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BROWNING NEWSLETTER

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Schizophrenic Weather

IN THIS ISSUE

- The medium-sized eruption of Alaska's Mt. Pavlof did not change global climate but it did cool a late May cold front and precipitate the Memorial Weekend freeze and snow in North America.
- A cool phase of the small Madden Julian Oscillation in the Pacific has made "mini-La Niña" conditions that may make conditions drier for the Western US in early summer.
- While planting conditions have been difficult, the oceans should supply enough heat to create near normal harvests for Eastern North America and Northern China. Similarly, after a late start of the Indian monsoon, Pacific conditions should help create a near normal rainy season.
- Three factors – volcanic debris, more variable polar jet streams and increased human habitation in high-risk areas – are creating extreme weather and high insurance payouts in the Northern Hemisphere.
- The variable Arctic jet stream, which is slowing weather fronts and prolonging storms and heat waves, correlates with reduced Arctic Sea Ice. If this correlation holds, then the more extreme weather pattern should last for another couple of decades, until the warm, ice-melting, phase of the Atlantic Multidecadal Oscillation is finished.

CONTENTS

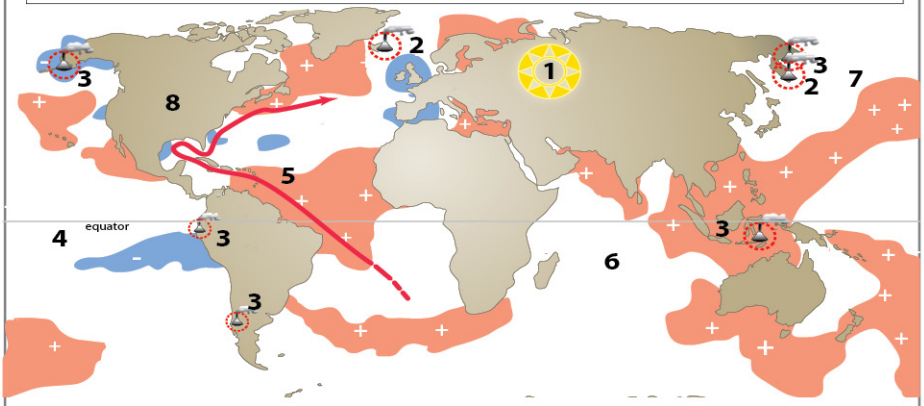
SUMMARY

The factors that shaped an extreme spring are still in place. In the Pacific, Alaska's Mt. Pavlof and a cool MJO are making late May and most of June even more extreme. The result for the Northern Hemisphere – a worrisome planting season with a strong probability of a better summer growing season than last year.

The crazy weather that rampaged across North America in spring is still here. It dropped three feet of snow in upstate New York on Memorial Day weekend! Three days later the state, including New York City had temperatures in the 90˚s (+32˚C). Western states had a major conference to deal with long-term drought while eastern states reeled under storms and hurricanes. After three months of relative quiet, tornadoes pounded the US from Wyoming to Pennsylvania, Oklahoma to Ontario, Canada.

Don't think North America was the only victim of tornadoes this May. The first tornado to hit Italy in living memory left more than 119 Italians homeless. In Asia, two deadly tornadoes swept Turkey while another left 400 homeless in the Philippines. The prize for the most bizarre tornado, however, goes to the F2 tornado that wandered through Yefremov, in Central Russia.

Natural Factors Shaping Summer's Weather



1 The sun is in the active phase of the solar cycle.

2 The impacts of the 2011 eruptions in the Arctic are in their last stages.

3 Small and medium sized volcano activity around the Pacific.

4 A neutral Tropical Pacific with La Niña-like conditions.

5 The Gulf Stream is very fast, warming the North Atlantic. Spring storms cooled some of the western ocean surface.

6 The Indian Ocean is developing a negative Indian Ocean Dipole.

7 The Pacific Decadal Oscillation is in its cool phase but it is weaker than last summer.

8 Polar air masses have plunged south.

fig. 1

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

Our calculations show the climate, over the next term, will cause dramatic changes in our social and economic patterns. We feel that readers, attuned to the changes that are occurring, may develop a competitive edge; and, by understanding their current and future environment, can use the momentum of change to their advantage.

What we are seeing is the Northern Hemisphere enduring a tumultuous spring. What does this mean for the hemisphere's growing season? Will we endure another year of high prices?

The Three Factors Dominating May And June

Most of the factors that have shaped this year's chaotic springtime are still in place. There have been three changes, none of which was major.

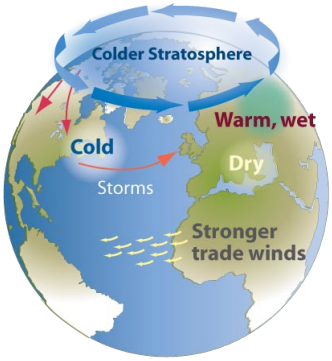
1. **A NEW ERUPTION IN THE ARCTIC AIR MASS** – – Back in 2011, two large volcanoes erupted in the high northern latitudes – Grimsvótn in Iceland and Sheveluch in Russia's far eastern Kamchatka Peninsula. The cold blasts from the north have been the result of a number of factors that have been evolving for two years.

