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BROWNING

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Exit La Niña

IN THIS ISSUE

- The La Niña should fade away by late May or early June. Most models expect the Pacific to be neutral for the rest of 2011.
- The retreating La Niña should bring floods and delayed planting in the US grain belt and drought throughout the South.
- The summer outlook is for normal to above normal crop production for the US grain belt.
- The Pacific has reached a tipping point, where the Pacific Decadal Oscillation has turned negative, producing major changes in the world's, particularly the Northern Hemisphere's, precipitation patterns.
- These changes have, over the past two phase changes, produced spikes in food and oil prices, particularly for wheat, corn and soybeans.

See charts on pages 6&7

CONTENTS

SUMMARY

The La Niña is retreating, setting up conditions for a troubled springtime planting season and a good summer growing season.

This winter, North America was smashed between three huge weather shapers – a strong La Niña in the Pacific, a strong negative Arctic Oscillation in the north and a super-warm Atlantic Ocean to the east. The result was a terrible winter, with record blizzards and freezes that reached as far south as the fields of Florida and Mexico. The good news is that it looks as if two of these three crushing climate factors are finally disappearing and will be gone by summer.

Goodbye to the Negative Arctic Oscillation

The first to go was the negative Arctic Oscillation, the force that let the polar air mass enfold most of North America.

The Arctic Oscillation is the index measuring how strong the circumpolar winds are blowing. When the Arctic Oscillation is positive, the winds circling the North Pole are strong. They trap the freezing polar air mass in the Arctic Circle. Temperatures remain cold and the sea ice freezes.

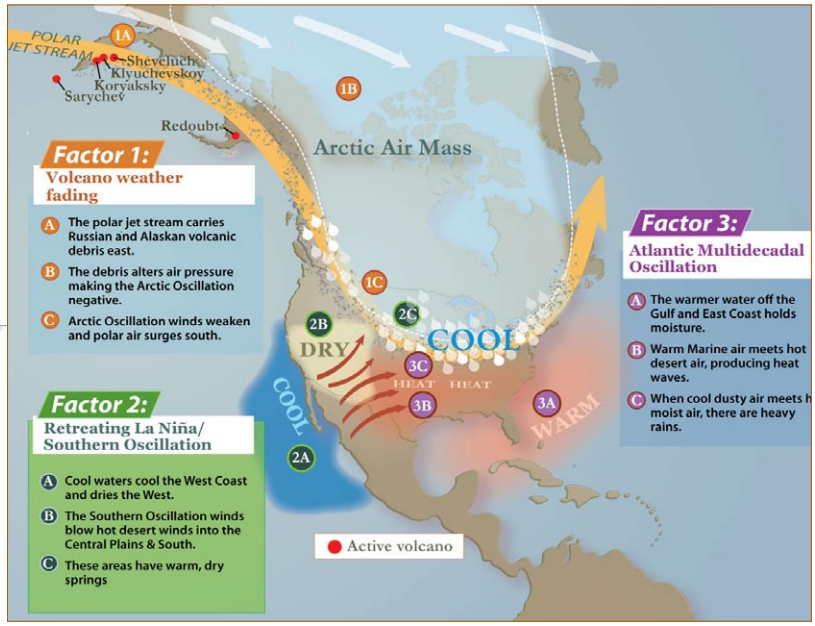


FIG. 1 **Weather factors shaping spring**

This newsletter contains articles, observations and facts to support our contention that man is significantly influenced by the climate in which he exists. Our calculations show the climate, over the next term, will cause dramatic changes in our social and economic patterns.

We feel that the reader, attuned to the changes that are occurring, may develop a competitive edge; and, by understanding his now and future environment, can use the momentum of change to his advantage.

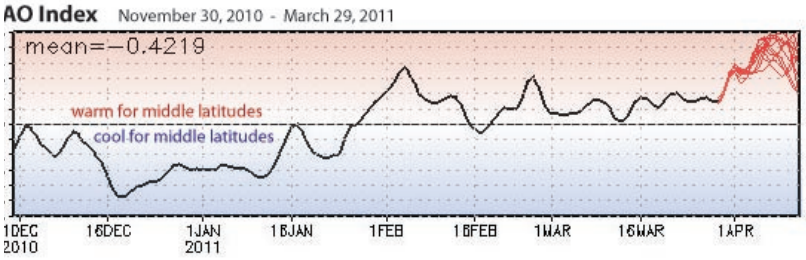


FIG. 2 **The Arctic Oscillation – Negative last winter and positive this spring**

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

When the Arctic Oscillation is negative, the reverse is true. The winds are weak and the freezing air escapes south. There is an almost paradoxical effect. The lands south of the North Pole are unusually cold. The Arctic, with less concentrated cold air, is actually warmer. The sea ice gets scattered into the warmer Atlantic and Pacific and melts. Scientists issue dire warnings that the Earth is warming while millions of people in North America, Europe and China shiver in the cold.

