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World Reports Covering Climate, Behavior, and Commodities Original Papers Historical Perspectives

BROWNING NEWSLETTER

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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.

In this issue

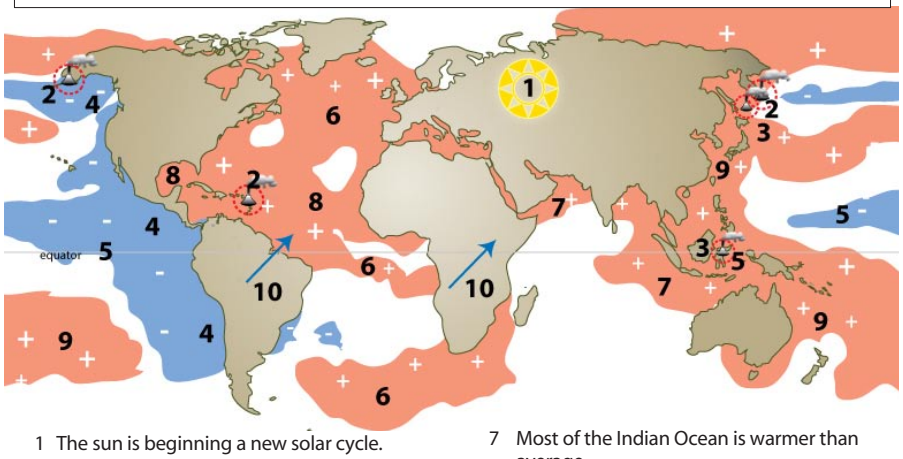
ATTACK OF THE TROPICS

SUMMARY: Between the Atlantic, Pacific and Indian Oceans, the globe was unusually warm last winter and temperatures remain above average. This has allowed the tropics to expand. This summer, the heat and moisture of these expanded tropics are plunging deep into the Northern Hemisphere, bringing heat waves and floods.

It is late August. Hurricane Danielle is swirling away from the US, deep in the Central Atlantic. Meanwhile, its evil twin, Hurricane Earl is lashing the islands in the Caribbean and threatening the East Coast. Closer to Africa, Tropical Storm Fiona simmers and grows. That's just the Atlantic. Over in the Pacific, two more tropical storms are threatening to pound the already flooded shores of a weather-weary China. After a relatively quiet summer, the tropical oceans have awakened and have become, literally, a hotbed of deadly storms.

Meanwhile Russia is recovering from a two month heat wave where temperatures soared to 40°C (104°F) or higher. Hot temperatures from Africa's Sahara blew north, sweeping into the vulnerable Russian fertile heartland. Wildfires swept through thousands of acres of prime forest and farmlands, choking the region with billowing waves of smoke. Unofficial estimates placed the death toll near 15,000 people across

Natural Factors Shaping Autumn & Winter's Weather



1 The sun is beginning a new solar cycle.

2 Large volcanic eruptions have put climate changing debris in the stratosphere.

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

4 The waters off the West Coast are cooling.

5 A moderate La Niña.

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

7 Most of the Indian Ocean is warmer than average.

8 The region between Africa and the Gulf is abnormally warm, a potential "Hurricane Alley".

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

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

FIG. 1

Russia, with 7,000 in Moscow alone. The nation, the world's third-largest exporter of wheat, lost 30% of its crop, slashing its harvest forecast from 90 million metric tons to 60 million metric tons.

Russia's weather problems have faded. Asian and African monsoon floods haven't. One fifth of Pakistan is underwater and over 20 million people (out of 166 million) are suffering. China has been enduring heavy monsoon flooding since May, exceeding even the deadly floods of 1998. Less reported is the "double disaster" in West Africa, where early drought has been followed by flooding rains and 8 million people in Nigeria alone are facing famine.

Heat, droughts, floods and hurricanes – all of these Northern Hemisphere abnormalities are due to one major factor. Tropical weather is surging abnormally far north. It is hitting areas, like Moscow, which are completely unprepared to cope with tropical conditions.

What in the World is Happening? – A Primer on Tropical Weather.

Last winter, at the IPCC fiasco in Copenhagen, attendees shivering in the chill Scandinavian winter were trying to claim that 2010 was one of the warmest years in history. Americans and Canadians, buried in snow, were not impressed. Unfortunately, the panelists were correct in reporting that global temperatures really were quite warm. The tropics, with a warm Atlantic, a balmy Indian Ocean and an El Niño heating the Pacific, were quite toasty. Summertime in the Southern Hemisphere caused these unusually warm temperatures to surge south, creating truly miserable weather.

Now it's summertime in the Northern Hemisphere. It's our turn to endure the surging tropical heat.

It is not surprising that the tropics are extended beyond their usual territories. This is part of a long term trend. According to scientists, the tropics have been expanding toward the middle latitudes since 1979. They have already expanded between 2˚ and 4.8˚ latitude, roughly 172 miles toward the poles.

Strictly speaking, "The Tropics" are the region between 23.5˚ North and 23.5˚ South. These are the locations of the Tropic of Cancer and the Tropic of Capricorn, the lines where the sun is directly overhead at noon on the June 21 and December 21 solar solstices. The regions between these two latitudes do not experience seasons because the sun is always high in the sky.

