

BROWNING

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NEWSLETTER

A Fraser Management Publication

Vol. 35, No. 3

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 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.

Triad

SUMMARY: – The combination of three climate patterns, the Arctic Oscillation, the El Niño/Southern Oscillation and the Atlantic Multidecadal Oscillation, have created an unusually stormy winter and should create a wet, stormy spring and a potentially very hot summer

Anyone who is familiar with the “triple witching hour” will understand what is happening with the weather. The expiration of three financial instruments results in extra stock volatility. Similarly, the peak of three climate oscillations, hitting at the same time, results in very volatile stormy weather. Just ask Washington D. C. The volatile “Snowmageddon” closed down the federal government for four days.

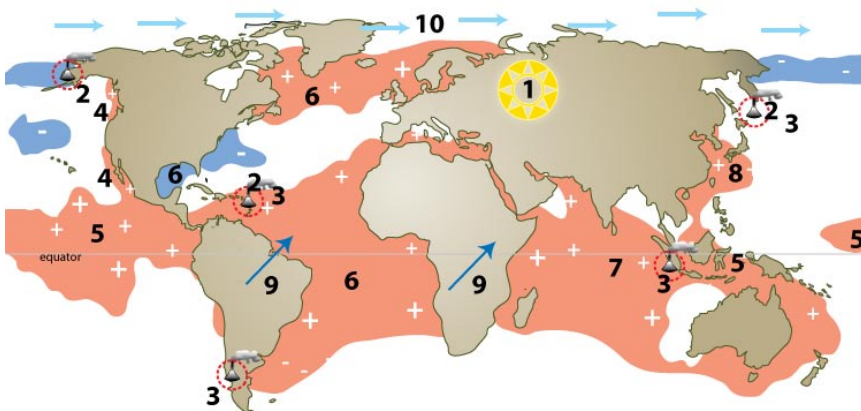
Of course there are a number of factors shaping this winter’s weather, not just the three climate cycles. The sun is currently at the bottom of a solar cycle, radiating less energy. Volcanoes are exploding immediately north and south of the US, sending chemicals high in the atmosphere. The tropical Atlantic is shifting its warmth northward. El Niño is slamming warm water along the West Coast. The Indian Ocean Dipole is heating the Indian Ocean and bringing rain to southeastern Australia.

All of these factors have combined to create a complex and abnormal global weather pattern, especially in North America. In the Northwest, the Vancouver Winter Olympics have been fighting to keep Mt. Cypress from melting into a giant mound of slush during the warmest winter weather on record. In the South, storms have been taking a cross-country road trip

In this issue

- 1 Triad**
A deadly combination of three factors has shaped this cold, wet, winter and will chill the upcoming spring. Looking ahead to the upcoming growing season.
- 6 Looking Beyond North America**
How is this deadly triad affecting the rest of the world?
- 8 NEWS NOTES**

Natural Factors Shaping Winter and Spring’s Weather



- 1 The sun is beginning a new solar cycle but it is still very quiet.
- 2 Large volcanic eruptions have put climate changing debris in the stratosphere.
- 3 Several volcanoes continue to have small and medium-sized eruptions.
- 4 Warm water off the West Coast.
- 5 A moderate El Niño, but Southeast Asia is unusually warm.
- 6 Most of the Atlantic is unusually warm.
- 7 Most of the Indian Ocean is warmer than average.
- 8 Warm water off most of Asia.
- 9 The high altitude Quasi Biannual Oscillation (QBO) winds are westerly.
- 10 Negative Arctic Oscillation (AO), weak polar winds.

fig. 1

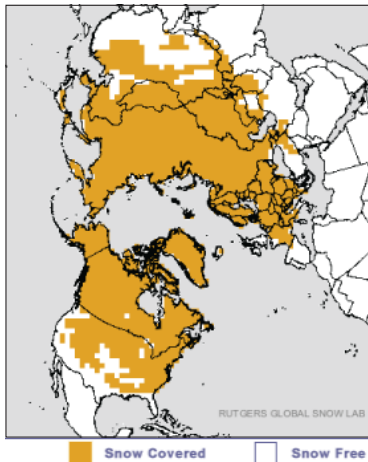


fig. 2 Near Record Snow Coverage Feb 13, 2010

http://climate.rutgers.edu/snowcover/chart_daily.php?ui_year=2010&ui_day=44&ui_set=

on Route 66, and Interstate 40. At one point every state except Hawaii had snow on the ground. Storm after storm slammed the Midwest while Nor'easters ripped up the East Coast. Meanwhile Northern Canada roasted as cold air and winter storms glided south.