This winter, the Arctic Oscillation was strongly negative, reaching record depths in mid-December and remaining low most of December. It became neutral in February and is expected to be strongly positive most of this spring.

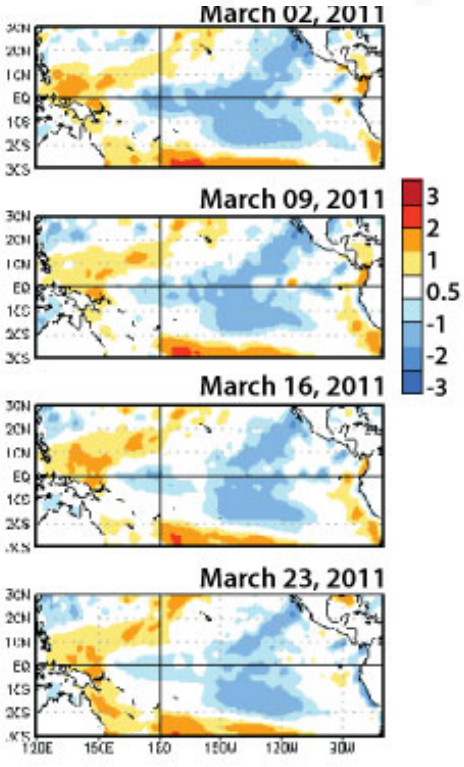
Part of the reason for this winter's extraordinary AO was due to the volcanic activity in the North Pacific. For the past two years, a number of volcanoes in Alaska and Russia's Kamchatka Peninsula have been very active. They have shot ash and chemicals as high as the stratosphere, so high that it will take years for the debris to precipitate out.

In the process, the materials changed air pressure, altered wind patterns and mixed with water to form huge clouds that blocked incoming solar radiation. This was responsible for the cool summer and winter of 2009. The debris continued to cool the middle latitudes and caused the heavy rains and snows of 2010 and early 2011.

Currently the volcanoes have been much quieter, although both Kizimen and Karymsky on the Kamchatka peninsula had moderate eruptions in mid-March, (6.1 – 7 km/3.7 – 4.3miles and 5.8km/3.6 miles respectively). These were not large enough for long-term weather effects, but they entered passing cold fronts and are partly responsible for the storms that lashed the US and Canada during the last week of March.

Goodbye to La Niña

The negative Arctic Oscillation faded in late January. La Niña, the huge pool of unusually cool water in the tropical Pacific is fading now. Since last summer this cold water has cooled the air above it, altering air pressures and winds. Since the pool was over a million square miles in size, it affected a vast amount of air, changing weather patterns all over the globe.



FIGS. 3-6 **La Nina - fading fast**

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

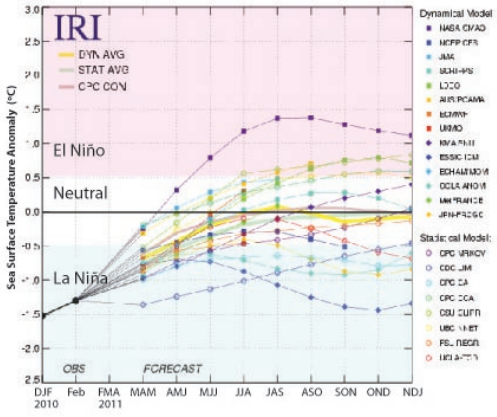
The phenomenon peaked in December and January. Now the tropical Pacific is warming up. Indeed, the La Niña is disappearing far more rapidly than almost anyone expected. This is great news for the US but it can produce whiplash in other nations.

Initially the different weather models projected a lingering La Niña and a possible return by next winter. Notice how the international models (figure 7) waver between predicting the La Niña will switch to an El Niño, as it did in 1976 to returning to another La Niña next winter, as it did 1999 and 2000. The average of all these models has the La Niña disappearing in May or June and the Pacific remaining neutral for the rest of the year.

The US models of NOAA's Climate Forecast System are more unified and more surprising. Two months ago they seemed to indicate a prolonged La Niña and a possible return. Now the charts, based on how rapidly the Pacific is warming up predict that the tropical Pacific will have neutral (less than -0.5°C/-0.9°F from normal) conditions sometime in April, although the event will not officially be over by late May or early June. They then indicate a potentially warm neutral Pacific or even a possible weak El Niño.

Looking Towards the Summer

If the NOAA models become reality (and they have a fairly good record) then this is great news for consumers, especially US consumers. La Niñas create severe problems for US agriculture. They produce cold, stormy springtimes followed by summers filled with heat waves and droughts. The key is if the La Niña lingers into July it usually hurts the US corn crop. El Niño summers, on the other hand, tend to be cooler and wetter and produce good crops throughout most of North America.



