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BROWNING

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Beware of Volcanoes with Unpronounceable Names

SUMMARY

The volcanic debris from several Russian volcanoes has weakened the Arctic Oscillation making it negative. This has allowed the polar air mass to surge south and push the cold and wet impact of the strong Pacific La Niña further south than usual in North America.

In April 2010, an obscure Icelandic volcano, Eyjafjallajökull, completely disrupted European air traffic patterns. At its peak, the troublesome cloud of volcanic debris stretched from Canada to Russia and its impact was felt worldwide

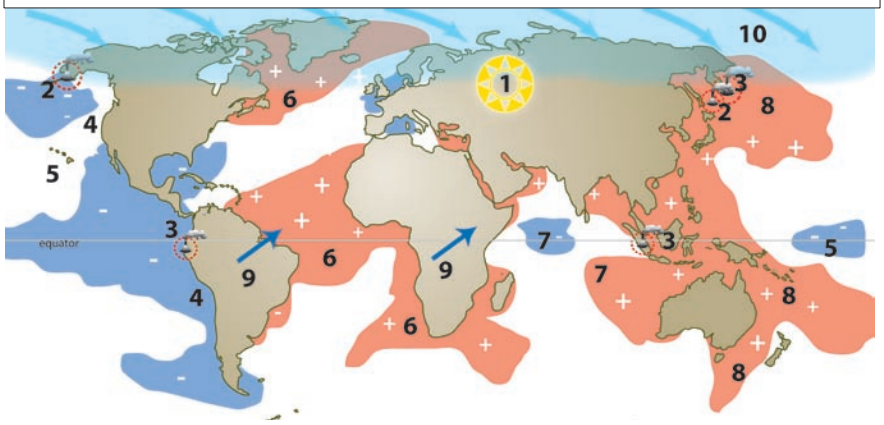
In December 2010, obscure volcanoes on Russia's Kamchatka Peninsula, totally disrupted North Hemispheric weather and air traffic patterns. Icy weather plunged deep into the Northern Hemisphere, from the US and Canada through Europe and Asia. (In the process, it chilled the UN Climate Change Conference in tropical Mexico.) California's Mammoth Mountain was buried in 9 to 13.5 feet (2.7 – 4.1 meters) of snow while New York was buried in 2 feet (60 cm) of snow. Twice Florida crops were hit with freezing temperatures. This record-breaking weather will affect global crop production and food prices.

Obscure polar volcanoes can have very expensive consequences.

A La Niña Winter

The cooling effect of the Russian volcanos was enhanced by the current La Niña. This year's La Niña began early this summer and has been warping global weather patterns for the past six months. In summertime, this meant hotter weather. In winter it creates colder and stormier conditions.

Natural Factors Shaping Winter's Weather



1 The sun is beginning a new solar cycle.

2 Large volcanic eruptions put climate changing debris in the stratosphere in 2009 and 2010.

3 Several volcanoes continue to have small and medium-sized eruptions.

4 The waters off the West Coast are cooling..

5 A strong La Niña.

6 Most of the Atlantic is unusually warm (a positive AMO).

7 A negative Indian Ocean dipole.

8 The waters off of East Asia and Australia are warming (a cool PDO/IPO).

9 The high altitude Quasi Biannual Oscillation (QBO) winds are westerly

10 The Arctic Oscillation is negative and will let the Polar air mass surge south.

Fig. 1

IN THIS ISSUE

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.

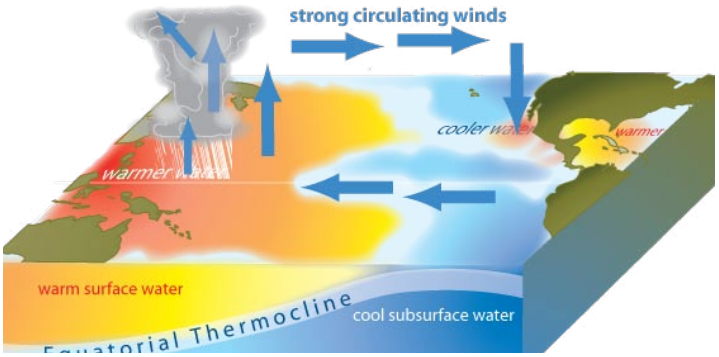


fig. 2 **This year's La Niña weather patterns**

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

right: http://www.pecad.fas.usda.gov/cropexplorer/continentView.cfm?ftypeid=24&fattributeid=1&stypeid=24&sattributeid=3&regionid=america&startdate=12%2F11%2F10&imenddate=12%2F20%2F10