The cold weather was not confined to North America. According to Rutgers University Global Snow Lab, the amount of snow in the Northern Hemisphere, covering 20,141,730 sq. mi. or 52,166,840 km², was the second greatest amount on record. Rutgers has been keeping track of snow using satellite observations since 1967 and the only time it has recorded more snow was in 1978. (Ironically, back in those days scientists fretted about global cooling and used the record snow to confirm their fears. Now we are hearing that the snowfall is confirming global warming!) The snow has smothered Europe down to the balmy Mediterranean, portions of the Middle East, China and Japan. China, in particular, has suffered an abnormally harsh winter with the worst blizzards in over six decades lashing the western provinces and freezing northern ports.

While a variety of complex climate patterns have combined to create this misery, three main patterns, the Arctic Oscillation, the El Niño/Southern Oscillation and the

Atlantic Multidecadal Oscillation are the major culprits. All three of these have united to make this winter memorable. The big question is whether they will continue to make 2010 a year of misery.

North and South - Cold and Dusty

One of the trends that is still continuing is the high level of volcanic activity. Climate oscillations swing back and forth and the impact of volcano eruptions are one of the driving forces of these cycles. The dust and chemical debris from these explosions change the atmosphere and change the climate. Specifically, they change the Arctic Oscillation.

Moderate volcano eruptions, if they are over 3 miles (4.8 km.) high have three effects that alter climate.

- The ash, which is a mixture of rock and volcanic glass, reflects back incoming sunlight. It also absorbs infrared radiation (heat). Less sunlight reaches the surface below. This causes cooling.
- The chemicals especially sulfur and hydrogen chloride, mingle with the water in the atmosphere and form shiny clouds which reflect back and block incoming sunlight. This causes cooling.
- Both the ash and the chemicals form clouds of micro-droplets that last unusually long periods of time before precipitating out. When they do

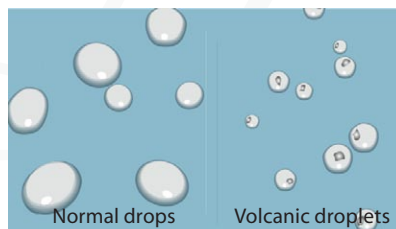


fig. 3 Volcanic aerosols (right) are tiny, and can linger for years in the the atmosphere. They make long lasting clouds of microdroplets.

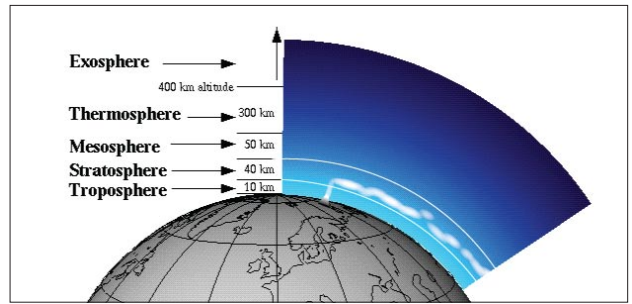


fig. 4 When volcanic debris enters the stratosphere, it can affect the climate for years!

<http://www.eduspace.esa.int/subdocument/images/image3.gif>

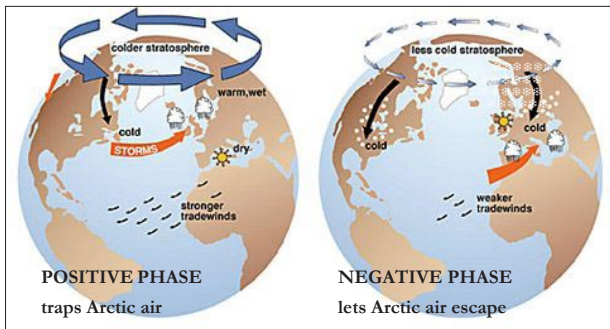
finally gather enough moisture to precipitate out, the dense clouds create abnormally heavy downpours of rain and/or snow.

The higher the column of volcanic debris goes, the longer it lasts in the atmosphere and the longer it affects the weather and climate. Smaller eruptions have only local effects for a day or two. The effect from moderate eruptions can last for a few weeks and be felt hundred, even thousands of miles away. Stronger eruptions, however, can soar past the layer of air closest to the earth, the troposphere, and enter the higher stratosphere. Once it enters the stratosphere, the dust can orbit around the Earth. The impact on the weather lasts much longer; indeed they can affect the weather for two or three years.

The stratosphere starts roughly 6 miles (10km) above the Earth over the warmer middle latitudes and 5 miles (8 km) above the poles. It stretches higher to over 31 miles (50km) above the surface before fading into the even thinner mesosphere. Between it and the lower troposphere is the electrically charged ozone layer. The air in the stratosphere is thin and relatively stable, Winds at this level last for months. Increasingly scientists have learned that the winds in this layer have a prolonged impact on the weather closer to the earth.