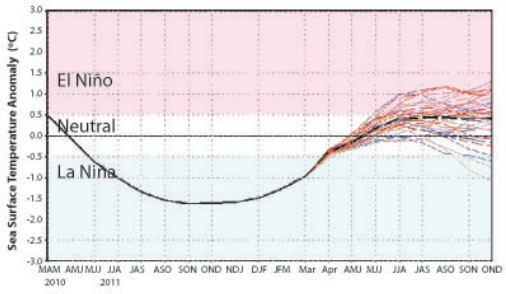


FIG. 7-8 **International Models predicting La Niña's disappearance** *(left)* **and US Models** *(right)*

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

If the La Niña ends in May or June, then the outlook for upcoming weather based on the 5 most similar years is:

MID-SPRING – The weather in the Western States and southern portions of Canada's Western Provinces should continue to experience colder than normal weather. The Midwest and Great Lakes should have storms and heavy snow melts with potential heavy flooding. Expect crop planting delays. Only portions of the Southwest and Northeast to experience warmer than average weather.

The big question for the South is rain. Much of the South is extremely dry with Texas having the worst drought in 44 years. The drought has damaged the winter wheat crop and is forcing ranchers to cut back their herds, despite the rising demand and prices for meat and grain. In 40% of similar years, the middle of spring was bone dry while 60% had near normal rainfall – not enough to repair the shortfalls but enough to get some plants into the ground. Typically the rainfall has been best for the middle Gulf States and Upper South, but poor for West Texas and Georgia.

LATE SPRING – In 80% of similar years, the Midwest and Great Lakes continued to have problems with heavy rains and delayed planting. Similarly, in 80% of similar years Canada's Western Provinces and the Northwest, Northern Rockies and Northern Plains had cooler than average temperatures. Finally, in 80% of similar years, the Southeast returned to drier than normal conditions. In 60% of the years, the dry weather extended all the way up the coast to Canada's Atlantic Provinces. In most of these years, the Southwest and California had some extremely high temperatures.

OVERALL – most of the years with similar factors had a worrisome planting season. In more recent decades, these concerns were reflected in continuing high food prices.

SUMMER – Typically years with similar conditions end up receiving enough moisture and heat for the grain belt to recover from late plantings and produce a normal to above-normal US crop, although cool conditions did continue to plague some of Canada's Prairie Provinces. In most of these years, the South received normal rainfall, enough for crops, but, as 2008 showed, not enough to end water wars over below normal reservoir waters. In 60% of similar years, the East Coast had a heat wave, as did parts of California and the Southwest.

Of course, if the Pacific Northwest volcanoes wake up again, conditions could change. Moderate eruptions will bring more rainfall to the West Coast and slightly cooler, wetter conditions to the Midwest.

Looking ahead, unless an El Niño really does develop by fall (unlikely) the hurricane season looks as if it will be lively. Without the La Niña's strong trade winds to steer the tropical storms south of the Gulf Coast, the Gulf of Mexico's oil patch faces higher risks.

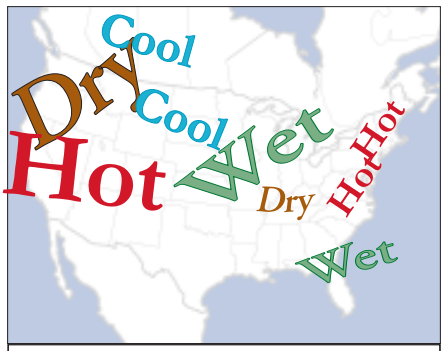
Remember, though, the negative Arctic Oscillation and the La Niña may disappear, but that third weather giant, the superwarm Atlantic, will continue to dominate North American (and European) weather.

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

figs. 9-11 © *Browning maps*

Mid Spring

Late Spring



Summer

The Tipping Point

SUMMARY

Every 20 – 30 years, there is a tipping point when the climate disruptions caused by the changing Pacific Decadal Oscillation, particularly during La Niñas, has a major effect on food and oil prices.]

Every 30 to 40 years, climate reaches a tipping point, changing from somewhat benign to disruptive or disruptive to benign. We have currently reached one of those tipping points toward disruptive.

For most Americans, weather is an inconvenience that can be cured with the switch of a thermostat. Floods and droughts make the news, but usually they happen someplace else, far away. Even farmers, whose produce depends on the weather, can usually adjust by switching seed if the planting season is delayed or irrigating crops if the weather is dry.

In short, while climate is a factor that can affect the economy, for most Americans, indeed for most Western societies, it is the most ignored factor. This year, we are in period of massive climate disruption and this ignorance is dangerous.

