six new species found in the jungles of Suriname, in northern South America.
- A new European orchard Scientists looking through old collections found a 170-year-old sample of an orchard that was a unique species. Studied and named the Hochstetter's Butterfly Orchid, the blossom comes from the Azores, islands off the coast of Portugal. It is the rarest breed of orchid in Europe.
- ▲ **A walking shark** Just when you decided that it wasn't safe to go into the water, a shark that can walk was discovered! Fortunately, these 27 inch (70 cm) creatures seem to walk underwater, on the ocean floor and they have never been known to hurt people. Still, strolling sharks is the stuff of nightmares.

📕 Two new primates –

• One was the dwarf lemur in Madagascar. It is tiny, nocturnal, and spends most of its time sleeping near the tops of trees. They think it may be facing extinction with only 50 of its species left, but with a creature this obscure, who knows?

• The second was a cat monkey. Actually, this monkey, which looks like a house cat with a really long tail, had been in museums and zoos for a while. However, a closer look at the specimens, revealed that it was a unique species that had never been recognized. There is now an expedition to the cloud forests of the Andes to see if any cat monkeys are still alive.

It's official – the coldest spot on Earth has been located and, not surprisingly, it's in Antarctica. A shadow-covered valley between two icy mountains Dome Argus and Dome Fuji, has temperatures of -136°F (-93.2° C). This is 50°F colder than any temperatures measured in Alaska or Siberia. These measurements are from 32 years of satellite observations. And yes, this is the same continent where a ship of scientists studying warming temperatures and melting ice has now been trapped by a summertime blizzard and growing ice. Their rescue ship is also stuck.

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Browning Newletter January 2014 page 8 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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