However, scientists have discovered that the tropical climate zones are shifting outside of these narrow definitions. The winds shaped by tropical conditions are flowing further than they used to. In order to understand this, you need to know about Hadley cell winds.

The Hadley cell is a wind circulation pattern that dominates the tropical atmosphere. Hot air rises and the hottest region on Earth is the area near the equator. The heated air rises, raining out as it reaches the higher altitudes. When it reaches the troposphere 10 to 15 km (6 – 9.3 miles) high, atmospheric circulation carries the air north and south towards the poles. Eventually it sinks back to the earth around 30°N and 30°S.

The region where the air is rising has low atmospheric pressure. It creates jungle rain forests over land and tropical storms and hurricanes over the oceans. The regions where the air is sinking produce high atmospheric pressures. These create dry deserts, like the Sahara and the Australian outback.

Once the air returns to the surface, it flows back towards the equator. The rotation of the earth slants these winds, called **trade winds** toward the west. The regions swept by these low easterly winds are the savannahs, the tropical grasslands that usually depend on monsoons for moisture. Over 3 billion people, half the world's population, depend on these rains for their survival.

The tropics have warmed over the past three decades. As tropical air grew warmer, the boundaries of the high altitude Hadley cell circulation have moved further away from the equator. **This has allowed the tropical climate zones, the jungles, savannahs and deserts, to expand so that about 8.5 million sq. miles (22 million sq. km.) of the Earth are now experiencing a tropical climate, compared to 1980. This year, the expansion was disastrous.**

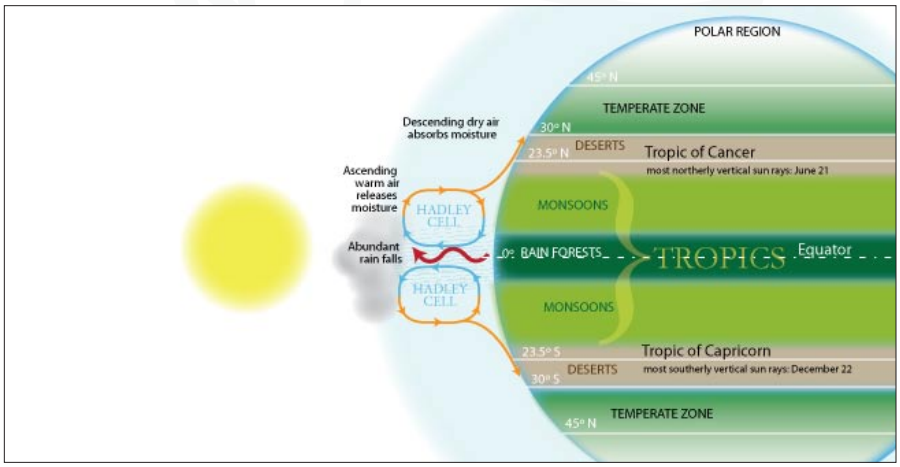


FIG. 2 **Hadley cells and tropical weather**

Hot Waters and Hurricanes

The most dramatic tropical weather to hit the US and Canada are tropical storms. The Atlantic Hurricane Season is literally heating up.

Tropical cyclones can be thought of as engines that require warm, moist air as fuel. Ocean temperatures need to be over 80°F (26.5°C). This year the Tropical and Northern Atlantic are between 0.5° and 2.5°C (0.9° - 4.5°F) warmer than normal. Think of the current Atlantic waters as thousands of square miles of gasoline, just waiting to be lit.

This warmth is not unexpected. The Atlantic has a decades-long temperature oscillation, called the Atlantic Multidecadal Oscillation (AMO). The Atlantic currents that carry heated tropical waters north started to flow faster back in 1995 and, according to scientists, will continue to warm the Atlantic for another 15 – 25 years. The tropical waters are usually warm in summer and early fall. This phase of the AMO guarantees that the temperatures will be even hotter.

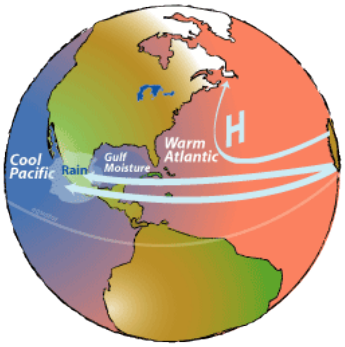


FIG.3 **Steering wind patterns during a warm AMO and cool PDO**

However, temperatures are not the only factor creating hurricanes. Storms need to be energetic and they need to be able to grow. If high altitude winds are too strong, they sheer off the tops of storms and keep them from growing into hurricanes. **Normally the best wind and temperature conditions for hurricane development are in late August and early September. Now, however, there is something special creating not just good conditions, but ideal ones.**

The Pacific Ocean covers over one-fourth, approximately 28%, of the Earth's surface. Major changes in the Pacific's temperature affects air pressures and wind for the entire planet.

Currently the three major temperature oscillations in the Pacific are positioning global winds to increase storm development in the Atlantic.