People choose to invest in what has worked for most of their lifetimes. Unfortunately, we have reached a tipping point, a period of massive climate disruption, and conditions have changed. Investment models will have to be adjusted to cope with these new climate realities. Investments need to be positioned accordingly.

The last time we faced a similar tipping point – the 1970s – global economies took almost a decade to adjust. Those who positioned themselves correctly in the late 1970s were in an ideal position to enjoy the prosperity of the 1980s and 1990s.

The Game Changer – The Pacific Decadal Oscillation

As the first article in this issue indicated, ocean temperature and air pressure are major factors in shaping global weather. The oceans cover 70% of the Earth's surface. They are major reservoirs of heat from solar radiation. They store the heat and their currents move this heat around the globe.

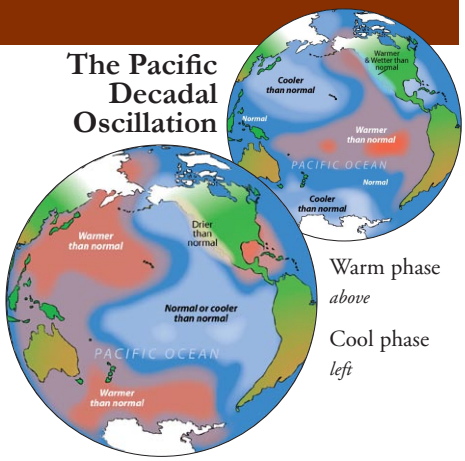
El Niños and La Niñas are specific short term tropical ocean patterns whose affects are felt around the world. The Pacific Decadal Oscillation **(PDO)** is much bigger. It affects the entire northern Pacific Ocean. Unlike these smaller tropical oscillations, which normally last 6 – 18 months, the PDO takes 20 to 30+ years to go through its warm and cool phases.

This means the PDO makes a huge impact on global weather and this impact lingers for decades.

The Pacific Decadal Oscillation or as some papers call it – the Pacific Decadal Variation – is a long and complex shift of water temperatures and high and low pressure areas with accompanying changes in wind speeds and ocean currents. Basically, it is a movement/shift of warm and cool waters in the Pacific, particularly in the northern portions of the ocean.

Most of the world's population lives in the northern hemisphere, so the changes in the PDO change the climate for billions of people. In the positive (warm) phase, the tropics and eastern Pacific waters are warm and the polar and western waters are cooler than normal. In the negative (cool) phase, the reverse is true. The complete cycle lasts 50 – 70 years with each phase lasting roughly 20 – 30+ years.

Notice, the PDO is a long term trend, not an absolute change. When it turns positive, warming the tropics and the American shores, it can be interrupted by a cool La Niña. When it turns negative, cooling the tropical and eastern waters, it can be heated up for a year or two by a strong, hot El Niño. These alterations are short term.



FIGS.12-13
The Pacific has been in a cool phase since 2006

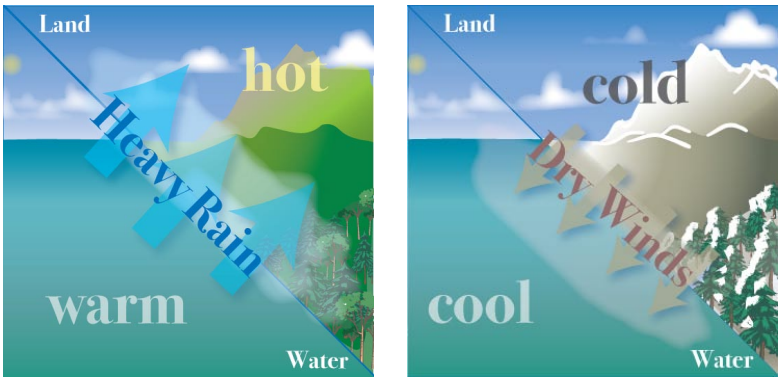
The Last Tipping Point – the PDOs of the 1970s

Let's look at the climate impact of each phase of the PDO. In the early 1970s, the PDO began to switch to its positive phase and settled into its warm pattern by 1976/1977.

The impact was felt on both sides of the Pacific.

Starting in the early 1970s the eastern and tropical Pacific warmed. This caused

FIG. 14-15 **Typical Asian monsoons during the positive PDO Summer (left) and Winter**



warmer than average water to flow along the West Coast of the Americas, particularly North and Central America. The water heated the atmosphere above it and warmer air can hold more moisture. The prevailing "westerlies" blew this moist air into North America and it precipitated out. North America had more rain and snow.

Meanwhile the Western Pacific was cooler. This was extremely important because Asian precipitation is dominated by monsoons and water temperatures shape monsoons.