Last November's classic strong La Niña weather

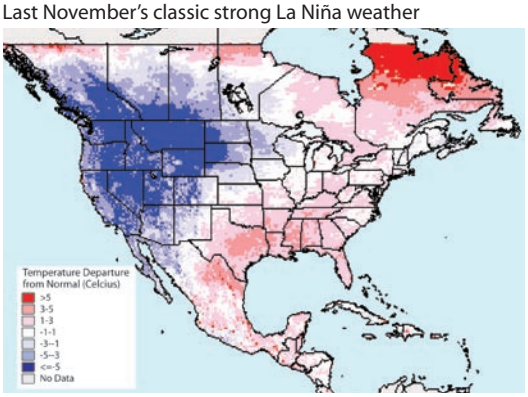


fig. 6 **North American temperature anomalies**

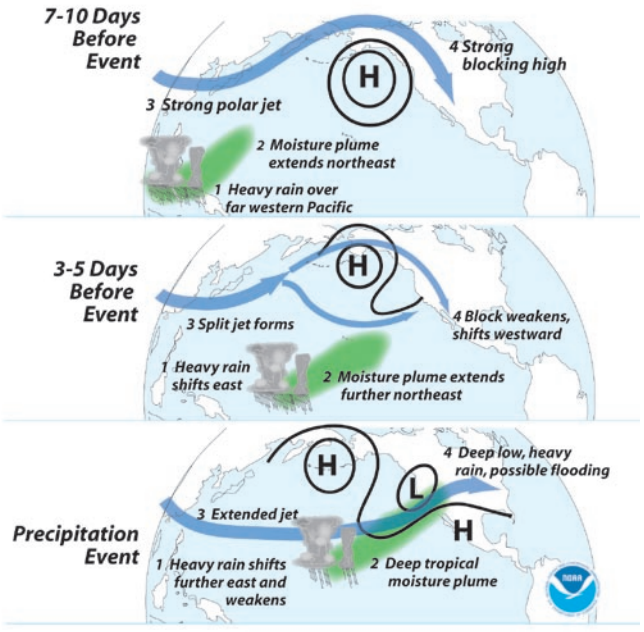
Nov 21-30, 2010

La Niñas occur when unusually strong tropical Trade Winds blow the sun-warmed surface waters of the Pacific toward the west. As a result, the western Pacific is warmer than average and the central and eastern regions are cooler. When the central and eastern waters are more than 0.5°C (0.9°F) cooler than normal, the phenomenon is officially declared a La Niña. As the event continues, the cool water expands north and south along the western coastlines of North and South America.

The current La Niña is a powerful phenomenon. The water temperatures are 1.4° - 1.6°C (2.5° - 2.9°F) cooler than normal with some areas more than 2°C (3.6°F) colder. These cool waters stretch from Alaska's Aleutian Islands to the southernmost tip of South America. NOAA's most conservative estimate is that these cool waters will remain in place for the rest of this winter.

Part of the reason this event is so strong is that the Pacific has entered the negative phase of the decades –long Pacific Decadal Oscillation. This ocean-wide event exaggerates the tropical cooling in the east and warming in the west.

La Niñas are the water component of a huge ocean-atmospheric phenomenon called the El Nino/Southern Oscillation (**ENSO**). Cooler waters chill the overhead air and this, in turn, changes air pressures and winds.



figs. 3-5 **The Pineapple Express Rain Event hits California** *data: courtesy NOAA*

These altered water temperatures and winds have a major impact on global climate, especially on the Pacific Rim nations. North America usually experiences the following four developments:

1. The cool waters typically lead to cooler temperatures off the West Coast of North America. This water holds less moisture and when the prevailing westerlies blow the air inland, there is less rain and snow. Most of the precipitation falls close to the coast, leaving less snowpack for the inland Rockies and the western plains and prairies.

2. The unusually warm waters in the western Pacific nurture tropical storms. These tropical disturbances have been able to linger and move very far north. Prevailing winds, called the Pineapple Express carry extraordinary their moisture to the Pacific Northwest.

Originally named for the winds that hastened the arrival of sailing ships from Hawaii to Seattle, the Pineapple Express is a deceptive name for a very real weather problem. When these warm tropical winds crash into a La Niña's cold offshore water, it causes heavy snow, rains and floods to the West Coast. Mid-December saw the Pineapple Express in all its fury hit Southern Califonia.

3. The polar airstream is diverted so that it carries cooler than average air through Western Canada, large segments of the western US and the northern tier of states. We saw typically large La Niña conditions in the last weeks of November. Usually, as winter progresses, this cold moves east and by mid-winter reaches the Great Lakes or, this year, the East Coast.

4. Finally the La Niña shifts the tropical jet stream north so that it flows northwest through the desert regions of Mexico into Texas and the Deep South. These hot dry winds deflect moisture from the Gulf. As a result, the South faces a winter of drought.