Scientists have also discovered that when volcanoes erupt high enough to enter the stratosphere, they have a fourth affect on the climate.

- The ash absorbs solar radiation and warms up. This heats the stratosphere. The thin stratospheric air expands. Meanwhile the lower level of air, the troposphere is not only cooling



figs. 5-6 **This year negative AO has created a cold winter.** courtesy J.Wallace, University of Washington, source: NSIDC

because it is receiving less radiation, it is also having abnormal pressure on it from above. This changes the air pressure and winds of the lower level of air.

Over the last 3 years we have repeatedly had eruptions that have penetrated the stratosphere. Last year had two major eruptions, Mt Redoubt in Alaska and Sarychev Peak on Russia's Kuril Island. This year, the volcanoes on Russia's Kamchatka Peninsula have been especially active and in mid-January Mt. Klyuchevskoy blasted debris from 4.5-8 km (2.8 – 5 miles) high. Even more dramatically, Soufrière Hills on Montserrat Island in the Caribbean exploded 15 km (9.3 miles) high on February 11.

Soufrière Hills has been quietly rumbling since its giant explosion on May 2006. Originally a pleasant island that had a recording studio used by the Beatles, its

volcano woke up in 1995. The northern portion of the island and the capital city, Plymouth, were evacuated. This February, the dome that had been growing in the crater collapsed. Lava from the explosion flowed 300 – 400 meters (or yards) out to sea and blew ash almost 10 miles high. The surrounding islands of Guadeloupe, Dominica, Martinique, St Lucia and Barbados have been covered with falling ash. Meanwhile winds are carrying the ash across north and northwest towards the Gulf of Mexico, Mexico and the southern states.

All of these eruptions have put ash and chemicals high into the stratosphere where they are forming icy reflective clouds that will linger for months, even a year or more. They will continue to alter stratospheric temperatures and wind patterns. At the same time, they are altering the air pressure of the air below the stratosphere, the atmosphere where our weather is formed.

This is where the volcanic eruptions in remote islands and peninsulas evolve into shivering cowboys in snowy Dallas Texas.

How much the cold polar air enters the US is determined by the Arctic Oscillation. This oscillation is a measure of north-south differences in air pressure between the

northern mid-latitudes and polar regions. These differences shape the winds which circle the polar air mass. When the AO is negative, as it has been this winter, air pressures are unusually weak to the south and high to the north. This makes the winds very weak and the cold air escapes to the south. The Arctic is left warmer than normal and the lands to the south, in North America, Europe and Asia, freeze.

Scientific observation has shown that if the large volcanoes erupt in the tropics, the air pressure to the south is higher and the

**Volcanic eruptions
in remote islands
and peninsulas evolve
into shivering cowboys
in snowy Dallas, Texas.**

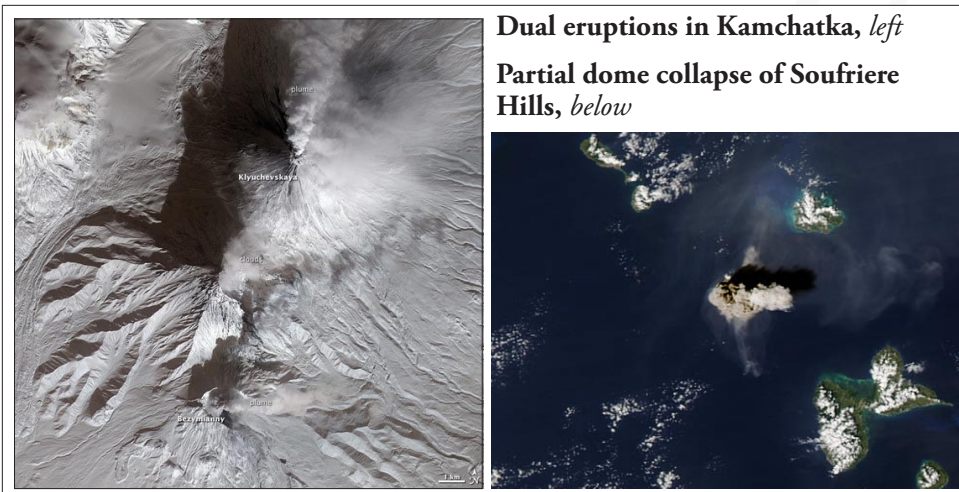
AO is positive. Temperatures in the middle latitudes are warm. Unfortunately last year all the major eruptions were in the Arctic, so the AO was more negative than it has been in over 60 years of observation.