- **LA NIÑA** – Last winter's El Niño abruptly began to cool and by May was showing La Niña conditions. In July, the US National Weather Service officially declared that a La Niña had developed in the Pacific. This phenomenon creates high altitude winds favorable for tropical storm development in the Atlantic.
- **A COOL PACIFIC DECADAL OSCILLATION (PDO)** – According to many scientists, the Pacific's longest cycle, which normally lasts 50 – 70 years, has turned cool. This cycle, which affects the northern and tropical Pacific (some say that it affects the entire ocean), tends to weaken El Niños and strengthen the impact of La Niñas. It cools the waters off of the western coasts of the Americas. When combined with a warm AMO, it tends to encourage strong trade winds blowing storms into the Western Caribbean and Gulf of Mexico.
- **THE MADDEN JULIAN OSCILLATION (MJO)** – This is the final Pacific air-ocean temperature oscillation that has been the switch that has turned on the Atlantic Hurricane Season. The Madden Julian Oscillations are 30-to-60-day cycles of wind behavior within the tropical trade winds. They are pulses of alternating winds that produce warmer and cooler water, called Kelvin waves.

Scientists have discovered that MJOs shape tropical rainfall patterns from 30°N of the equator to 30°S. They are major factors in forming hurricanes and typhoons. The pulse of warm and cold waters, strong and weak high altitude winds produce environments that can be favorable or unfavorable for storm growth.

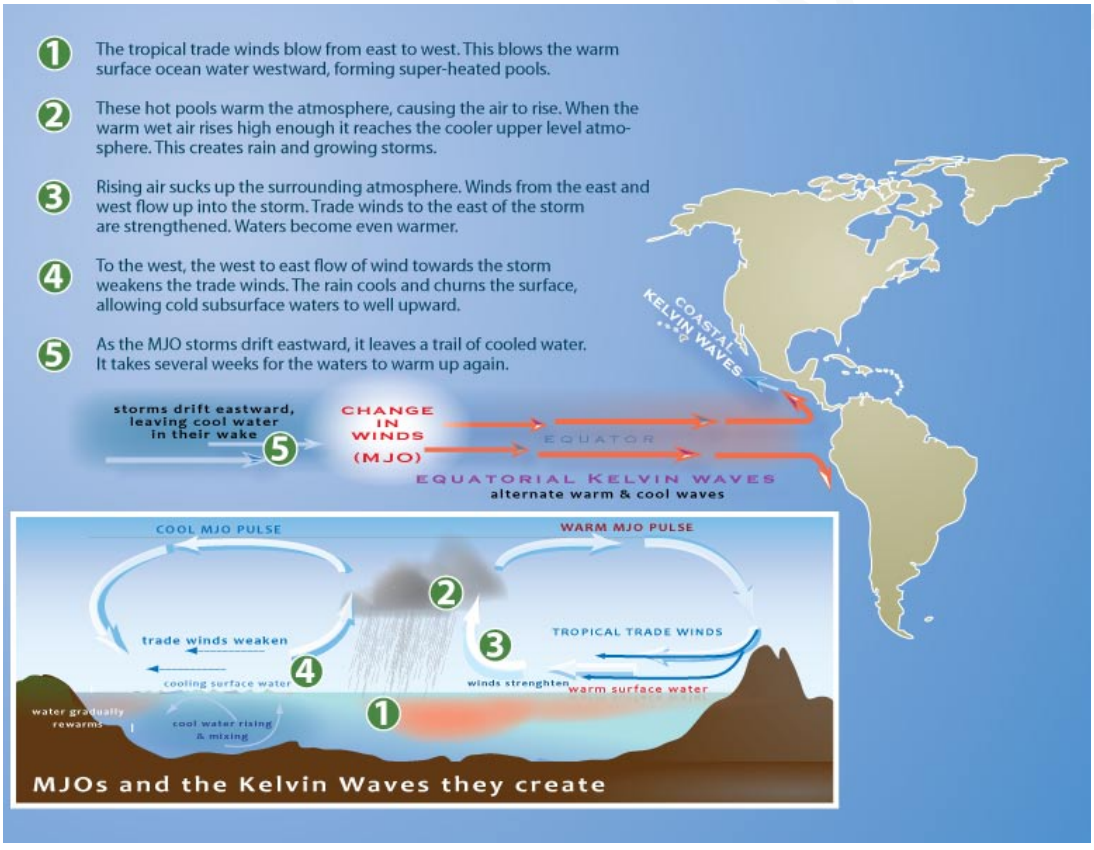


FIG. 4

In May and early June, the MJO induced winds over the Atlantic were very favorable for hurricanes. A tropical area of low pressure was able to grow into Hurricane Alex, the first June hurricane in 15 years. Then the unfavorable pulse moved over the Atlantic and for the nine weeks there were only tropical depressions and week tropical storms. **Now another positive pulse has moved over Tropical Atlantic. Conditions are ideal and Hurricane Danielle and Tropical Storm Earl formed within four days of each other.**

All three Pacific oscillations are positioned to create high-altitude winds over the Atlantic that will encourage the growth of tropical storms and hurricanes. The MJO will continue to be favorable during the heart of the hurricane