Monsoons are major seasonal wind patterns. The winds change direction, according to the season, and this changes the climate over large regions. Every continent except Antarctica has them.

Monsoon winds are shaped by the difference in temperatures between the land and water. Land heats up and cools down more quickly than water. In summer, land reaches a higher temperature than the ocean. The hot air rises, creating an area of low pressure. Air flows in from the ocean to take its place. This creates an extremely constant moist wind blowing toward the land. As the moist air blows inland, it ultimately precipitates out – forming the "wet season".

In winter, the land cools off quickly, but the ocean retains heat longer. The hot air rises, creating a low-pressure area. The cool dry winds from the land blow toward the water. Typically the winds during the "dry season" are not as constant, allowing some moisture from other sources.

Historically, the greater the contrast between the land and the water temperatures, the stronger the monsoon winds are.

When the PDO switched to its positive phase, the waters off of Asia cooled. This meant that in winter, the cool waters are more similar to the cold land temperatures, and the dry winter monsoon winds are weaker. In summertime, the winds blowing from sea to land aren't as warm, so the land does not heat up as much. This reduces the flow of the moist "wet season" winds.

As a result, huge areas of Asia had weaker monsoon seasons. This reduced the wet season, leaving huge areas with less water and a poor growning season. For peasants trying to grow traditional crops, it is a major problem.

As the positive PDO phase continued through the 1970s, 1980s and 1990s, societies learned to cope with the new precipitation regime. Occasionally, however, this pattern was interrupted by El Niños and La Niñas. As the powerful El Niños of 1982 – 1983 and 1997 – 1998 showed – the warm PDO magnified their impact. Those events were huge, creating disastrous fires, droughts and floods around the globe. On the other hand, when there was a cool La Niña, the warm PDO lightened the impact of the event.

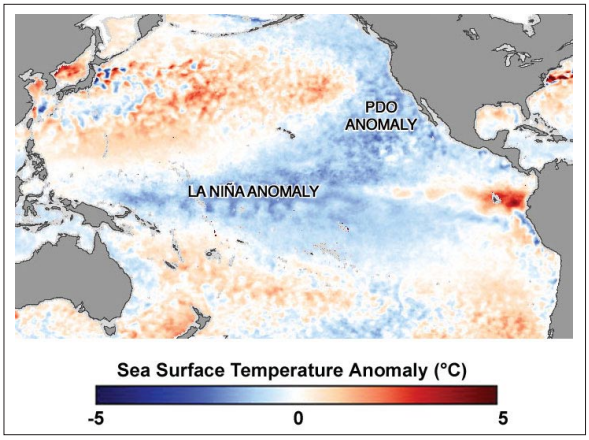


FIG. 16 **A La Niña magnifies the impact of a cold PDO**
http://en.wikipedia.org/wiki/File:La_Nina_and_Pacific_Decadal_Anomalies_-_April_2008.png

The Current PDO Tipping Point

Starting in 1999, the Pacific Decadal Oscillation began to turn negative.

In the new negative phase, the tropical ocean currents and waters off the western coasts of the Americas became cooler. The Western Pacific and the polar waters warmed. The Pacific remained this way for a few years, and then switched back. In 2006 they switched again. Now scientists are claiming that the PDO is in its cool phase, and it will stay that way (with occasional exceptions during El Niños) for the next 20 to 30 years.

Once again, global rain patterns are being shifted, particularly those in the Northern Hemisphere.

The cooler waters off the coast of the Americas hold less moisture. Most of western North America, particularly California, the Southwestern states and Northern Mexico are much drier, and will stay that way for 20+ years.

The waters off Asia have warmed which has, overall, increased most of the continent's monsoons. This has meant stronger monsoon seasons, both the lush wet season and the harsh, frequently cold, dry season. The 2010/11 Asian winter is likely to repeat itself often over the next 20+ years.

At the same time, the negative PDO has an impact on the strength of El Niño/La Niña events. The cooler waters of the negative PDO appear to be lessening the impact of warm El Niños and strengthening the effect of cold La Niñas. Part of the reason that this last winter was so miserable was that the La Niña weather impact was magnified by the current PDO. . Most climate observers diligently report the La Nina/El Nino events and ignore the PDO effects.