Hopefully the large tropical eruption of Soufrière Hills in the Caribbean will moderate the air pressures enough to ease the negative AO this spring. However, by next winter global winds will have carried its debris to the northern stratosphere and we face the risk of another cold winter.

East and West – Warm and Wet

The first of the three climate-changing patterns shaping this winter, the Arctic Oscillation, is being shaped by volcanic activity. The volcanoes are still erupting. Their climate changing debris will linger for months.

The other two patterns are the El Niño/Southern Oscillation and the Atlantic Multidecadal Oscillation. They are shaped by ocean temperatures. Like the volcanic aerosols in the air, they



Dual eruptions in Kamchatka, left
Partial dome collapse of Soufriere Hills, below

above: <http://www.examiner.com/x-25803-Natural-Disasters-Examiner~y2010m2d18-Amazing-satellite-image--Dual-erupting-volcanoes-in-Kamchatka-Russia>

above, right: <http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=42688>

figs. 7-8

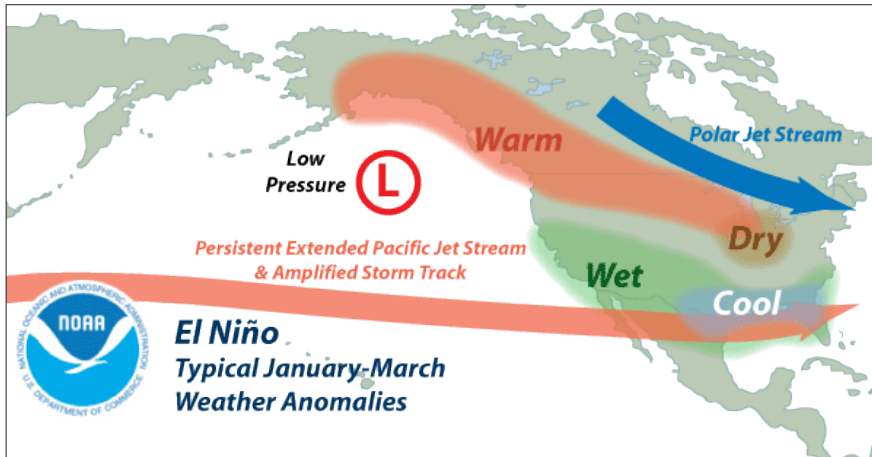


fig. 9 Typical Moderate El Niño Winter Weather

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

are going to continue for a while. Both create warm, wet weather. When this moisture collided with the cold dust Arctic Oscillation air mass, it creates huge storms.

The ocean and atmospheric phenomenon, the El Niño/Southern Oscillation (ENSO) is shaping the Pacific weather. An enormous area of the tropical Pacific has become warm. (The exact cause of the El Niño warming is not really understood but it seems to involve strengthening and weakening trade winds and, sometimes, underwater volcanic activity.) The warm water heats the air above it, changing atmospheric pressure and winds. Think of that large mass of warm air as a rock in a stream. Normal atmospheric currents have to change directions to flow around it. This warm equatorial water drifts eastward, until it is against South America, then it flows up and down the west coasts of the Americas.

The result is that the West Coast of Mexico,

the US and Southern Canada have abnormally warm water and air off shore. The normal prevailing westerly winds carry this warmth inland. Just ask Vancouver, which is hosting the Winter Olympics while experiencing the warmest winter in 114 years.

Typically in an ENSO, El Niño refers to the warm water and Southern

Oscillation refers to the changed weather patterns. One of the changed patterns is that the tropical or Pacific jet stream is shifted north. This means unusually warm wet air is moving through the southern tier of states. The Arctic jet stream is also shifted north, especially in the western portion of North America. This year, however, the Arctic Oscillation has forced the northern jet stream south, far enough to collide with the Pacific jet stream. The result has been heavy snow and rainfall. The week that all of the lower 48 states had snow, it was because the Arctic Oscillation had collided with the Southern Oscillation.

The last of the three climate patterns is the Atlantic Multidecadal Oscillation. Like the El Niño, it is a combined ocean and atmosphere pattern. Basically the Gulf Stream and other Atlantic currents are in a long-term phase of speeding up. They are carrying more of the tropical Atlantic waters north, heating up the North Atlantic.

What this means is that warm water is heating up the Gulf and East Coasts, providing plenty of warm, moist air.



fig. 10 Three strikes against the moderate El Niño

© Browning maps

When the cold and dusty Arctic Oscillation slams into this moisture it causes rains and snows. When the combined Arctic Oscillation jet stream and the warm, wet Pacific jet stream hit the moist AMO air, the result is record setting snow and ice storms.