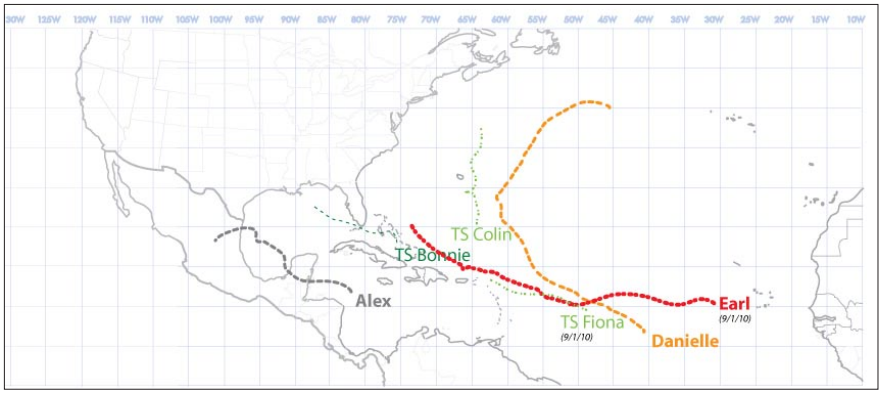


FIG. 5 **The 2010 Atlantic hurricane season, so far** *September 1*

season – late August, all of September and early October. The La Niña will linger into the spring of 2010. The cool PDO phase, with occasional interruptions, should last for decades.

What this means is that the peak of the Atlantic hurricane season will have ideal water temperatures and winds for storm growth. Expect at least 10 more tropical storms and hurricanes and two to three more hits in the gas and oil regions of the Gulf of Mexico, on both US and Mexican shores. As giant Category 4 Hurricane Earl is showing, the extreme ocean heat will create at least 4 more intense hurricanes with winds over 111 mph (178kph).

The African Monsoon – Tropical Heat In Europe/ Floods In Africa

As most Americans in the central and eastern portions of the US have noticed, the heat of the Atlantic has been broiling the nations around its rim. The same has been true on "the other side of the pond." Africa has seen stronger, deeper monsoons. Europe, particularly Eastern Europe and Russia have been blasted by desert heat.

While the heat wave in Russia was considered unique, the "worst in a thousand years according to the Russian Meteorological Center, European heat waves have become common. The heat wave in 2003 killed 40,000 people, 20,000 just in France. A similar heat wave with, fortunately, fewer fatalities hit in 2006. So this decade, soaring temperatures have invaded Europe in three killing heat waves.

Most weathermen focused on the strange patterns of the polar jet stream in order to explain what happened this year. Certainly the jet stream is part of the story. In June and early July, most of Europe was experiencing unusually high temperatures. Then, in mid-July, the meandering polar jet stream shifted. It dove deep into Western Europe bringing cooling temperatures and bowed to the north in Eastern Europe, allowing African air to flow up into Russia. The jet stream then plunged south again into Northern Pakistan and soared north over North China. Then, the position froze for weeks, allowing Moscow to bake and Pakistan to drown

Focusing just on the jet stream, however, ignores other factors shaping the heat. The air that baked Europe this summer came from Africa. In June an air pressure high settled over the southern portion of the continent and allowed warm Saharan air to well up north. In mid-July, the high shifted, the jet stream shifted, steering the African air masses further east.

Normally the high would have been over Africa. But conditions weren't normal in Africa this year. Just as in 2003 and 2006, the African monsoons are unusually heavy. The monsoon brought torrential rains to the baked grasslands of the Sahel, the area south of the Sahara desert. The nations of Mauritania, Mali, Senegal, Niger, Nigeria, Ethiopia and the Sudan have been hardest hit. Crops were washed out and there has been extensive damage to the infrastructure of these already poverty-stricken nations.

The situation is particularly dire in Niger. . More than 100,000 people have been left homeless after heavy rains washed away their homes earlier this month. The region, like India, had a terrible monsoon drought last year and was facing food shortages. Now floods have washed away the crops that the farmers managed to plant with their carefully hoarded seeds. Thousands of animals have drowned from herds that were already depleted from last year's drought. It is estimated that nearly eight million people, half the population, are facing hunger. Unfortunately, flooding is also hindering the delivery of aid in remote areas and food distribution will be limited to only 40% of those in need.

Why is this happening?

Remember the Hadley cell wind circulation pattern. In this region of the world, next to the simmering Atlantic, the equatorial air is warmer than usual and this is affecting circulation. The atmospheric low is more intense, bringing more rain into lands that are normally savannah grasslands. The monsoons are extending deeper into formerly parched lands where farmers live in