A Cold War from Russia

North America experienced a typical La Niña autumn and began to develop normal La Niña winter conditions. Then, in the late November, rumbles from Russia

La Nina brings drought to southern states

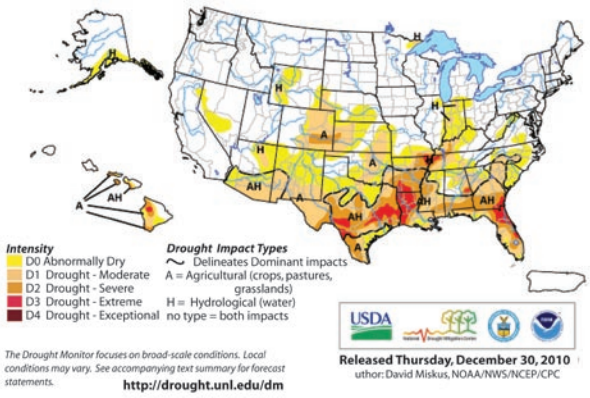


fig. 7 **US Drought Monitor** *December 30, 2010*

http://drought.unl.edu/DM/MONITOR.html

completely changed the weather scenario. The volcanoes on the Kamchatka Peninsula awoke and began to blast the atmosphere.

Russia's Kamchatka Peninsula, across the North Pacific from Alaska's Aleutian Islands, is one of the most volcanically active areas on Earth. Its long central valley is flanked by large volcanic belts containing about 160 volcanoes, 29 of them still active. From a weather point of view, it is upwind from North America, and when those volcanoes explode the debris is carried here.

Geologically, Kamchatka could be described as the site of a multiple car crash. It is located on the Okhotsk tectonic plate, a relatively small block of the global surface. The huge Pacific tectonic plate is slamming into it from the southwest at a rate of ~3.1 cm/year (1.2 inches per year). At the same time, halfway up the peninsula, another tectonic plate, the Bering Block, is colliding into it from the west and northwest at a rate of ~ 1.9 cm/year (0.7 inches per year.) Not surprisingly, the result is messy.

Basically, both the Pacific and Bering plates are subducting (sliding beneath) under it and each other. Just as fenders crumple during a car wreck, so the Kamchatka Peninsula surface is buckling with mountain ranges. When the ocean plates sink deep enough, portions are melted by the intense heat generated within the mantle, turning the solid rock into molten magma. The magma bubbles up through the crust, ultimately bursting to the surface and forming volcanic eruptions.

As a result of all this geological activity, Kamchatka tends to be somewhat active – but recently it has been ridiculous! Since late November Kizimen, Sheveluch, Karymsky and Kliuchevskoi have been erupting almost constantly. Most of the eruptions have ranged from 2 – 10 km (1.2 – 6.2 miles) high. While the smallest eruptions have only had minor local eruptions, the larger ones have entered passing fronts, cooling temperatures, altering air pressure and increasing precipitation.

Volcanic ash screens out incoming temperature, cooling the air below. This lowers air pressures which, in turn, changes wind patterns. In particular, in polar regions, it appears to weaken the Arctic Oscillation winds. When the Arctic Oscillation turns negative, that is when the winds weaken, the cold air normally trapped around the North Pole surges south.

Additionally, the ash and chemicals in the volcanic debris collect water, forming thick clouds and eventually falling out in unusually heavy rains and snows. Smaller Kamchatka eruptions tend to precipitate out along the West Coast. Larger ones sail further in the atmosphere and precipitate out east of the Rockies, in the Northern Plains, Midwest and East Coast.

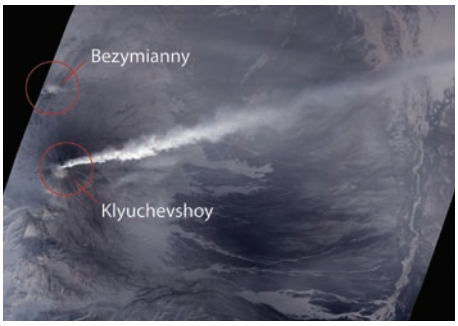


fig. 8 **This December, Kamchatka volcanoes are erupting simultaneously**

Like characters in Russian novels, Russian volcanoes can have more than one name. Klyuchevskaya Volcano is also known as Kliuchevskoi and Klyuchevskoy

http://earthobservatory.nasa.gov/images/imagerecords/47000/47538/klyuchevskaya_ali_2010338_lrg.jpg

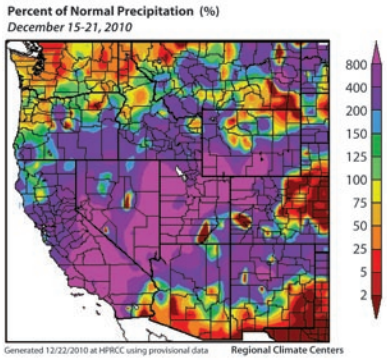


fig. 9 **When volcanic dust combines with a Pineapple Express**

http://www1.ncdc.noaa.gov/pub/data/cmb/hazards/2010/12/ca-rainfall-20101215-21.png