Will This Go On – Looking Towards Spring and Summer

Will the three factors that have shaped the cold and stormy winter continue to create abnormally cool weather this year?

The first question is how long these three patterns will continue.

- The dust and chemicals from recent volcano eruptions should continue to linger in the atmosphere for at least another 6 to 9 months. At the same time, the volcanoes in Kamchatka continue to be restless and, according to Russian scientists, three of them could go off again at any time. While the Arctic Oscillation is usually a wintertime phenomenon, the risk of the polar air mass diving unusually far south due to volcanic cooling will last into early summer.
- **THE EL NIÑO/SOUTHERN OSCILLATION** peaked in late December and is currently declining. The Tropical Pacific temperatures should be neutral sometime in May to July. After that the models scatter from predicting a returning El Niño next winter to a cool La Niña by fall.

- **THE WARM ATLANTIC MULTIDECADAL OSCILLATION** will last for another 15 to 20 years. Expect warm waters in the Gulf and Atlantic to heat up temperatures this summer.

This makes the upcoming growing season very unusual. The last time we have seen any remotely similar conditions were one year in the early 1970s and two years in the 1950s. In four of the five years with the most similar natural conditions, there was a cool early spring with plentiful rainfall and three of the years had very hot mid-to-late summer.

EARLY SPRING – Spring’s weather will depend on the activity of volcanoes in the Northern Pacific. In most El Niño years, the cool early spring warms up rapidly in Southern Canada and the northern states. The southern tier of states remains cool. Nor’easters and heavy rain storms rampage along the Southeastern and Mid-Atlantic coasts, occasionally hitting the Northeast as they did towards the end of February. However, if the northern volcanoes remain active, (they probably will) the Midwest will be much colder and wetter. While this will avoid drought concerns in the eastern Corn Belt, it may lead to flooding and wet fields.

LATE SPRING – Late spring is very hard to project because almost every similar year has been incredibly volatile. Even years without much volcanic activity tended to have warm and dry conditions through most of the West, warm conditions in most of Canada and plentiful rainfall in the Midwest and East. (The one year that was different had extreme drought in the

coastal Southeast.) Two of the years had a strong warm spell and sudden melting that caused heavy mid-western and Ohio Valley flooding. In most of these years, conditions were cool and wet enough that planting was delayed in much of the Corn Belt and many farmers switched from corn to soy.

SUMMER – Three out of five similar years had a very wet early summer in the Midwest. Four of the years had mid-to-late winter heat waves throughout Eastern Canada and the Middle Atlantic, Northeast, and Midwestern states. The same four years had a tropical storm/hurricane hit Texas in August. The Southwestern monsoon was on time but in three of the five years it was more southern than usual, so that Texas got additional moisture and California got almost none. Three of the five years were dry in California, the Pacific Northwest, the northern Plains and Western Canada.

Three of the five years had a very busy hurricane season with two or more hits in the gas and oil regions of the Gulf of Mexico.

So far this year, the triad of the oscillations, the AO, ENSO and AMO, have created a rare and miserable winter. They will continue to plague springtime but hopefully their impact will fade as summer progresses.

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



Early Spring



Late Spring



Summer

figs. 11-13

*If the North Pacific volcanoes continue to be active, these regions will be cooler and wetter.

© Browning maps

Looking Beyond North America

SUMMARY: The same three climate patterns - the Arctic Oscillation, the El Niño/Southern Oscillation and the Atlantic Multidecadal Oscillation are affecting other areas of the world as well. Add a fourth pattern, the Indian Ocean Dipole, and it will be an interesting year for agriculture.

Europe

Not all of this winter's weird weather was concentrated in North America. The Arctic Oscillation (AO) is plunging deep into Europe. Additionally, the Atlantic Multidecadal Oscillation (AMO) has warmed the Atlantic and this has given the winter storms more energy. England is suffering its coldest, winter in 35 years. Heavy snows have cut power, closed roads and schools and paralyzed transportation. Accord-

ing to the Federation of Small Businesses, the bad weather has brought the economy to a standstill several times costing £600m (\$926 m) a day. British wildlife is suffering, especially birds which are dying off in huge numbers. One of the most disturbing notes is that 98% of the eels in the Thames have vanished. Since eels are the first fish that repopulated the "biologically dead" Thames estuary in the 1960s, their death is as alarming to biologists as dead canaries would be in a coal mine.