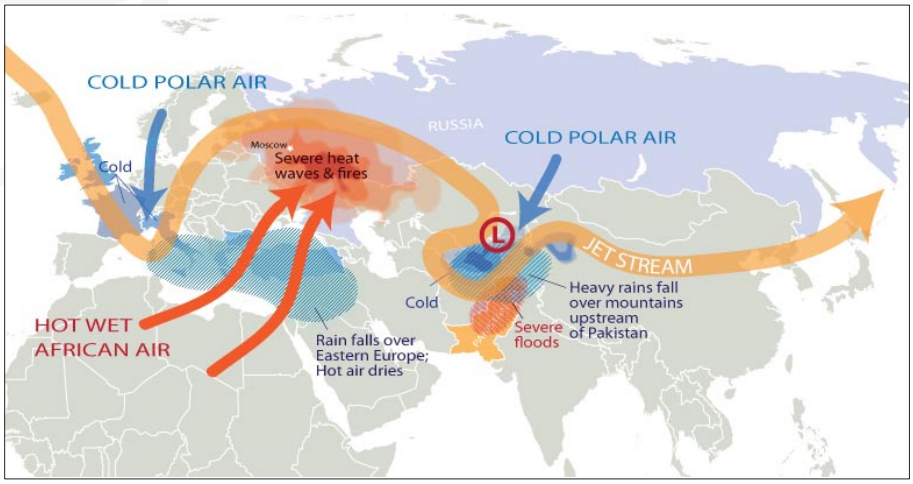


FIG.6 **The stalled jet stream that brought disaster to Europe &Asia**
mid-July to Mid-August

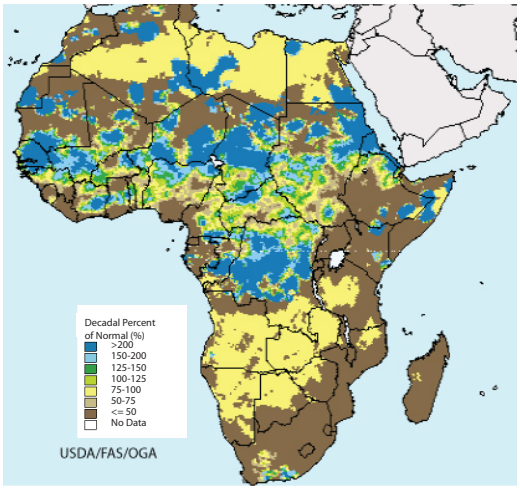


FIG. 7 **Precipitation anomalies in Africa**
July 11-20

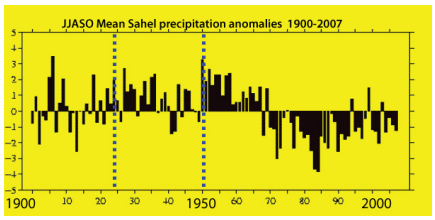


FIG. 8 **Changing rainfall patterns in Africa**

http://www.sfu.ca/~ianh/geog312/lectures/Drought.htm
top graphic: http://www.pecad.fas.usda.gov/cropexplorer/continentView.cfm?ftypeid=1&fattributeid=1&stypeid=1&sattributeid=2&regionid=africa&startdate=07%2F11%2F10&imenddate=07%2F20%2F10

river floodplains. The atmospheric high, that blocks moist westerly winds and creates desert conditions over the Sahara, has retreated north.

History shows us that in the 1940s and early 1950s, this much rainfall in these regions was typical. However, during the 1960s the amount of rainfall began to decline and the Sahara expanded. By the 1970s and 1980s the rainfall across the Sahel of Africa had dropped severely. Over 5 million people were affected by this shift of rainfall, with more than 200,000 dying from malnutrition and related diseases. Over 80 percent of their livestock died. There was a massive social upheaval as tribesmen had to leave their lands and migrate to overcrowded cities. It was about this time that people started hearing of starving Ethiopians.

The African monsoon was no longer penetrating as far inland. The Sahara Desert expanded south, increasing 15% in size. This trend reached a peak in 1983.

Starting in the mid-1980s, the rainfall began to come back. The rainfall is moving north and the air pressure high that marked the northern border of the monsoon rainfall has also been moving north. Unfortunately, while this means more rainfall for Africans, it has meant that the high pressure, and the heat and dry weather associated with it, occasionally surges north into Europe. It was over Western Europe in 2003 and 2006 and, this year, it was over Russia.

Russia has had heat waves in the past, particularly in its southern regions. However, Alexander Frolov, head of the Russian Meteorological Center reported that this was the longest unprecedented heat wave for at least one thousand years. The last time the region has had these types of temperatures was during the Medieval Warm Period (950 – 1250 AD).

What Russia didn't have in those medieval times was the same high urban density. Cities and their heavy use of energy produce "heat islands" This heating is ideal for Russian winters, when living huddled together saves on energy costs, but can be fatal in a hot year. This led to at least 15,000 casualties and, in Moscow, 700 deaths a day.

On August 19, the jet stream finally began to shift and the monsoon retreated. The Russian heat wave broke but left its impact. **Russia's Central and Volga districts lost up to 40% of their wheat crops and the nation as a whole has suffered an estimated 30% loss. The Ukraine is reporting a 19% wheat loss from last year. Even more serious, the fall sowing season for winter wheat is stalled by the drought. According to the Ministry of Agriculture, fewer than 21,000 hectares of winter crops had been planted by August 18 compared to 571,000 hectares by the same date last year. As a result, on August 5, Putin announced that Russia, once the fourth largest exporter of grain in the world, would ban all exports.**

Asian Floods

As in 2003, 2010 Europe experienced a heat wave while Asia was hit by disastrously heavy monsoons. Unfortunately for Asia, the Russian heat wave broke on August 19, but the water levels in flood-stricken southern Pakistan are only beginning to recede.