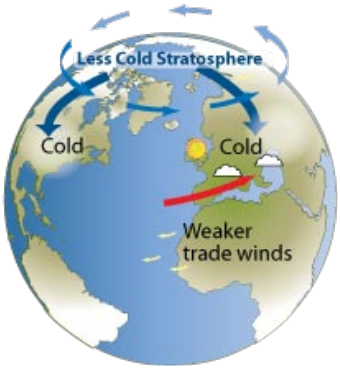
The impact of these volcanoes was discussed in detail in the May issue of the *Newsletter*. Briefly, the volcanic debris was blasted so high into the atmosphere that it has taken up to two years to finally precipitate out. While it was in the upper atmosphere, it cooled the Arctic air mass and altered air pressure, which, in turn, altered the polar winds. Last year, the winds around the Arctic were so strong that they trapped the frigid polar air mass north.

This spring, the Arctic winds were "normal" (this is called a neutral Arctic Oscillation (**AO**)). These weaker winds allowed the cold air to leak south. **It shows how much cold air has accumulated that even with a neutral AO and a normal strength circumpolar wind we have seen dramatic plunges of cold air through the Prairie Provinces and Great Plains where it has cooled the Southeast for most of the month.** It has also delayed planting and created Midwestern freezes as late as the last week of May.

fig. 2A *(left)* Winter 2011/12's positive Arctic Oscillation (AO) trapped cold air in polar regions.

fig. 2B *(right)* This spring's neutral AO is allowing the cold air to escape south..





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Historically, the cold air would dip south in April and begin retreating in early May. Unfortunately, something unexpected happened. **On May 13, Mt. Pavlov erupted in Alaska.** The eruption has continued for almost two weeks, reaching a peak of 4.5 – 7 km. (2.8 – 4.3 miles) high on May 18 – 20. **While this is not enough to affect climate, it was enough to cool a passing cold front and fill it with ash.** (An eruption this size does not drift far – if it had been in Russia, as most polar eruptions are, it would have hit the Pacific Northwest.) After passing through Alaska, the cold front hit the Midwest and the snowy conditions shifted to New York and New England during Memorial Day weekend.

While this article is focusing on North America, it should be noted that the plunging cold has not been restricted to only one continent. **England and portions of Western Europe have had miserably cool and wet spring weather. Similarly, cool conditions and rain has delayed Northeastern corn farming by one to three weeks. (China is already concerned with food safety and these wet conditions have not been good for stored crops.)**

Barring new eruptions, the polar air mass should retreat quite rapidly – but look out for autumn!

fig.3 Alaska's Mt. Pavlof erupts *May 13, 2013*
photo courtesy: Brandon Wilson http://www.avo.alaska.edu/images/image.php?id=50141

2. **THE COOLING TROPICAL PACIFIC** – Meanwhile the Pacific remains technically neutral, without a warm tropical El Niño or a cool La Niña. However, this does not mean the tropical waters are quiet.

Within the large 6 to 18 month long El Niño/La Niña cycles are smaller patterns of alternating warm and cool waters, called Madden Julian Oscillations. The MJO is a pattern of weakening and strengthening tropical winds that stir localized pools of ocean water for 4 – 6 weeks. If they are strong enough, they can act like "mini-El Niños" or "mini-La Niñas".

Currently the Eastern Tropical Pacific is experiencing a negative or cool MJO that has lowered water temperatures between 1˚ – 1.6˚C (1.8 – 2.9˚F) below normal. If these cool conditions spread to the Central Pacific and lingered for five months, it would be cool enough to create a large La Niña. As it is, it will affect weather patterns for a few months this summer, but not as powerfully as a full-fledged event.

The most unfortunate effect these conditions have on summer weather is that they discourage western rainfall in the US.

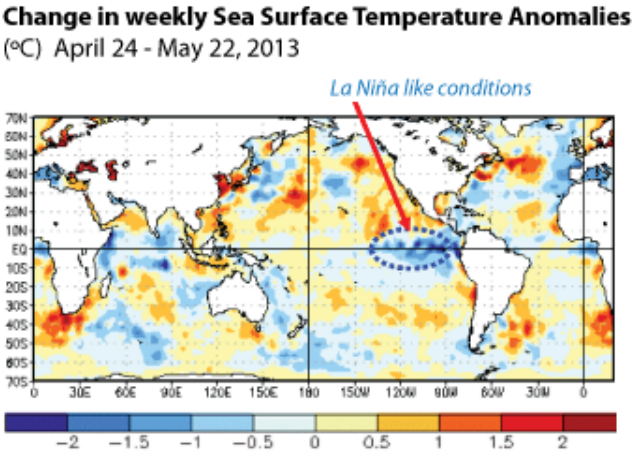

fig. 4 *http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf*

Despite the current rains and thunderstorms, 56.9% of the contiguous US is still dry and 44.3% is still in drought conditions.

The impact is being felt in Asia. In Southeast Asia, these conditions have intensified the drought in Thailand, the world's greatest rice exporter. Meanwhile in China, particularly Southeast China, the monsoons have not extended as far inland. This has created extremely wet conditions in already soggy Eastern China and concerns about crops and rivers.

The "mini-La Niña" has the potential to be good news for India. Conditions in the Indian Ocean are shifting the warmer ocean waters to the east, which normally weakens monsoons. We are already seeing hot dry conditions in Southern and Western India. The India Meteorological Department expects the onset of the monsoon to be delayed three days. However, normal to cooler conditions in the Tropical Pacific frequently moderate the impact of the Indian Ocean. The "mini-La Niña" may help this June's and early July's rainfall remain closer to normal.