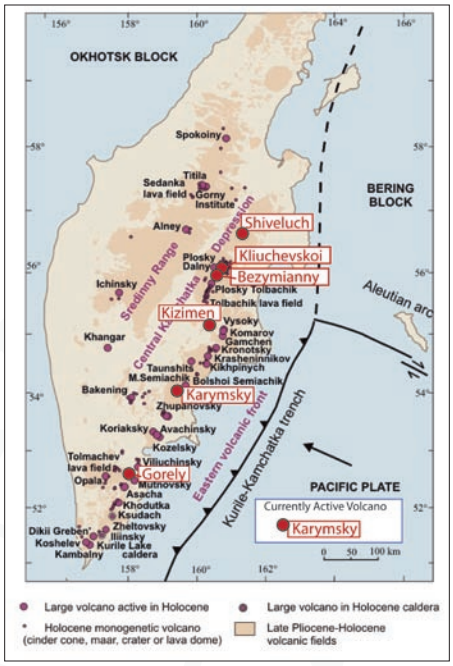


fig. 10 **Active volcanoes on Kamchatka**

http://www.kscnet.ru/ivs/volcanoes/holocene/main/main.htm

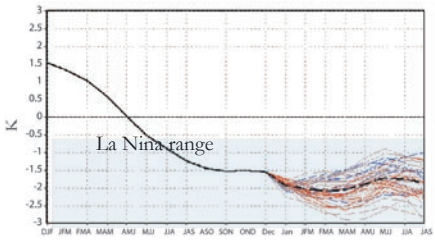
What we are seeing this December is the combination of the La Niña with volcano weather. Basically, the cooling that resulted from the northern eruptions has shoved the typical La Niña patterns south. For Canada, this meant many regions enjoyed warmer temperatures as the storm track shifted further south than normal. The La Niña would normally bring heavy rains to the Pacific Northwest. Instead the cooling from the Russian volcanic debris moved the precipitation south so that the Pineapple Express hit Los Angeles and San Francisco. The ash and debris added to the record-breaking intensity of the rains. A large La Niña would normally have polar air masses sink into the East in midwinter. The volcanic conditions encouraged the Arctic air to plunge deep into Florida and the Gulf of Mexico.

One more factor has added to this winter's misery. The waters of the Atlantic are relatively warm. When the chilled continental air mass meets the warm marine air, the result is snow- lots and lots of snow. From Atlanta to Boston, the East Coast has had a white Christmas – delighting the children and stranding thousands of frustrated travelers. (There will be more about this in the second article.)

The Rest of Winter

After a freezing month of coast-to-coast storms, what can we expect? Some weather forecasters are saying the worst is over.

fig. 11 **NOAA's CFS models project La Niña will continue into summer**



The CFS ensemble mean (heavy line) predicts La Niña conditions into Northern Hemisphere summer 2011

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

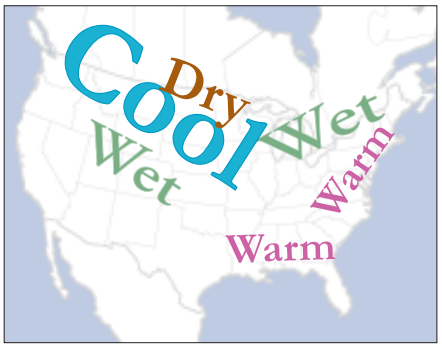
Part of this is based on the progress of the La Niña. The Tropical Pacific's cooling has mostly stopped and a few areas are slightly warmer. However, overall, the pattern seems fairly stable with little sign of large-scale warming. There is little to no sign of the pattern being interrupted by any warming influences of the smaller Pacific. Indeed, most models expect the event to continue through spring and NOAA's Climate Forecast System model has it remaining at least until mid-summer. It is not unusual for a La Niña to last for more than a year.

In other words, the La Niña will remain strong all winter long. The next question is whether it will continue to be enhanced. This depends on whether the circumpolar winds continue to be weak enough to allow the Arctic air mass to surge deep into the middle latitudes. If one looks at models, most expect the Arctic Oscillation (AO or strength of the winds circling the North Pole) to remain negative – but not as negative. The ocean temperatures in the Arctic and Northern Atlantic that affect air pressures and wind patterns do not indicate a continuation of the current extreme negative AO.