At that, England is getting off much lighter than Eastern Europe. There have been massive power failures and hundreds have died from Germany, through Poland to Moscow. (Europeans name severe winter storms like the US names hurricanes. Ironically, the most vicious storm had the harmless sounding name of Daisy. Europeans were dumped on by Daisy. Death by Daisy.) Moscow has had the heaviest snow since 1966, even though its mayor (as quoted in Time magazine) promised a winter without snow due to superior Russian cloud seeding technology.

Asia and Australia

Europe has had difficulties, but this winter has been much more severe in Asia. There,

nations have been hit by the Asian Triad – the AO from the north, the Pacific's El Niño/Southern Oscillation (ENSO) from the east and the Indian Ocean Dipole (IOD) from the south. This has created a volatile nightmare.

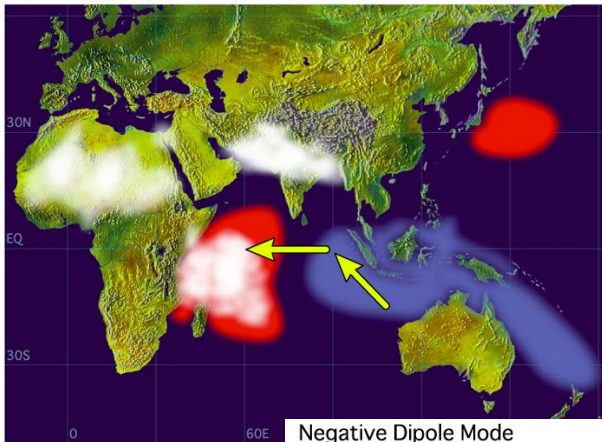
The IOD is an oscillation that controls the monsoons of Southern and Eastern Asia, East Africa and Australia. Almost half the world's population depends on it for the seasonal rains that grow their crops.

Like the better known El Niño, the IOD is a shifting of warm and cool ocean waters that affect atmospheric temperatures, air pressures, winds and weather. A positive IOD is when the tropical Indian Ocean shifts the warmest waters westward towards Africa and the cooler waters are east, by Australia. Typically this shifts rainfall west, with strong, wet summer monsoons in India, Africa and the Middle East. Eastern Asia is left with a milder winter. Meanwhile, Southeast Asia and Australia have drier weather. Indeed, all of Australia's droughts occur during positive IODs or neutral years with an El Niño. Indeed, the deadly "Black Saturday" wildfires swept Australia after the continent endured 3 positive IOD years in a row.

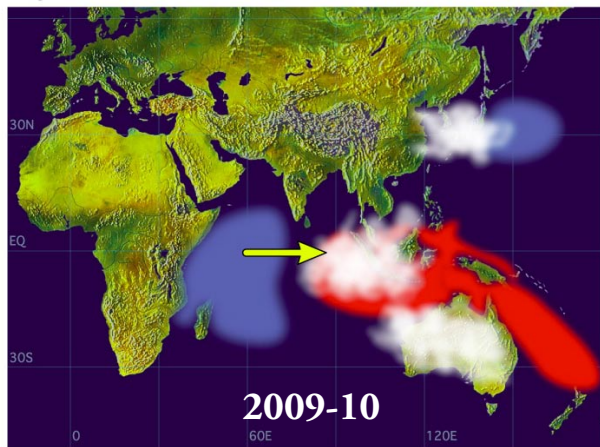
In 2009, the oscillation turned negative. The combined negative IOD and El Niño proved disastrous for the Indian monsoon. Either one would have lessened the seasonal rainfall. Together they cut the desperately needed precipitation by 54% during the planting and early growing season and 23% over the entire summer. Large sections of northern and western India, including Delhi, received only 1/3 of the year's normal rainfall.

The negative IOD/El Niño combination is still hitting Asia hard. It is strengthening the winter monsoon of East Asia and encouraging Siberian cold to plunge further south. Korea has had the heaviest snows on record. Record cold temperatures -58°F (-50°C) have killed almost 2 million head of Mongolia's livestock, leaving wide-spread ruin among the largely pastoral population. Western and Northern China, including Beijing have experienced the coldest and snowiest winter in thirty years. It has been so severe that it has slowed coal mining in

Positive Dipole Mode



Negative Dipole Mode



figs. 14-15

Positive or Negative, the Indian Ocean Dipole makes all the difference for Australia and India.