A tree-ring study by Rosanne D'arrigo and Rob Wilson, "On the Asian Expression of the PDO", in the *International Journal of*

The PDOs effects on precipitation

Winners	Losers
Midwest US	California/Southwest US
Northern & Central China	Southern China
India	Pakistan
Japan	North Korea
Brazil	Andes Republics/Southern Argentina
Southern Africa	East Africa
Eastern Australia	Western Australia

FIG. 17

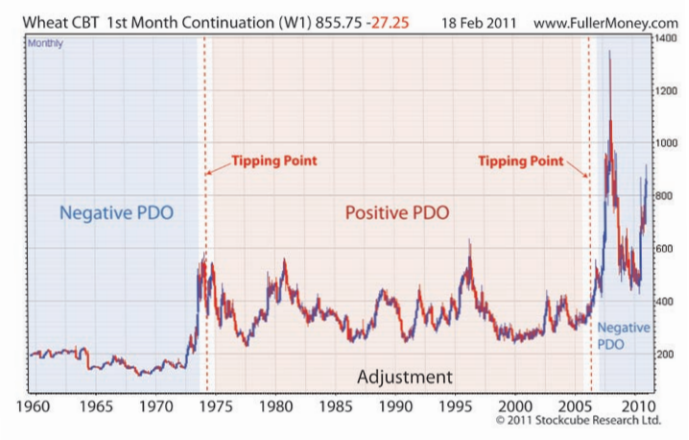


FIG. 18 **When the PDO changes it affects crop production and prices: Wheat Prices 1960-present**

Climatology, Vol. 26: 1607-1617 (March 29, 2006) showed the impact of the changed PDO on global precipitation patterns. The impact can be summed up as winners and losers of precipitation.

It should be noted even being a precipitation "Winner" can be a problem for societies that have adjusted to decades of drier weather. This is particularly true for monsoon societies. While this will eventually mean more precipitation and better crops, the initial stage of the change presents problems for regions used to weaker monsoons. This winter, for example, the winter East Asian Monsoon was so cold and dry that it threatened over a third of China's winter wheat crop and has left North Korea facing wide-spread hunger.

The Economic Impact - Agriculture

Agriculture is one of the most weather-related sectors of the economy. The last time we had a tipping point was in the 1970s. The PDO veered from cool to very warm. Food prices soared. There was social unrest, particularly in the Middle East. Societies adjusted in a decade or so and commodity prices eventually adjusted as well.

The Pacific Decadal Oscillation has reached a tipping point and changed to its cool phase. The change began around 1999/2000 and was fully in place by 2006 – 2008. Precipitation and climate patterns around the world altered. It is also having enormous economic consequences, particularly on agriculture. Since the recent change of the Pacific Decadal Oscillation, La Niñas have had strongly negative impacts on crop production and food prices.

If one examines the price of crops during these phase changes, a pattern becomes apparent. The price of many of the world's most important food crops show price jumps following these PDO tipping points. (Soybean prices jumped when the Pacific began to change.) Eventually prices settle down, but not to the previous levels. Tropical crops, like cocoa and, to a lesser extent, rice, are less sensitive to the PDO.

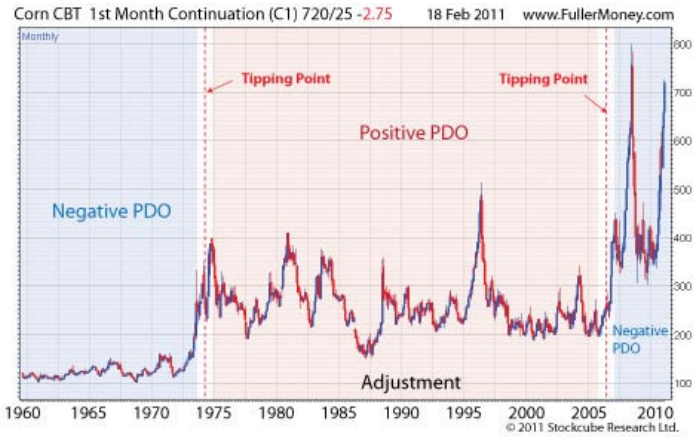
The impact of the current phase of the PDO is causing weather problems, but the problems have been particularly acute during cold La Niñas. The two have worked together through last summer and this winter to cause some acute food shortages. We saw a similar pattern during the 2007/2008 La Niña.

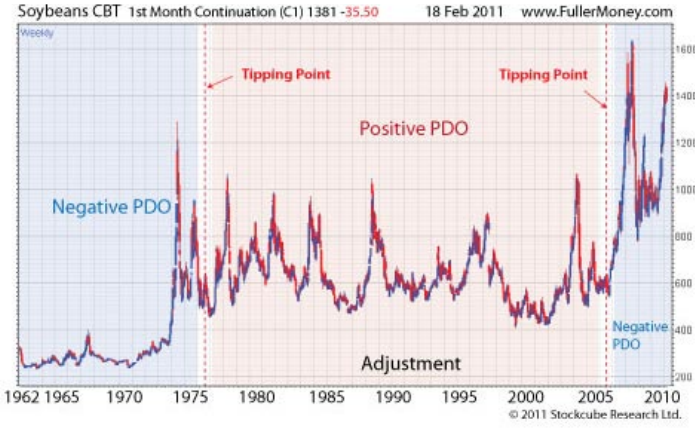
The problem is that most of the world depends on peasant agriculture for their food production. If the rainfall pattern changes in Iowa, for example, the educated farmer will switch crops. He or she may decide to grow soybean instead of corn because the springtime chills delayed planting. This is not an option for the world's peasants. They may not know what crops to grow.