This winter's severe cold and stormy weather depends on whether northern volcanic activity continues to be high enough to affect the Arctic air patterns. Most of the debris from last year's huge explosions should have precipitated out, so the weather will depend on this winter's eruptions. That is hard to project. However, given the current huge level of activity, it appears unlikely that they will become quiet in the next few months. In other words, it appears that the cooling created by La Niña will continue to be enhanced. Additionally, this would probably indicate that the severe drought usually caused by La Niñas will probably be at least partially alleviated

fig. 12 **Volcano Weather + La Niña = A mess** ©Browning Maps

Mid Winter



Late Winter

Spring

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

figs. 13-15 © Browning maps

The severe drought usually caused by La Niñas will probably be at least partially alleviated in the West and Midwest by volcanically enhanced precipitation.

in the West and Midwest by volcanically enhanced precipitation.

When one examines the years with the most similar alignment of natural factors shaping the climate, the winters and spring had the weather patterns shown in figures 13 – 15. The future usually resembles the past, which means we are looking ahead to warmer conditions in the South and cold temperatures and heavy storms in the North and portions of the West. But remember – this weather will depend on volcanoes with unpronounceable names.

When Jetstreams Run Amuck: A Cautionary Tale of Global Weather

SUMMARY

The warm Atlantic and Indian Oceans have combined with the La Niña and volcanic activity to create weather problems throughout the globe.

This winter's travel chaos has not been confined to North America. The US and parts of Canada may have been deluged in snow, but so was Europe. We may have been freezing, but so were the Irish, British and Germans. The harsh American weather crossed "the pond" and lashed Europe with the same intensity as it did here.

Indeed, part of the reason both sides experienced so much misery has been that "the pond" has been warm. Ironically, higher temperatures in the Atlantic have led to lower temperatures throughout the Northern Hemisphere. When combined with La Niña and the volcanic activity in the North Pacific, the warm Atlantic has created a season of snow, storms and misery.

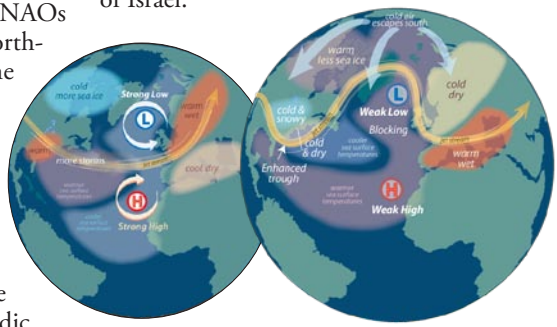
Three Oscillations and a Jet Stream

It all comes down to three oscillations. These oscillations are teleconnections, links between atmospheric occurrences or weather patterns that are very far apart. When one pattern switches, so does the other, even if it is hundreds, or thousands, of miles away. In the case of oscillations, we are referring to teleconnections that alternate between extremes – hot and cold, wet and dry, positive and negative. The three oscillations that are creating the weather that is blasting both sides of the Atlantic are:

1. **THE ATLANTIC MULTIDECADAL OSCILLATION (AMO)** – The temperatures of the Atlantic Ocean are dominated by the flow of tropical currents like the Gulf Stream from the equator to the north. The different tropical currents are flowing unusually fast, which warms the North Atlantic. Large portions of the ocean have been 1.5° – 3.5°C (2.7° - 6.3°F) above normal. Sometimes the western portions of the ocean cool down when cold winter storms churn up the water, but the Gulf Stream warms the waters again fairly rapidly.
2. **NORTH ATLANTIC OSCILLATION (NAO)** – Since the 1920s, it has been known that Northern Atlantic weather patterns are shaped by the difference of atmospheric pressure between the Icelandic low and the Azores high. This difference controls the strength and direction of westerly winds and storm tracks across the North Atlantic. When the difference between these pressures is high, the west-to-east winds are very strong in the north and Arctic air masses remain trapped in the polar latitudes. When the NAO is negative the difference between these air pressures is weak and the winds, particularly the polar jet stream, are weak. The weaker winds fluctuate more, veering north and south. Typically negative NAOs are more common when the Northern Atlantic is warm – when the AMO is in its warm phase.
3. **ARCTIC OSCILLATION** – According to most climate scientists, the Arctic Oscillation "is closely related to the NAO." Specifically they share the polar jetstream over the Atlantic and are partially shaped by the Icelandic low air pressure. When one of these oscillations turns negative, the other usually turns negative as well. Not surprisingly, with the warm AMO weakening the cool Icelandic low it makes both the negative NAO and the negative AO more frequent. **Both of these encourage cold Arctic air to plunge deep into the Northern Hemisphere, particularly eastern North America and Western Europe. Both reinforce the La Niña impact on the polar jet stream. All three are causing the jet stream to fluctuate wildly.**

The result has been an insane polar jet stream. In North America, it has dipped past Cuba into the Caribbean. Across the Atlantic, it dipped into Africa, then soared far to the north over Russia. We have seen the results in the US and Canada. The impact has been as paralyzing in Europe.