<http://www.oceansatlas.org/servlet/CDServlet?status=NDOxMjc0MCI2PWUuJmZPSomMzc9a29z2>

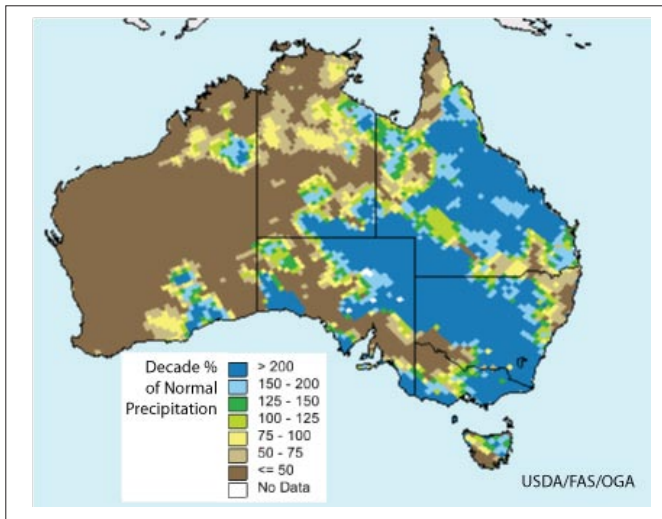


fig. 16 **Australian Precipitation Levels** Feb 11-20, 2010
<http://www.pecad.fas.usda.gov/cropeplorer/imageview2.cfm?regionid=as>
 decade % normal

Shanxi province, which supplies 70% of the nation's energy needs, causing widespread rationing and blackouts. Further south, the winter monsoon forced dry Chinook-like winds to blast southwest China which had already suffered a dry summer. The result has been the worst drought in over 60 years, centered in earthquake-blasted Sichuan province.

Not all nations are being hurt by this combination, however. In India, the stronger winter monsoon has brought plentiful moisture for the wheat crop, which is growing at record levels. In Southeast Asia and Australia, the negative IOD is modifying the drought that these regions would normally suffer during an El Niño. The oscillation is shifting warmer water in these regions. This has given Indonesia normal temperatures and plentiful rainfall, producing a record rice crop.

At the same time, Australia, has been super-heated by the combination of El Niño and IOD warmth. Also, the negative IOD has produced a strong monsoon for the island continent. Heavy rains are breaking the "Big Dry" in the Southeast. Unfortunately, it has not helped southwestern West Australia which, according to a report Nature Geoscience magazine by Tas van Ommen and other scientists, may be suffering the most severe drought in 750 years.

typive by fall, but this will be too late to help India or the rest of Southern Asia.

South America

Between the El Niño warming up the tropical Pacific, the AMO warming the Atlantic and the IOD heating the eastern Indian Ocean, the tropics and the Southern Hemisphere have been quite warm while the northern hemisphere is freezing. Few areas are feeling the warmth more than South America.

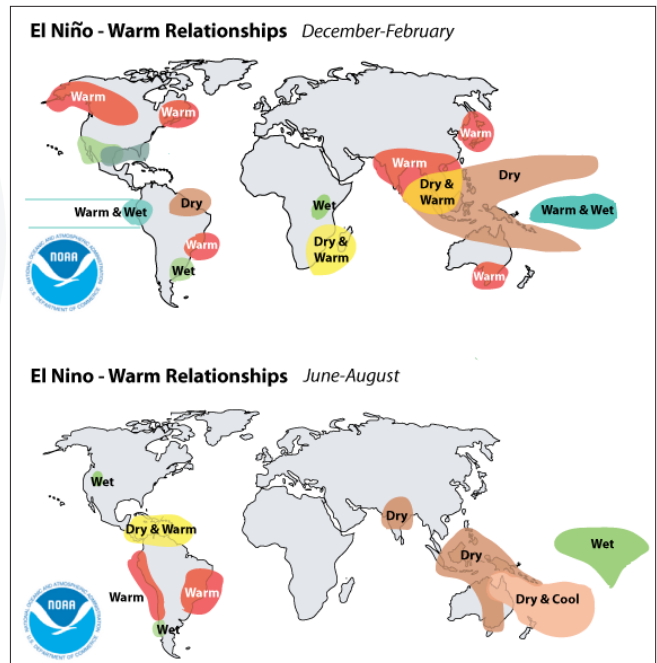
Typically El Niños bring dry weather to northern Brazil. This year the dry weather is so widespread that it has spread to Venezuela. There reservoirs and lakes have dropped to the lowest levels in 50 years and threaten to shut the nation's biggest hydroelectric plant and collapse the power grid. The entire nation has rolling blackouts, a problem which is projected to last for the next 5 months.

Looking ahead for Asia and Australia, the possibility of the El Niño lingering until June is not good news. It would cause a weak start for India's monsoon, continued heat for Australia and heavy flooding on China's major rivers. Typically in these types of years, northern China has production problems in its wheat, corn and soybean growing regions during spring and early summer. Japanese scientists predict the IOD will switch to a weak positive

Further south, Rio de Janeiro has been enduring the harshest heat waves in decades. Industrial Sao Paulo and surrounding regions have had temperatures as high as 45°C (113°F). The deadly heat waves threaten to collapse the electrical grid in neighboring Paraguay. This heat follows torrential rains that have killed over 70 people in mudslides.