Eventually peasant societies adjust, but it usually takes about a decade. During this time peasants, who are very traditional and conservative, tend to be more open to new crops and techniques. For example, during the turmoil of the last tipping point, there was widespread acceptance of the crops and techniques of the "Green Revolution."

FIGS. 19-20

Corn Prices: 1960-present *(top)*
Soybean prices: 1962-present





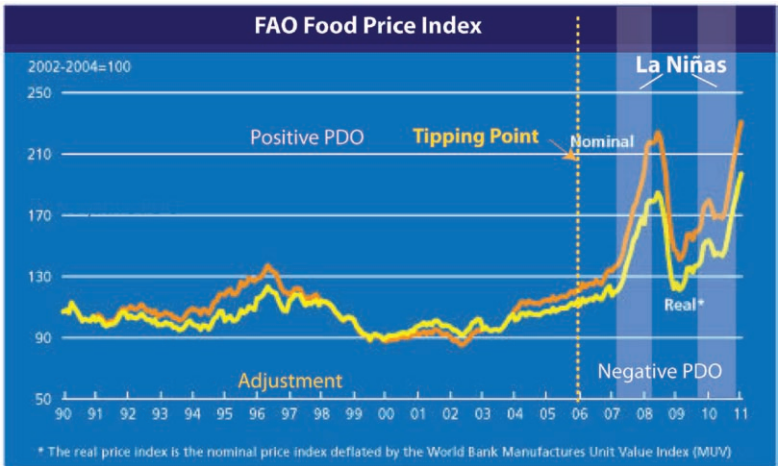


FIG. 21 **Until global agraiculture adjusts to the changed PDO, production will be vulnerable to La Niñas.**
Food and Agricultural Orgainization of the United Nations
www.fao.org/worldfoodsituation/wfs-home/foodpricesindex/en/

The Economic Impact – Energy

Like agriculture, the energy sector of the economy is strongly affected by weather. It is not the sole factor determining prices, but weather can be a game changer. Heat and cold affect energy consumption, while storms and heat waves can limit energy production.

If one looks at the long-term price of oil, one can see the pulse of the changes in the Pacific. Every twenty five to thirty years, prices rise and then settle back down to the new normal. Look at the 1970s. The ocean began its change in the early 1970s, shifting water and agriculture. Social unrest followed. Finally oil prices reached a peak in 1979, with the Iranian revolution. Then prices settled, though at new, higher levels. The Pacific began shifting again in 1999 and prices start to climb, peaking during the 2007/2008 La Niña.

We are in a period of climate problems, disasters and increasing social unrest. Once again oil prices are climbing. Weather and climate change are certainly not the only factors behind these increases, but they are a significant factor contributing to the disturbances in oil-producing nations. If history repeats itself, societies will adjust and prices will settle with occasional upticks during conflicts and strong La Niñas.

Noticeably natural gas, like tropical crops, does not show the pulse of the PDO.

The PDO impact is not just limited to oil. The electric power sector is enormously water-intensive, accounting for 41% of America's freshwater usage. Some of the water is used for hydroelectricity, but fresh water is also vital for cooling nuclear, coal and gas generators. The current negative phase of the PDO reduced the snowpack in the western portions of the Americas. In some portions of the Southwest, the drought has lasted 11 years. Some of the giant lakes that generate hydroelectricity to Southern California fell to 40% of normal levels. The winter of 2010/2011 provided some temporary relief, but the long-term outlook for the area is grim, especially with its ever-growing population.

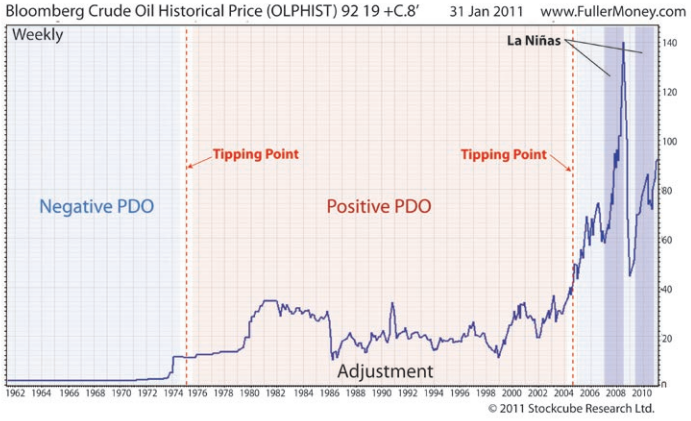
China has seen some similar problems. During this phase of the PDO, the South China Sea monsoon is reduced, particularly during La Niñas. We saw this in 2010 when the worst drought in a century hit Southern China. The months-long dry spell affected 61.3 million residents. Overall hydroelectricity from the southwest power plants was reduced by 40% due to the drought. In Yunnan Province, the generated power was less than 20% of normal while 90% of the hydro capacity in Guangxi Province was considered "paralyzed." The southern provinces coal-fired power plants had to run at full-blast operation to keep the lights on. Since the capacity of coal-fired power plants is very limited in the region, electricity shortages and blackouts were common.