Meteorologists are reporting that this has been Europe's coldest winter in 100 years and the cold will last well into 2011. The UK's Met Office has reported that this December 2010 was 'almost certain' to become the coldest since records began in 1910. Hundreds of people have died, and hundreds of thousands have been stranded. The weather chaos even created a cyclone in the Eastern Mediterranean which disrupted the Suez Canal and sank a cargo ship off of Israel.



Positive NAO **Negative NAO**

FIGS. 15-16 **The Negative NAO has been more common since the AMO went warm in 1995**

At the same time, further east, the jet stream veered sharply north flooding first the Middle East, then Moscow with unusual warmth. (This was a similar pattern to the Russian heatwave of this summer.) Snow turned to rain, then froze, coating Moscow with thick layers of paralyzing ice. Power lines collapsed, filling the region with massive blackouts. The news reported near riot conditions as angry airport travelers attacked Aeroflot employees. What won't be reported are the upcoming days of thick, wet snow and the long wait for power repairs.

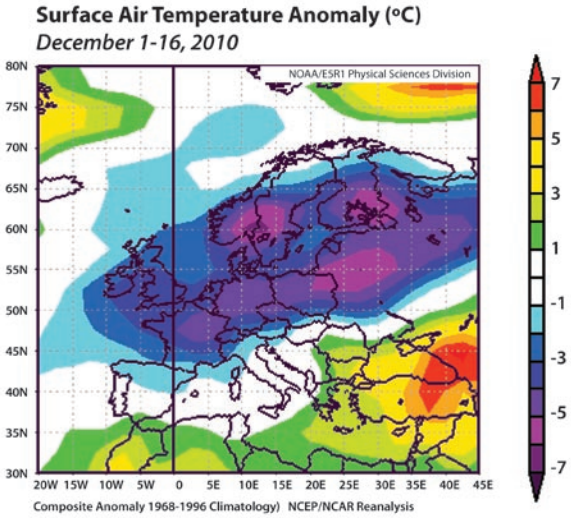


fig. 18 **Europe's very chilly winter**

http://www1.ncdc.noaa.gov/pub/data/cmb/hazards/2010/12/europe-temp-anom-20101201-16.gif

Asia and Yet Another Oscillation

The wild fluctuation of the jet stream does not stop with Moscow. In Asia, it veers south again and has swept cold weather through Eastern China.

Don't expect China's cold to be as record-breaking as Europe's. The impact of La Niña, while present, is relatively minor in Europe. It dominates the Pacific Rim. The phenomenon may chill North America, but it strengthens the **Pacific Warm Pool**, the warm region of water around Southeast Asia. Currents are carrying this warmth north along Asia's coastline. The warmth is cushioning China from the full impact of the southward plunge of the polar jet stream. Southern China has been recently been experiencing temperatures 2 - 4°C (3.6° - 7.2°F) cooler than normal but not the record-breaking cold of Europe.

The cold doesn't have to be record-breaking, however, to present China with some severe infrastructure problems. The nation is facing a severe coal shortage and blackouts are sweeping seven provinces. Experts predict the shortages will reach critical proportions and the blackouts may expand nationally. To make the problem even more severe, large portions of China had a very dry year and hydroelectricity plants have, on average, water levels 10% below normal. The State Grid reports that China's Three Gorges dam, the world's biggest hydroelectric dam, has water flow 26% below normal.

China depends on coal for 75% of its power production, but coal reserves have been emptied by a huge surge in power demand, prompted by the recent cold weather, and the challenge of transporting China's annual output of over 3 billion tons of coal. This problem has been compounded by government efficiency campaigns that closed down smaller privately owned mines.

The cold weather is likely to produce another problem, particularly in southern China. When the cold air hits the unusually warm waters off the East and South China Seas, it can produce heavy precipitation. The last time we saw a La Niña combined with heavy fluctuation of the Arctic Oscillation was in early 2008, when blizzards paralyzed the Chinese New Year travel.

An article by Chongyin Li and Mingquan Mu, "Relationship Between East Asian Winter Monsoon, Warm Pool Situation and ENSO Cycle", published in the August 2000 ***Chinese Science Bulletin***, notes that the La Niña and a warmer Pacific Warm Pool correlate with a stronger East Asian winter monsoon. This means colder weather and heavier storms for East Asia. We are already seeing this happen and it will continue to shape the Asian winter.

Remember, the last time we saw this happen, the winter of 2007 – 2008, there were shortages in Southeast Asian grain production, particularly rice. There is a +70% chance of history repeating itself.

When the East Asian Monsoons are affected, it is not just a Pacific phenomenon; it also is an event affecting the Indian Ocean. Like the Atlantic and Pacific, the Indian Ocean goes through an oscillation – the Indian Ocean Dipole (IOD). It shapes the monsoons that feed half of the world's population, not only in Asia, but also East Africa and Australia. This winter, the IOD has gone negative. Not only is it affecting Asia, but it is setting Australia awash.