As we move into summer, the location of these MJOs becomes very important for the development of rain and tropical storms. **Notice – the location of the cooler MJO near Central America is creating ideal conditions for East Pacific hurricanes. Next week it should encourage early season tropical storms in the Caribbean. Meanwhile in Asia a warm MJO is creating more dry weather in Southeast Asia. Further west, a cool MJO is positioning itself to help the early Indian wet season.**

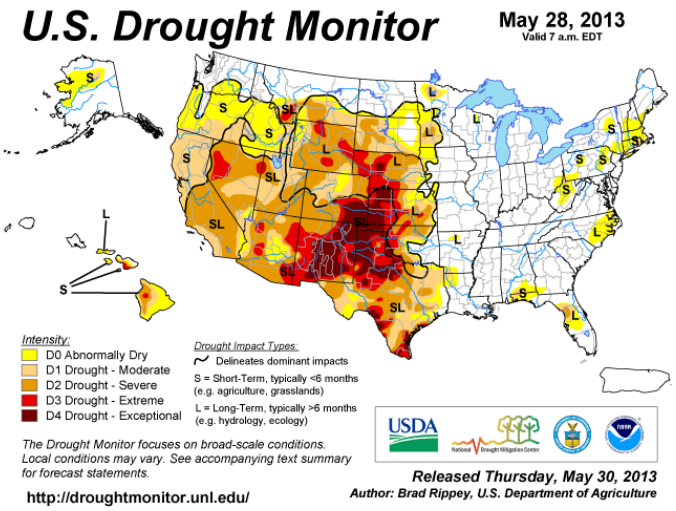

fig. 5 Increasing La Nina conditions will not help end the drought in the Western US.

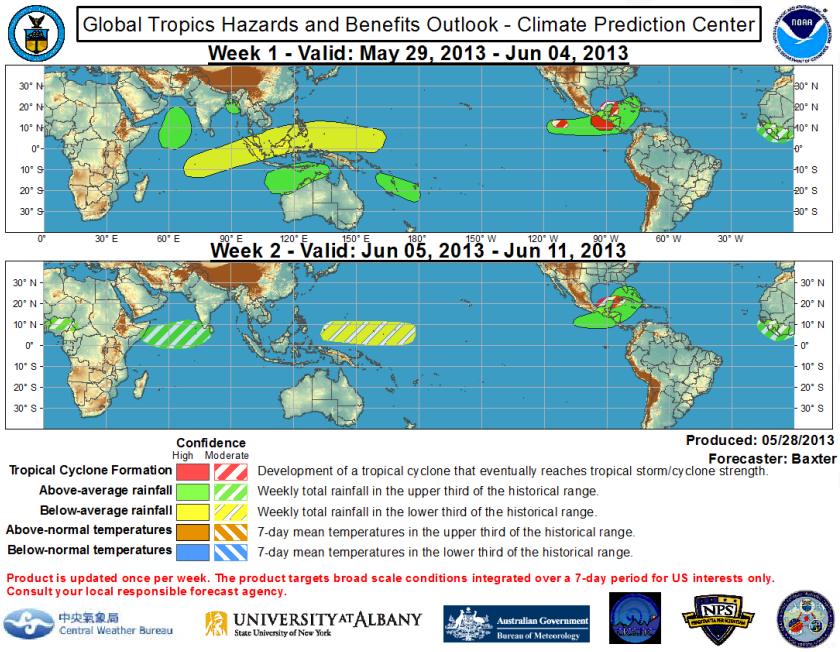

fig. 6 The impact of warm and cold MJOs *http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ghazards/index.php*

3. **THE WARM ATLANTIC** – On the other side of the globe, the Atlantic continues its long-term trend of warming. The Gulf Stream and other tropical currents are flowing faster than normal, flooding the Northern Atlantic with warm water. As the prevailing westerlies in the middle latitudes blow storms out into the ocean, the churned up surface waters cool. You can see the cooled waters with the cold storm patches in the Atlantic waters of figure 1.

The Atlantic waters off of New York and New England remain warm and that is the source of the current +90˚F (+32.2˚C) East Coast heatwave. Further south, the tropical waters remain unusually warm.

The Outlook for Summer

In summertime, two major topics dominate the weather discussion – the Atlantic Hurricane Season outlook and the growing season. Let's examine each.

- **THE ATLANTIC HURRICANE SEASON** – Two factors, the heat of the ocean, which provides energy for storm development, and the prevailing winds, shape tropical storm seasons. In the Atlantic, the tropical waters are already hot and the prevailing winds are excellent. Expect a busy Atlantic hurricane season.

fig. 7

Atlantic Hurricane Season Prediction	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average: 1981-2010	12.1	6.4	2.7
CSU	18	9	4
NCSU	13-17	7-10	3-6
UKMO	14* *Jun-Nov*	9* *Jun-Nov*	N/A
NOAA	13-20	7-11	3-6

CSU: Colorado State University

NCSU: National Climate Data Center

UKMO: United Kingdom Meteorological Office

NOAA: National Oceanic and Atmospheric Administration

What I'm saying is nothing new. From NOAA, the British Met, Dr. William Gray's Colorado State University and North Carolina State University, most hurricane experts look at the heat and the Tropical Pacific as the major shapers of the climate. [See Figure 7] As the summary chart shows, most experts expect between 13 – 20 tropical storms, 7 – 11 hurricanes and 3 – 6 intense hurricanes.

What is not being said – the warm/cool pulses of the MJOs time when the storm activity will be most intense or quiet. When the cool pulses are in the Atlantic, as they will be in June and early July as well as portions of September and October, the wind conditions will be most favorable and storms will be most active. If warm pulses form, which create unfavorable tropical winds, they are statistically most likely to appear in mid-to-late July and August and November.