Conclusion

The negative PDO of 20-30+ years is magnifying the disruptive weather impact of La Niñas. Based on history, it will probably take peasant agricultural societies most of a decade to cope with the new climate conditions. Until they do, the world economy faces increased food and energy volatility, particularly during La Niña.

The change began around 1999. Precipitation and climate patterns around the world altered. It is having enormous economic consequences, particularly on agriculture.

FIG. 22 **Oil Prices: 1962-present**



News Notes

California – the drought is over! For three years, California has suffered from drought, but this year's La Niña and volcano weather have yielded record-breaking and much needed snow in the Sierra Nevada Mountains. So far the mountains have received 61 feet (18.6 meters) of snow. Since the range normally gets snowfall in April, there is a good chance that this year will record the most snowfall in California history. Resorts like Squaw Valley are extending their ski season to Memorial Day. So college students – celebrate graduation with a nice ski vacation to California.

On a more serious note – this is wonderful news for California farmers – no more rationing or irrigation cutbacks!

Does anyone else appreciate the irony of Americans basking on tanning beds, chatting on cell phones, microwaving their dinners and then rushing off to get iodine pills because they are afraid of radiation from Japan?

I have been asked about the potential climate impact from the recent tragic earthquake in Japan. The event was so enormous that, according to Kenneth Hudnut of the U.S. Geological Survey, it moved Japan's main island about 8 feet and shifted Earth's figure axis by about 6 1/2 inches (17 cm). Measurements by Richard Gross at NASA's Jet Propulsion Laboratory show it has caused the Earth to spin 1.8 (millionth of a second) faster, shortening of the day.

Despite all this, there is no research showing any link between earthquakes and climate. The only measureable effect that we have seen is that the damaged cities use less energy, so their "urban heat islands" are weaker. Cities have slightly lower temperatures until they are able to rebuild.

Speaking of "urban heat islands" – The just released *UN Global Report on Human Settlements 2011, Cities and Climate Change* reports that the world's cities were responsible for about 70% of all man-made emissions, yet only occupied 2% of the planet's land cover. Since over 50% of the world's population is now living in urban areas, this will be a very tough trend to change. The UN suggests urban planning, but many of the world's cities are struggling just to house the inrushing population, much less control their greenhouse gasses.

One of the unnoticed side effects of Japan's terrible earthquake is that it has started talks between North and South Korea! After months of tense confrontation, the two nations have begun talks – about a deadly volcano. The volcano, Mt. Paekdu (also called Mt. Changbaishan) is on the border between North Korea and China. The peak is considered sacred by both sides. North Korea's leader Kim Jong-Il was born there and its schoolchildren are required to visit the peak to pay respects to the ruling Kim dynasty. It has been over a century since the mountain erupted, but satellite images and science show that its core is still active. Any eruption that caused its enormous crater lake to overflow would be disastrous. In light of the increase volcano and earthquake activity around the Pacific Rim, Pyongyang's earthquake bureau had proposed joint research into any possible activity at the volcano. The talks are going very well and there is some suggestion that it may spark other cooperative meetings.

Springtime typically brings drought and wild fires to the Western US. However one of our most western states – Hawaii – has been having very unusual wildfires. National Park Service firefighters spent a week keeping a fire set by the lava flowing from erupting Kilauea Volcano from burning a protected rain forest. The blaze burned 2,000 acres (809 hectares) of the park but now seems to be suppressed.

La Niña's last gasp – La Niña usually bring drought to the Americas, but Asia gets rain, lots and lots of rain. In mid-March, Jakarta, Indonesia had a storm that uprooted trees, caused widespread flooding and extensive damage. It even hailed, something most Indonesians never see. The winds peeled away the outside of a mall and ripped a tree, blew it over a police station and slammed it into 14 cars.

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.*

VOLCANO UPDATES

Evelyn Garriss now offers an e-mail update service to notify subscribers when eruptions happen, and how they are likely to affect the weather.

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The Browning Newsletter
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