Looking South – Australia & South America

The negative IOD indicates that Australia will have plentiful rain. What is didn't indicate was the absolute chaos the Land Down Under has experienced this summer. Large sections of the nation have had between 200 – 400% of their normal rainfall. Queensland is currently experiencing the worst flooding in a century, with military helicopters recuing the entire town of Theodore. Three monsoon lows and a cyclone have swept the beleaguered nation and it's only the first month of summer. It's nice to end the Big Dry, but not like this!

The rain can be explained away, but it is harder to explain the summer snow. Residents in east coast states New South Wales and Victoria experienced a rare "White Christmas"-style start to their holiday week, after a cold spell left up to 11 inches (28 cm) of snow covering some of the area's ski resorts. A few days later, it snowed in sunny Tasmania.

What is happening is that Australia is being hit by both the negative IOD which encourages rainfall in western and northern parts of the nation and a strong La Niña which brings rain to the northern and eastern states. At the same time, the La Niña seems to be affecting the southern polar jet stream, so that it is fluctuating as violently as the northern one that is freezing the US. This allowed freezing winds from Antarctica to hit Australia in the middle of

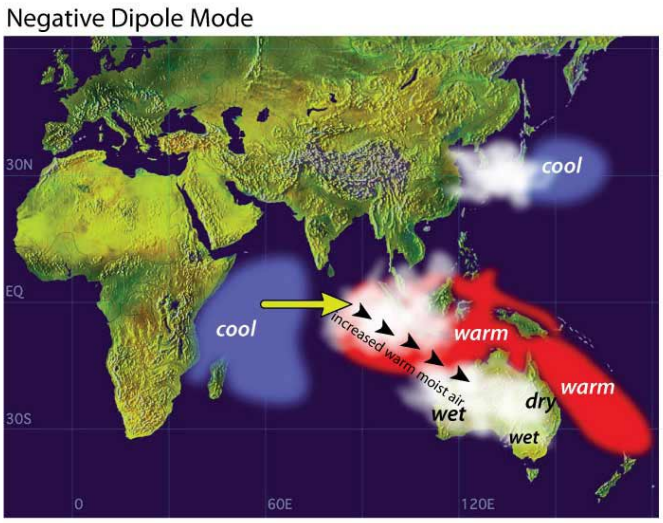


fig. 19 **The Negative Dipole brings rain -and flooding-to Australia**

http://www.jamstec.go.jp/frsgc/research/d1/iod/

summer.

Australia is the world's largest wheat exporter but the excessive moisture has delayed its wheat harvests by 4 to 6 weeks and damaged the crop. It is currently estimated that the level of damage could wipe up to $1billion from the value of the national wheat crop.

Australia is not the only southern nation suffering unusual weather and crop damage. South America is typically more affected by La Niñas than any other continent. Indeed, they named the phenomenon and have recorded it since the Spanish conquest in the 1500s. The phenomenon usually brings severe cold to the western Andes nations, drought to Argentina, and rain to Venezuela and Brazil. This year it is following its normal pattern with a vengeance. This is a strong La Niña and its climate impact is heavy.

For the Central America and northern South America, this December's torrential rains have been more of the same. The regions May-November rainy season, warped by the La Niña, have been extremely severe. December opened with widespread flooding in Venezuela, including its capital Caracas. More than 40 people have died and 130,000 people have been left homeless. This natural disaster was used to justify granting Venezuelan President Hugo Chavez the ability to rule by decree and near-total control of the government for the next 18 months.

Further south, the concentration has been on crops. Argentina is the world's biggest shipper of animal feed and cooking oil made from the oilseed and it shows an 80 – 90% historical correlation of having droughts during La Niñas. Rainfall was low in both October and November. Now summer has arrived and the unusually warm Atlantic is creating temperatures from 95° - 106°F (32° - 41°C). The heat and drought is devastating the corn and soybean crop. Typically Brazil has plentiful rain, but this is an unusually strong La Niña, and the heat and drought is spreading to Brazil's southern farmlands. Brazil's central growing lands are doing well, but some private forecasters worry that the heavy rains in the north may increase plant disease.

Conclusion

The current strong La Niña is causing unusually cold stormy weather in the Northern Hemisphere and problems with crop production in the Southern Hemisphere. Expect more problems with extreme weather, especially in January. Some experts claim that the phenomenon has peaked, but if others, who predict a new peak in March are right, the problems with crops, storms and global transportation will last for the next three months.