Like 2003, the monsoon arrived late. In both years, the week-long delay of the rainclouds allowed the temperatures on land to soar up to 49°C (120°F). When land temperatures are warmer, monsoons tend to be stronger.

Basically, monsoons are seasonal winds that are shaped by the difference in temperatures between land and water. Land heats up and cools down more quickly than water. In summer, land reaches a higher temperature than the ocean. The hot air rises, creating an area of low pressure. Air flows in from the ocean to take its place. This creates an extremely constant wind blowing toward the land. As the moist ocean air blows inland, it ulti¬mately is diverted upward by mountains, which causes cooling, and in turn, condensation and rainfall.

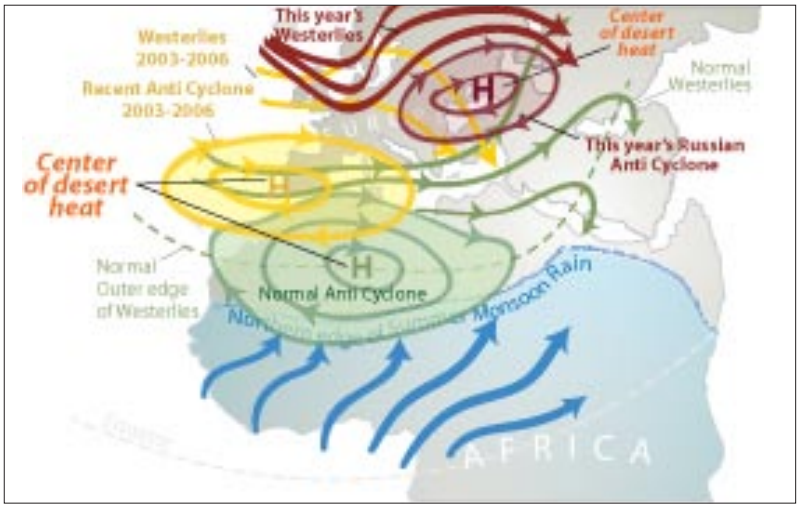


FIG. 9 **Three deadly heat waves in one decade-Tropical desert highs invade Europe.**

FIG. 10-11 **Monsoons: normal summer *(left)*, and this summer**

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

The extra heat guaranteed that this year's monsoon would be heavy. The kink in the jet stream (See Figure 6) made it a catastrophe for Pakistan. The warm wet air from the Indian Ocean crashed into the cooled polar air mass over the northern highlands. The result was torrential rainfall over the headwaters of the Indus River, the worst in 80 years. The rains started in late June and continued through July and early August. Even when the jet stream finally moved and the rainfall slowed, the flooding continued as the waters made their way south. On August 30, the floodwaters finally reached the mouth of the Indus on the Arabian Sea and the floods could begin the slow receding process.

The impact on Pakistan is devastating. More than 1,600 people have died and about six million are homeless. In total, about 17- 20 million of Pakistan's 166 million people have been affected by the disaster. Government and private relief efforts have been able to reach only reaching a small proportion of the people who need help.

The UN's World Food Program estimates that the floods have damaged about 14% of the country's cultivated land. With damage to crops estimated at almost $3 billion and a minimum of $1.5 billion damage to the nation's infrastructure, Pakistan will take years to recover. More immediately, the lingering floodwaters mean farmers will be unable to meet the fall deadline for planting new seeds in 2010. This will lead to a massive loss of food production in 2011, and potentially, long term food shortages.

Pakistan is not the only Asian nation to be pounded by heavy monsoons. India has experienced some flooding, but on the whole, has benefited from the abundant rains. China is not so fortunate.

China has been enduring a summer of natural disasters. Official media has declared it the nation's worst flooding in a decade. According to China's Ministry of Land and Resources the "extreme weather" has caused a tenfold increase in geological disasters, such as landslides. Earlier in August, heavy rains in northwestern Gansu province triggered landslides that killed more than 1,400 people and left more than 300 others missing. Rain caused smaller mudslides in southwestern China, including in Yunnan and Sichuan provinces. Floods wiped out many rice paddies in central Hunan province, one of China's top rice-growing regions, and damaged crops in northeastern Jilin province, China's main grain-growing region. As this is being written, more than 250,000 people in China's northeastern Liaoning province are being evacuated from floods. Two tropical storms are expected to make landfall, one near Hong Kong, the second near the already flooded regions by the