While the heat and rain have been deadly for people, they have been a blessing for South American corn, soy and cotton production. Argentina corn production, at 17.2 million tons is up 37% from last year. Brazilian soybean production is at a record 66 million tons, up 16% from last year. While extremes of heat and rain remain a problem, the lingering El Niño makes the outlook for the region's crops excellent.

As one surveys the globe, the overall outlook is one of extremes – major freezes and heat waves, droughts and floods. While the current crop production, from Indonesian rice to Indian wheat, to South American corn and rice looks good, the outlook for the higher latitudes in the Northern Hemisphere is more troubled. Expect many countries, particularly China and the US to have a cooler wetter spring that delays planting.



figs. 17-18 **Typical El Niño weather patterns**
http://www.cpc.noaa.gov/products/analysis_monitoring/impacts/warm.gif


News Notes

 February is ending with a flurry of misery. New England and the Northeast have been smashed by a “Snowicane” Sixty mile-per-hour (96.5 km.) winds swept the region from West Virginia to Long Island, New York to Massachusetts with New Hampshire being hit by 91 mph (146 km) blasts. New York City was buried in 20 inches (51 cm.) of snow. Over a million people were left without power. While the National Weather service accused private weather services for overhype, calling the storm a snowicane, it’s better than when the government services in Europe called their killer storm “Daisy”.


The misery was not confined to North America. On the same weekend, Europe was hit by Xynthia, a winter storm that killed at least 50 people in Spain, Portugal and France. Winds of up to 140km/h (87mph) lashed Portugal and measured at 175km/h at the top of the Eiffel Tower. The worst damage was along the west coast of France, where huge waves and strong gusts spread floods inland. Residents had to take to their roofs and be rescued by police helicopters in the Vendee region. Over a million people were left without power.


On the same weekend, freezing temperatures and blizzards, described as the heaviest snowfall in years, hit Western and Northern China. Details are scarce, but entire areas are being cut off.


All of these happening simultaneously is due to the weakened winds of the negative Arctic Oscillation. The good news is that most of the US Climate Prediction Center models project that the AO should return to neutral or near-neutral by the second week of March. If there is no more volcano activity in the North-west Pacific, the models could be right.

 Accuweather’s Jon Auciello found a sunny side to the horrendous blizzards that buried Washington D.C. and Baltimore. Both cities experienced a remarkable drop in crime. The snows fell from February 5 – 10. From February 8 – 14 Baltimore, buried in 45 inches of snow, had a 71% drop in serious crime. Washington, with 29 inches of fresh snow, went a week

without a single murder. The official verdict is that the snow kept the criminals penned up at home, unable to go out and commit crimes. The unofficial verdict is that the blizzards helped the criminals “chill out.”


 One of the factors influencing climate is the amount of solar radiation. Currently the sun is in a solar minimum, a period of reduced sunspot and radiation which occurs every 11 years. However, this solar minimum has been incredibly quiet. Normally minimums have between 450 and 500 days without sunspots. This minimum has had 772 days. Indeed during 2009 71% of the days had no sunspots. Some scientists were beginning to wonder if the sun was beginning a long-term cooling trend like the “Little Ice Age.” However since 2010 began, we have had only 2 days (3%) without sunspots. The solar engine is once again starting to rev.

 If you think Vancouver had problems with snow, wait until 2014 when they are held in Sochi, on the “Russian Riviera”. Since losing its Black Sea resorts to the Ukraine, Russia has been trying to promote this Russian owned tourist region near the Caucasus Mountains. The region is beautiful, but (yikes!) noted for its “mild climate.”

 It has been a season of unusual climate conditions, but Australia has won the award for the weirdest weather. It rained fish in Lajamanu, a tiny desert town in the Northern Territory! Twice.

On February 25 and 26 the town was showered with “hundreds and hundreds” of small white fish. The fish, mostly spangled perch, were alive when they hit the ground. The nearest lake is hundreds of kilometers away.

This is the third time that this has happened to the small community. The event also was reported in 2004 and 1974. It is believed that the fish were probably sucked up from a lake by a tornado before they finally rained out on the baffled Australians.

 Sometimes it is the weather that *doesn't* happen that makes the news. This February there were no tornadoes in the United States. This is the first tornado-free month since January 2003, and a record low for February.

The **BROWNING**
NEWSLETTER
is published by

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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 via e-mail

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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