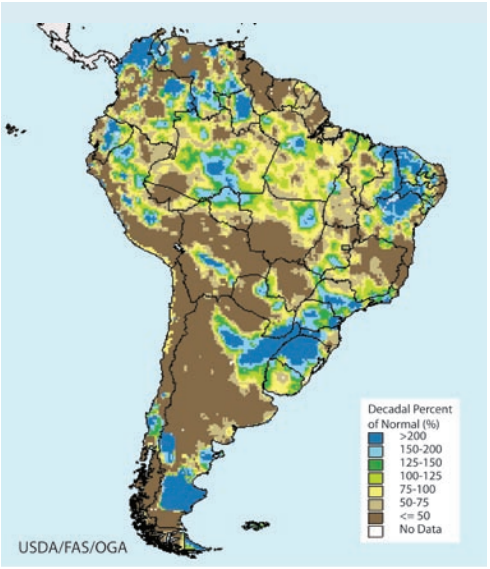


fig. 20 **La Niña brings drought to much of South America**

Precipitation anomalies: *Dec 11-20, 2010*

http://www.pecad.fas.usda.gov/cropexplorer/continentView.cfm?regionid=samerica

News Notes

Thanks to improved satellite imagery scientists are finally beginning to understand more about the aerosols that float through the atmosphere and alter the weather. What they are learning is how little we know. One of the most recent studies published by Jasper Kok in the ***Proceedings of the National Academy of Sciences*** suggests there are several times more dust particles in the atmosphere than previously thought. The dirt, dust and volcanic ash shatters in the air like glass, producing an unexpectedly high number of fragments. Since these fragments control the amount of solar energy that can enter the atmosphere, discovering that there may be 2 to 8 times more fragments than we thought is a major flaw in our understanding of climate.

Last year, 2010, was the UN's International Year of Biodiversity. As it drew to a close, scientists at the Royal Botanic Gardens, Kew have been reporting on some of their findings. Not only have they discovered new species, but

some species, long thought to be extinct in the wild, have been rediscovered. The Kew botanists have collected over 8 million specimens of plants and fungus and are responsible for 10% of the new discoveries of global plant life. Some of the Gardens' discoveries this year have been pretty, like a new orchid and three new irises. Others are just weird, like Dypsis metallica, a Madagascar palm tree with thick, blue leaves and the British bird's-eye primrose smut (Urocystis primulicola) thought to be extinct for the past 106 years. Their labs even discovered that one species, the Paris japonica, has the longest known genome on earth - 50 times the size of the human's. They are so long that, if the coiled tangle of genes was stretched out to their full length, they would be taller than the tower of Big Ben! What 2010 has shown is how very diverse the globe's population is.

It may only be a coincidence but a number of elephant stories have come out after the recent round of Republican victories.

Remember when life was simple and you were taught that there were 2 types of elephants – African (big ears) and Asian (small ears). Whoops – it turns out there are 3 species! Africa has two species (both with big ears), the large savanna elephant and the smaller forest elephant. DNA studies by Nadin Rohland et. al., published in the December 21 ***PLoS Biology***, show that the two species have been separate for several million years. The scientific team collected DNA from all three species and the remains of extinct woolly mammoth and mastodon. Surprisingly, the two African species are as genetically distinct from each other as Asian elephants and the extinct mammoths. According to the authors, they have been separate species almost as long as mankind has been distinct from chimps. This has come as a surprise to the biological community despite the fact that the six to seven ton savannah elephant was roughly double the weight of the forest elephant.

Scientists think they may have rediscovered the extinct Javan elephant – alive and well and living in Borneo. Findings by Junaidi Payne et.al. , of the World Wildlife Foundation published in the ***Sarawak Museum Journal*** show the rare Borneo pygmy elephant is not native to Borneo after all. They are not closely related to any other known population of Asian elephant and have a unique appearance and behavior.

Instead, researchers are beginning to believe that they are the last survivors of the Javan elephant race – accidentally saved from extinction by the Sultan of Sulu centuries ago. The Islamic Sultanate of Sulu, which stretched from the Philippines to Borneo, used elephants as gifts to tribal leaders. After Europeans arrived, the herds in the Philippines and their native Java were hunted to extinction by the 1800s.. Apparently a few of the imported animals of Borneo escaped and have bred in the wild for centuries. Preservationists who are currently trying to save endangered animals, like the white rhino, are encouraged to see a 400-year-old relocation program that has saved a species from extinction.

Lots of people want to help the environment, but Florida marine conservationists have come up with a tasty way to save it - have a nice serving of lionfish. Red lionfish, native to the South Pacific, Indian Ocean and Red Sea, are poisonous, spiny predators spreading across Floridian and Caribbean coral reefs, destroying the local fish, shrimp and crab populations. Some scientists are now listing the invasive lionfish species among the top 15 threats to global biodiversity.

The Key Largo-based Reef Environmental Education Foundation has come up with a delicious way to fight back. They've released "The Lionfish Cookbook," and report the prickly fish has delicately flavored white meat, very buttery. It is safe to eat and contains no venom. So be a hero. Leave the cold and save a reef by vacationing in Florida and eating lionfish. Bon appétit!

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