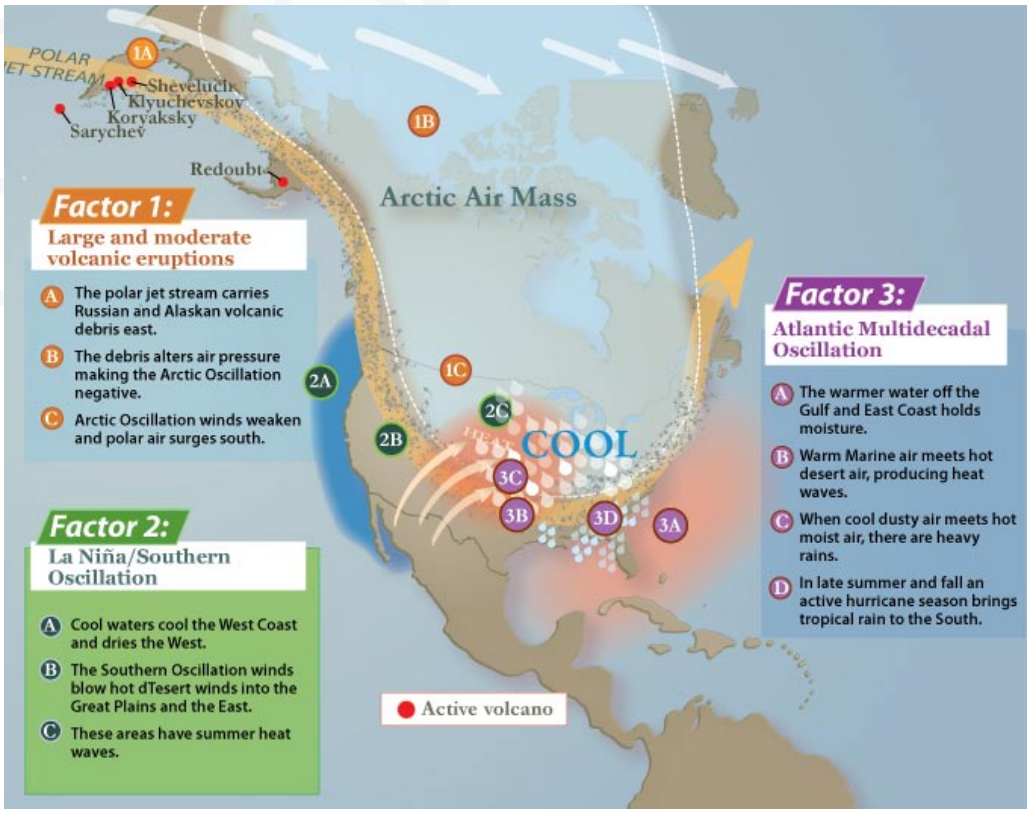


FIG. 12 **This summer's complex weather**

Korean border. Unfortunately, August and September are the main flooding months and there is still a possibility of more heavy rains.

Volcanoes and La Niña – The Summer in North America

The United States is the anomaly. Global weather has reduced wheat production in Canada, Russia, the Ukraine, the European Union and Kazakhstan. Similarly, the global supply of cotton, oilseeds and coarse grains (corn, rye and barley) is down. Meanwhile, America's Midwest breadbasket is enjoying some of the most massive bumper crops in years.

To make this anomaly even more surprising, This was a La Niña summer, which typically means hot weather and drought. As anybody living east of the Rocky Mountains knows, we have been experiencing the heat. But unlike most La Niña years, we have had rain – lots of healthy rainfall. For people, this has frequently led to steamy misery, but crops thrived.

Typically during a moderate-sized La Niña cool waters flow along the West Coast. Temperatures plunge along the coast and precipitation drops further inland. Further east, trade winds become stronger, blowing directly into Mexico and sending less Gulf moisture into the US. Temperatures rise and the Plains become parched.

The reason that this La Niña has not been dry is because we are feeling the impact of the volcanic activity in the Northwest Pacific. Last year two huge eruptions, Mt. Redoubt in Alaska and Sarychev Peak in Russia put huge amounts of ash and chemicals into the stratosphere. This year there has been a small-to-medium sized eruption on Russia's Kamchatka Peninsula almost every week. According to the latest report from Tokyo's Volcanic Ash Advisory Center (which warns airplanes of possible engine-damaging clouds of ash) Russia's Mt. Sheveluch had eruptions that produced plumes that rose to altitudes of 6.4-8.5 km. (4.0 – 5.3 miles), high enough to enter the stratosphere. This means the ash can linger in the upper atmosphere for months and years.

The ash has a triple effect:

- It filters out incoming sunlight. This creates cooler temperatures.
- The altered temperatures change air pressures and wind directions. Polar winds are now weak, allowing the ash-filled polar air mass to escape south.
- Ash particles collect moisture, forming droplets. These form cooling clouds that can drift for thousands of miles before falling out in heavy rains and snows.

The ash from Russia is literally precipitating out in North America. Smaller eruptions tend to precipitate out in Western Canada (as it did this spring – interfering with Canadian wheat planting) and the Pacific Northwest. Moderate-sized eruptions rain out across the nation.

This is what has happened this summer. The warm Atlantic and the La Niña have heated up the continent and the volcanic ash has encouraged rainfall. This trend will continue into autumn. Temperatures will tend to be cooler in the West and warm and wet in the East.

Don't expect this warmth to linger into winter, however. Typically moderate La Niñas produce cool winters in the West and warm early winters, cold mid-winters and late winters in the East. Volcanic dust has cooled the polar air mass and will magnify to cold. Expect a snow-filled winter with a frigid blast in January.