In a neutral Pacific, with alternating "mini-El Niños" and "mini-La Niñas" the prevailing storm directions fluctuate like a garden hose flopping on a lawn. This means the Gulf, Florida and the East Coast are all at risk, depending which MJO is pulsing through the Atlantic at the time the storm develops. If you have an El Niño, trade winds are weak and storms tend to drift north and veer to the Northeast. If you have a cool La Niña, trade winds are strong and storms are steered into the Gulf and Caribbean.

In 2012, "mini-El Niño" conditions quelled storm development in the height of the Atlantic Hurricane season but had faded by mid-October when Hurricane Sandy formed. This year, it appears the Atlantic waters will not be as hot (which may reduce the size, if not the strength, of storms) but the winds will be more favorable for the September peak of the season. This would allow more intense hurricanes to form, compared to only one Category 3 in 2012.

• NORTHERN HEMISPHERE

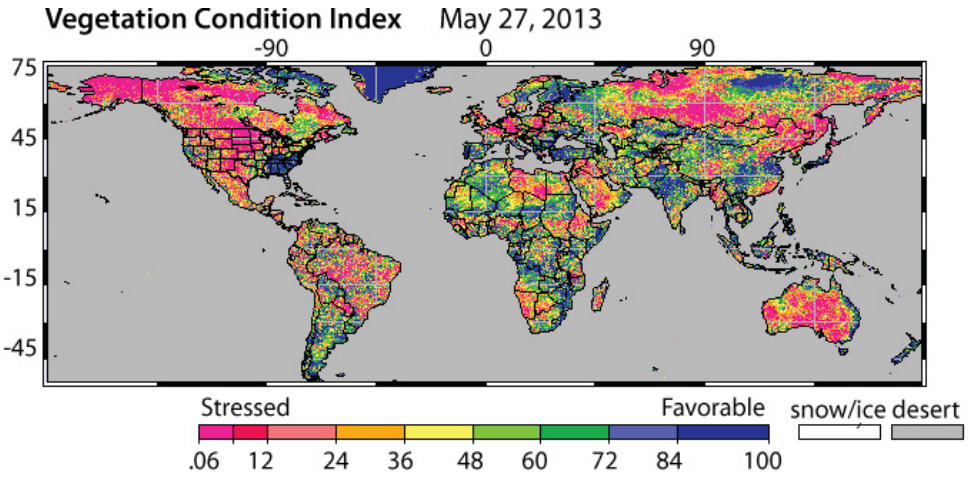

fig. 8 *http://www.ospo.noaa.gov/Products/land/vhp/vhp_images.html?product=VCI*

GROWING SEASON – As one looks at the global satellite, it is obvious that many regions of the Northern Hemisphere are experiencing weather related problems that are stressing their crops. Between cold and drought, the AO and Mt. Pavlov's eruption, North America is the most adversely affected. Further east, England, France, western Germany, parts of Poland and Benelux have had a difficult spring. More dramatically, look at Northeastern China, the corn, wheat and soybean belt of the nation. For many critical production regions of the Northern Hemisphere, spring planting has been a difficult season. No wonder the "old crops" have been almost bought out.

Here in the US and Canada, heat from the warm Atlantic will solve many of the growing problems from the Mississippi Valley and east. Even with a late planting, the crops should prosper. Unfortunately, the same is not true west of the Mississippi, where planting season is stormy, and crop root systems will be relatively shallow as the sub-soil is still dry. These areas will be at risk during mid-to-late summer heat waves. However, in 60% of similar years, late summer, when the MJO shifted, saw a strong summer monsoon bring moisture to Northern Texas and the Central Plains.

The July *Newsletter* will focus more intently on Asia and Europe. However, a few observations can be made at this point. Northern China, like the Eastern US, should have enough heat to help even late-planted crops prosper. Southeastern China has a 60% chance that the early growing season should continue to have problems with flooding and heavy precipitation. In India, the monsoon should begin late but in 80% of similar years, the wet season finished with near normal rainfall. As for Europe, conditions have to be monitored carefully. At least 40% of similar years had heat waves that affected crop production and energy consumption.

In other words, the weather whiplash from one extreme to another should continue. It's crazy out there!

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

figs. 9A,B,C Summer conditions will continue to be volatile.
* Moderate eruptions in the North Pacific will bring more moisture to the west.
** 40% chance of Gulf hurricane relieving Gulf dry.

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Going To Extremes: Why Weather Patterns Are Becoming More Expensive

SUMMARY

Three factors – volcanic debris, more variable polar jet streams and increased human habitation in high-risk areas – are creating extreme weather and high insurance payouts. Some of these are temporary while other factors will last for decades.

It's May – time to publish the economic impact summaries of last year's weather. They are not pleasant reading.

In the United States, there were 3,527 monthly weather records broken for heat, rain, and snow in the US. That's even more than the 3,251 records smashed in 2011; some of the newly broken records had stood for 30 years or more. According to the National Climatic Data Center **(NCDC),** every state in the union saw record-breaking extreme events. The nation saw the hottest March on record in the contiguous US, and July was the hottest single month ever recorded in those lower 48 states. In particular, the US had:

- The worst drought in 50 years across the nation's grain belt, with over 1,300 US counties in 29 states declared drought disaster areas.
- Wildfires burned more than 9.2 million acres in the US, and destroyed hundreds of homes. The average size of the fires set an all-time record of 165 acres per fire, exceeding the prior decade's 2001-2010 average of approximately 90 acres/fire.
- Hurricane Sandy's storm surge height (13.88 feet) broke the all-time record in New York Harbor, and ravaged communities across New Jersey and New York with floodwaters and winds. The cost of Hurricane Sandy reached an estimated $79 billion for federal aid to cover damages, recovery and measures to cope with future storms in New York and New Jersey. However, that price tag doesn't include health-related impacts.

Overall, U.S. taxpayers paid nearly $100 billion responding to damage caused by last year's extreme weather events associated with climate change, about $1,100 per taxpayer, according to an analysis by the Natural Resources Defense Council (NRDC). The analysis shows taxpayers spent, through the federal government, nearly $100 billion on climate change cleanup more than on either education or transportation.

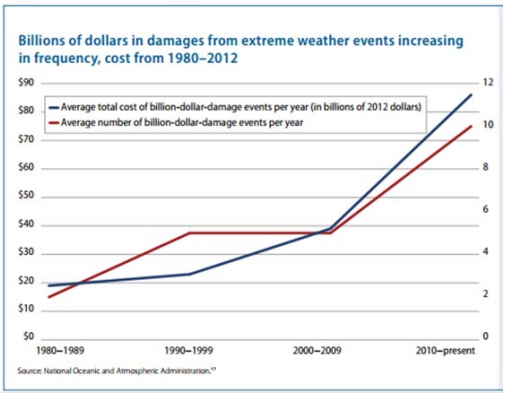
This is part of a long-term trend. Recently, international insurance giant MunichRe concluded that from 1980 through 2011, the frequency of weather-related extreme events in North America nearly quintupled, rising more rapidly than anywhere else in the world. The insurance industry estimates that 2012 was the second most expensive in U.S. history for climate-related disasters, with damages totaling more than $139 billion.

The burden of paying for the damage created by these weather events has shifted away from private insurers and is falling more heavily on America's taxpayers. Over the past five years, taxpayers spent three times more than private insurers to pay for recovery from climate damages. According to Dan Lashof, the NRDC's Climate and Clean Air Program, "This single-ticket expense now tops the list of non-defense discretionary federal spending".

The US had 90% of the global disaster costs of 2012. However, there was enough devastation to go around. The world experienced 900 major disasters in 2012, compared to the average annual number of 800 disasters worldwide since 1980. The weather forced 32.4 million people to leave their homes, with the majority displaced by flooding from monsoons and typhoons in Asia. Over half of the displaced millions were in India, Nigeria, China and the Philippines.

At that, the cost of global natural and man-made disasters in 2012 is actually significantly lower than last year's total. According to a report released by reinsurer Swiss Re, total economic losses from disasters -- naturally occurring or otherwise -- is estimated to be at least $140 billion. The total financial loss from disasters did not near 2011's total of $380 billion -- the highest in history -- or 2010's $218 billion.

Why are the costs of disaster rising so much?



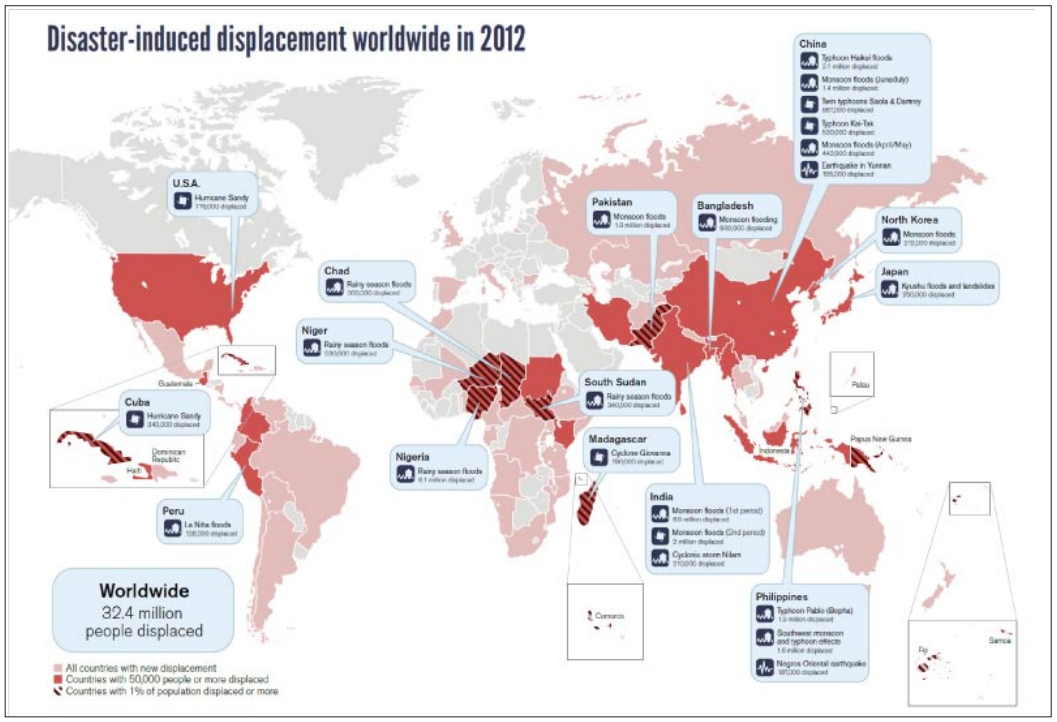


fig. 10, *above right* fig. 11, *above*

Source, two graphics : Michelle Yonetani et. al. Global Estimates 2012: People displaced by disasters, *Internal Displacement Monitoring Centre and Norwegian Refugee Council, May 2013*