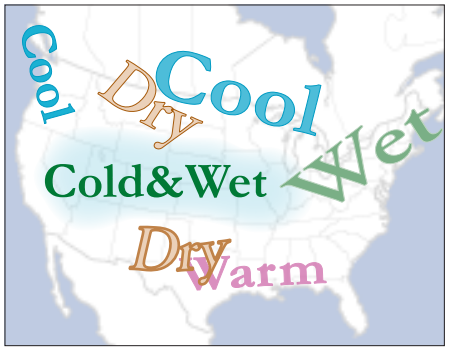
Conclusion

The tropics are unusually warm and this summer's abnormal weather has been due to the northward expansion of tropical storms, monsoons and deserts. This has led to a global crop reduction in a time of increasing demand. Only the US, cooled by volcanically triggered rainfall, has had great growing conditions and a potentially good crop. Expect this warmth and rain to linger into autumn, potentially creating some harvest problems.

Don't expect this heat to last. Once again the Northern Hemisphere faces a very cold winter due to volcanic ash.

Early Autumn

Late Autumn



Winter

FIGS.13-15 **If the North Pacific Volcanoes continue erupting**

Cool 2°C or more lower than normal temp.

Hot 5ºC or more higher than normal temps

Wet 125% or more of normal moisture

Warm 2-4°C or more higher than normal temps.

Dry 75% or less of normal moisture

News Notes

While the Northern Hemisphere bakes, South America is chilling out. Not only is the continent in the middle of its winter season but the cold La Niña waters are flowing along its western coastline.

A vicious cold wave, the coldest in 30 years, hit South America in mid-July, the first week that the La Niña became official. Freezing temperatures engulfed Chile, Argentina, Paraguay, Uraguay and Bolivia, killing at least 57 people. While the low temperatures were relatively mild compared to a US winter, the local citizens literally had is no infrastructure to handle the cold. Indeed, Chile's capital, Santiago, had to turn its football (soccer) stadium into a mass shelter for its freezing citizens.

The heavy snows closed down highways and killed cattle across the Andes. The native llama/alpaca herds were hardier but there have been tens of thousands of livestock miscarriages. Chile reported a 30 – 40% loss of its fruit and vegetable crop and expects food prices to rise 20%. The nation's avocado and citrus orchards were particularly damaged.

People weren't the only ones suffering from the cold. Bolivia reports that the freeze killed over 6 million dead fish, alligators, turtles and dolphins. As a consequence, rivers, lakes, lagoons and fisheries are brimming with decomposing fish and other creatures. This much cold and death was virtually unprecedented. Inhabitants of riverside communities report the smell is nauseating and can be detected as far as a kilometer (0.6 miles) away from river banks.

Early August saw snow falling in Brazil. For two days Southern Brazil and 12 Argentinean provinces had snowfall. To get an idea of how unusual this icy snap is, you just have to take a look at the weather records of Argentina's capital Buenos Aires. It's snowed there three times since 1918 -- and two of those dustings have taken place in the past month. While the city got off relatively light, the country's Andean and Patagonian provinces have been buried under 3 feet of snow. Dozens of villages have been cut off by the vast drifts, which have killed an unknown number of livestock and ruined thousands of acres of crops.

Meteorologists reported that temperatures were colder in Argentina than in Antarctica. To cope with freeze, Argentineans cranked up their home heating systems, sending electricity demand to a new high. The local press reported that this record-breaking surge in demand caused a blackout that forced hundreds of industries to temporarily shut down.

Not all of the cool weather was south of the equator. The strange configuration of the tropical "Sahara" high this summer really warped the normal westerlies over Western Europe. England cancelled summer early and had the coolest August in 23 years. Indeed, it went through the month without a single hot day. England and Wales was almost one and a half times the average amount of rain and "the skies remained cloudy all day."

This year, not all of the particles floating in the stratosphere are volcanic. Scientists are beginning to understand one of nature's most impressive phenomenons – the Pyrocumulonimbus Clouds. Meteorologist Mike Fromm of the Naval Research Laboratory, is beginning a massive study of these huge stormy clouds. What they are discovering is that these storms, are either started or augmented by the smoke and ash of wildfires. They explode in size and carry the debris up to the stratosphere. Once the debris enters these heights, it drifts for months or years, blocking sunlight and cooling temperatures for months or years.

These studies are explaining a long-term enigma. In the past, scientists have found mystery clouds in the stratosphere were attributed to volcanic eruptions, although volcanic evidence was lacking. It was only recently that scientists have realized that debris from fires could raise that high and spread globally. The first time this was studied was in 2002, when Canada and the USA were swept with wildfires. Now they have discovered that this phenomenon is fairly common in massive fires. For example, satellite pictures taken 8 August, show pyrocumulonimbus clouds carrying pollution from the Moscow fires towards Finland.

In short, the hot fires of Russia in August may help shape the cold temperatures in this upcoming winter.

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This newsletter will **not** contain:

- *Analysis of, or recommendations concerning, any investment possibilities.*
- *Recommendations on any particular course of action.*

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