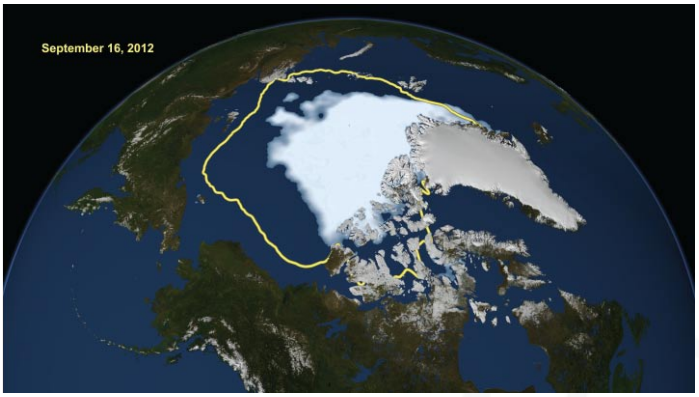


fig. 12 In 2012, the Arctic Sea ice was only 51% of the size that was normal between 1979 - 2000
http://www.nasa.gov/topics/earth/features/2012-seaicemin.html

Why are we seeing more extreme events? The answer seems to lie in three factors:

1. **VOLCANIC ERUPTIONS** (3 – 7 year duration) – As noted in the first article, large volcano eruptions temporarily alter climate. If the eruption pours ash and chemicals into the stratosphere, it takes two to seven years to precipitate out. For those two to seven years, the aerosols and the clouds they create block out incoming sunlight. The atmosphere below cools. It holds less moisture. Air pressure is changed and this in turn alters the strength and direction of winds.

Since 2006, we have seen increased volatility in both Alaska and Russia's Kamchatka Peninsula and in the North Pacific. For seven years, large eruptions distorted normal airflow, altering the Arctic Oscillation from decades-long patterns. These distortions have been felt throughout the Northern Hemisphere but have had their greatest impact on North America, which is directly downwind from the eruptions. Two extremely cold winters and volatile springs followed the giant 2009 eruption of Alaska's Mt. Redoubt. The 2011 eruptions of Iceland's Grimsvótn and Russia's Sheveluch produced the last two bizarre winters and springs. (Snow on Memorial Day!)

2. **EXTREME ARCTIC SEA ICE MELT AND ITS EFFECT ON THE JET STREAM** (long-term impact) – Scientists have been reporting the dramatic reduction of the Arctic sea ice for more than a decade. Last year, the sea ice dropped to a new low record, 1.27 million square miles (3.29 million square kilometers) or 49% below the 1979 to 2000 average minimum. (Satellite measuring of the ice pack began in 1979.) This ice loss is the equivalent in size to Europe minus Scandinavia and Russia or 45% of the contiguous US. Now scientists are correlating this dramatic change in the Arctic with the volatility of the polar jet stream.

There are several reasons for this dramatic reduction of Arctic sea ice. Most of us have read about the impact of man-made greenhouse gasses and the studies to determine how much they are contributing to this trend. At the same time two natural factors, both long term, are warming the Arctic. The Atlantic is in the middle of the warm phase of a 70-year-long Atlantic Multi-decadal Oscillation. In this, the oceans tropical currents are flowing very rapidly and warming northern waters. Similarly, in the Pacific, the Pacific Decadal Oscillation has entered the negative phase, which creates cooler conditions in the tropics and steers warmer water toward the poles. Both oceans are pouring warmer waters into the Arctic basin. History shows that this trend should continue for at least another 20 years.

Dr. Jennifer Francis, professor of Atmospheric Science at Rutgers University has explained how this affects the jet stream in

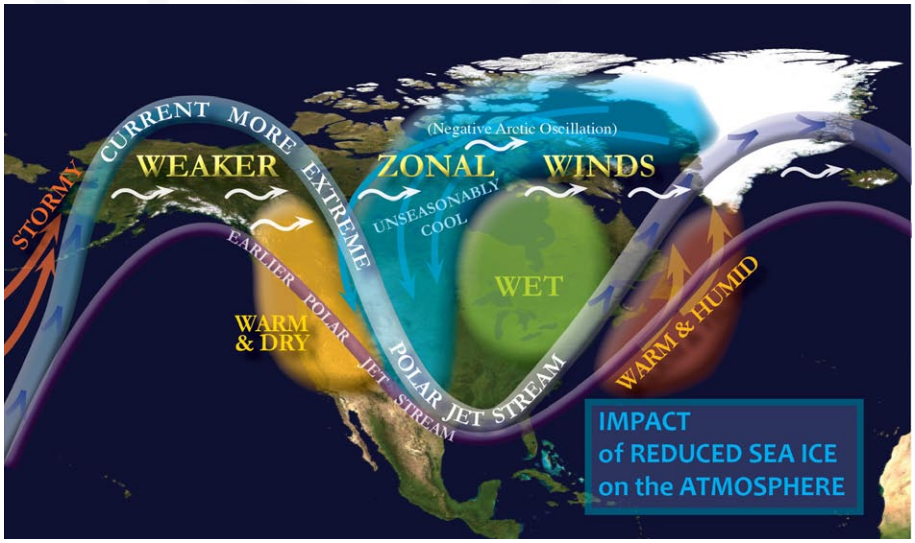


fig. 15 © Evelyn Browning Garriss

"Evidence linking Arctic amplification to extreme weather in mid-latitudes," published in *Geophysical Research Letters*, on 21 February, 2012. Arctic ice reflects sunlight while open waters absorb the heat. As fall comes, the stored ocean heat is released into the atmosphere, heating the autumn air by 2–5˚ and altering air pressure. This alters upper air circulation by:

- **SLOWING ARCTIC WINDS** – The flow of the circumpolar winds that circle the Arctic and trap the cold in the north are slower and weaker. More of the frigid polar air escapes south.
- **INCREASING TENDENCY TO MAKE CONTORTED HIGH-AMPLITUDE LOOPS**. The jet stream fluctuates as it circles the Arctic, dipping south and arching north. What

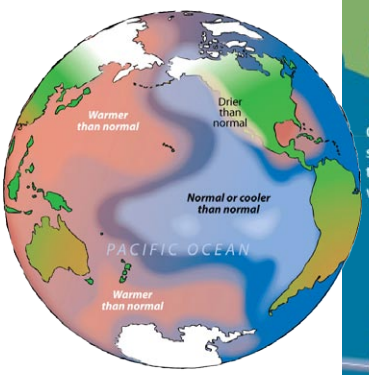
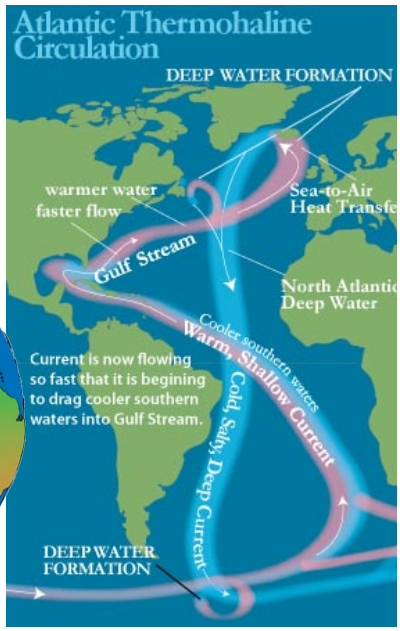


fig. 13, *left* The Negative PDO.

fig. 14, *right* The fast-moving Gulf Stream brings tropical water to temperate zones.



2 graphics © Evelyn Browning Garriss

Francis shows is that in years when the Arctic ice is severely reduced, the size of these north south loops increases. The polar jet stream soars further north and plunges further south. Dr. Francis's work concentrates in North America and shows that we are seeing the jet stream fluctuating at its most extreme along the East and West Coast.

Both of these changes slow weather patterns. Weaker zonal winds mean they don't push weather fronts as hard and fast. Instead of zipping from the west to east, the weather patterns linger in one place, prolonging the heat wave or cold spell. Storm fronts linger, dropping heavy precipitation and creating blizzards or floods. Similarly, the giant dips in the jet stream (called Rossby waves) move much slower than shallow dips. The cold air or heat waves stall. This creates more extreme weather – hotter, drier summer heatwaves or prolonged winter and springtime chills and storms.

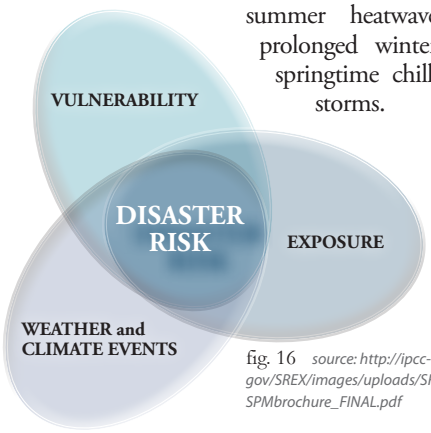


fig. 16 *source: http://ipcc-wg2.gov/SREX/images/uploads/SREX-SPMbrochure_FINAL.pdf*

Unfortunately, the melting Arctic ice pack is at least partially caused by Atlantic and Pacific Ocean patterns that will last another 20 years. This means the extreme weather patterns caused by slowing air circulation should last another couple of decades.

3. **THE HUMAN FACTOR** – The third factor that is causing an increase of extreme and expensive weather events is the human factor. People are living in high-risk areas. Frequently it is the poorest and most vulnerable members of society in these areas and this can cause severe weather events to become deadly.

Let me give an example: In 1995, the Atlantic Multidecadal Oscillation switched to its warm phase, which according to NOAA research roughly doubles the numbers of Atlantic hurricanes. In 1996, one of my clients called and complained. He had built a new beachside home and three hurricanes had brushed near it that year. All I could reply was, "Why do you think it's called Cape Fear? Why do you think the Native Americans never lived there?"

During the cool, more benign phase of the AMO, the Atlantic had been relatively quiet and millions of Americans had moved to beautiful coastal regions. By the mid-Nineties, half of the US population lived within 50 miles of a coastline. When the AMO once again turned warm, this left billions of dollars of US property in high-risk areas. The US has since increased its exposure.

This is not unique to the USA. China's two major exporting cities, Hong Kong and Shanghai are near the Pacific coast and were brushed by typhoons last year. India's economic powerhouse city of Mumbai is also coastal and as the India Ocean increases in heat, the city has been flooded repeatedly.

According to the UN's 2012 IPCC report, a disaster risk combines not just weather and climate events but also exposure and vulnerability.

EXPOSURE – With the shift in the AMO in 1995, Atlantic Rim precipitation patterns have shifted. Coastal and flood plain regions in the Americas, Europe and West Africa are facing increased exposure to floods, heatwaves and, particularly in North Africa and the US interior, drought. Since the shift in the Pacific Decadal Oscillation in 2006, low-lying regions of Asia and Australia face greater exposure of storms and floods while most of the western Americas face increased risk of drought.

VULNERABILITY – To the extent that societies do not adjust to the new climate shifts, they are increasing their vulnerability. Building codes that reflect the past 30 years, rather than the past decade do not provide adequate protection from the new strains on infrastructure. As urbanization increases, with hundreds of millions of people moving into ramshackle urban slums, the vulnerability of societies and economies increases.

Conclusions:

1. The payouts for disaster related events and the number of billion dollar damage events is increasing and has increased dramatically since 2009.
2. Overall, global weather has not necessarily become more extreme. The scientific community is debating the issue. However, statistics do show that the weather is becoming more extreme in the middle latitudes of the Northern Hemisphere.
3. The trend for the increase of extreme weather in the Northern Hemisphere due to volcanic distortion of polar weather will fade out in another couple of years, unless we have more large eruptions. The trend for more extreme weather due to the prolonged impact of storms or droughts has another 20 years or more to run.
4. Because of the shifts in the Atlantic and Pacific long-term oscillations, new areas are exposed to extreme weather. This increases their vulnerability and their risk of disasters.

Areas Facing Increased Exposure to Weather-Related Risk

DROUGHT including flash droughts	FLOODING & SEVERE STORMS including both winter and tropical storms
The US Southwest including Southern California	Western portions of the US Midwest
The US Southern Plains from Western Kansas to Texas	The Mid-Atlantic US states
Georgia and Northern Florida	Southern Mexico
Northern Mexico	The Caribbean
Southern Argentina	Southeastern Brazil
The Southern Andes Mountains	Africa's Eastern Sahel
Northern Africa	India
West Africa	Bangladesh
Mediterranean Europe	Central Coastal China
The Ukraine	Eastern Australia
Iran	
Pakistan	
The Southern Himalayas	
Southwest China	
North Korea	

fig. 17 *© Evelyn Browning Garriss*

News Notes

Talk about bad – potentially lethal—timing! A key satellite positioned to track severe weather in the eastern United States has failed, just as the 2013 Atlantic hurricane season is about to start. Back in 2006, NOAA launched three Geostationary Operational Environmental Satellites (GOES), designed to last 10 years. Unfortunately GOES – 13 has failed years ahead of schedule.

NOAA typically operates two GOES spacecraft over the United States, overlooking the East and West coasts, plus one in-orbit spare. The two satellites watch for clouds and developing storms, as well as measuring temperatures and humidity. NOAA has activated the spare but is not planning to drift it east, while efforts to troubleshoot its failed sister satellite are under way. Meanwhile, the Atlantic hurricane season is scheduled to begin June 1 with favorable conditions for a storm to develop early in the month.

One of the stories making news is that there has been a recent downturn in the rate of global warming. Since 1998, there has been an unexplained "standstill" in the heating of the Earth's atmosphere. Researchers say this will reduce predicted warming in the coming decades. Even the UK Met Office lowered their five-year temperature forecast. While the scientists argue what this means for global warming – as a historical climatologist I notice that this correlates with the beginning of negative phase change of the huge Pacific Decadal Oscillation. This phase change tends to cool the Tropical and Eastern Pacific. When the world's largest ocean, which covers 30% of the Earth, gets cooler -- it tends to slow "global" warming.

It is ironic that two of the crops that grow best in dry weather with sandy soil are wine grapes and opium poppies! This means that the potential for drier weather in California and the West should be potentially favorable for California wines this year. However, the cool phase of the PDO and current cool MJO producing a "mini-La Niña" are not necessarily good news for those marvelous Pacific Northwest reds. (Medium eruptions of North Pacific volcanoes, like the recent explosion of Mt. Pavlof, bring rains to British Columbia, Washington and Oregon.) Following a decent winter, the regions are being hit by rains and have the potential for a wet early summer. The 2006 change in the PDO has been good news for West Coast white wines, but some of the more northern red wine areas are facing a number of years with heavier rains.

It's the story of the ultimate Sleeping Beauty – if you don't mind "Beauty" being mossy. Canadian scientists have reawakened a moss (Aulacomnium turgidum) that was covered by Tear Drop Glacier for 400 years. Radiocarbon dating showed that the moss plants ranged from 400 to 600 years old. Researcher Catherine La Farge, of the University of Alberta and her colleagues think the plants were entombed in a glacier during the Little Ice Age, which plagued much of Europe and North America from about 1550 and 1850. It is interesting that with all the warning of polar melting, it has taken until now, over 150 years after the end of the Little Ice Age, for the ice to melt and reveal its mossy undercoat.

With news stories emphasizing the massive extinction of species, it is refreshing to hear about the latest award for the 10 most interesting new species discovered in 2012. The International Institute for Species Exploration at Arizona State University had an international panel of taxonomists (scientists that search for and classify species) review the roughly 18,000 new species discovered annually for the top ten. They looked for organisms with unexpected features or size, those found in rare or difficult to reach habitats and those especially significant to humans — those that play a certain role in human habitat or that are considered a close relative.

The results are unique, ranging from a solemn blue-bottomed monkey to the tiniest vertebrate in the world – a 7-mm. frog that can comfortably sit on a fourth of a dime. One butterfly, the Semachrysa jade, was discovered on Flickr, when a Shaun Winterton, a Florida scientist saw a picture on social media and was able to coordinate Hodk Ping Guek and Stephen Brooks at London's Natural History Museum to use new media to discover a new species. A newly found Chinese fly is a living fossil, identical to species that existed 165 million years ago that were believed to be extinct. The list also includes the world's tiniest violet, a snail-eating snake, a huge carnivorous sponge shaped like a lyre and (ugh!) a glow-in-the-dark cockroach that looks like it has a small face on its back.

The selection is held to publicize the fact that most scientists estimate that eight out of every ten species (excluding one-celled plants and animals) on Earth remain unknown. If sustainability is a goal nowadays then it is important to actually learn about what life forms exist. There is a world of discovery out there!

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

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