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

BROWNING

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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

The Return of La Niña Weather

SUMMARY: The natural factors that shaped a cold December will continue to chill January. A new La Niña is developing and should linger through spring.

2008 – the year began with millions of Chinese workers unable to get home for Chinese New Year. It ended with millions of Americans unable to get home for Christmas. For the first time in decades, the Arctic ice cap grew. As headlines warned of global warming, 2008 evolved into a cold, wet, miserable year.

The year has ended. 2009 has begun. What can we expect? Was 2008 an anomaly or the beginning of a cooling trend?

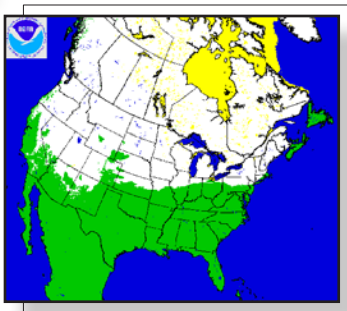

fig. 1
The White Christmas of 2008

http://www.ncdc.noaa.gov/oa/climate/research/snow/animation.php?region=us&begmonth=12&begday=1&begyear=2008&endmonth=12&endday=28&endyear=2008&submitted=Animate+Selection

Basically, 2009 will have a chilly beginning. The conditions that have shaped this winter are continuing. Volcanic activity remains unusually high. A neutral Pacific is evolving into a La Niña. The Atlantic is developing a strongly negative North Atlantic Oscillation. These factors will shape a cool mid-winter. At the same time, they may allow a warmer late winter and early spring.

Let's examine each of the factors that have shaped this December.

1. **There was a medium-sized volcano eruption in the Caribbean and several medium-sized eruptions on Russia's Kamchatka Peninsula.**

The volcanoes of the Northern Pacific are active. However, since 2006, the region has become extremely active. For example, Alaska normally has two volcano eruptions per year but this summer had 3 eruptions in 3 weeks. The dust and debris shaded the North Pole throughout most of the summer, leaving the region unusually frigid.

The activity is continuing. Since mid-November Kliuchevskoi and Sheveluch, on Russia's Kamchatka Peninsula, have been continuously erupting. Kliuchevskoi's explosions have ranged from 5 - 8 km (3.1 – 5 miles) above sea level, while Sheveluch's eruptions have averaged 6.8 – 3.1 km. (4.2 – 1.9 miles) high. These eruptions were not high enough to alter global climate, but they did cool the Arctic air mass. The ash collected moisture and snowed out over North America throughout December.

Both Asian volcanoes continued erupting through the last week of December. Around Christmas, Klyuchevskoy eruption was 7 km (4.3 miles) high and Sheveluch was 8.5 km (5.3 miles) above sea level. These eruptions will cool the fronts that sweep through North America in early January. According to Russian scientists, neither volcano shows any signs of subsiding. Also, Koryak volcano, which has been quiet for 3,500 years, has become so active that the government has closed down the Kamchatsky Airport.

Not all of the volcanic activity has been in the North Pacific. Soufriere Hills volcano on

fig. 2: **Volcano weather**
Eruptions in Russia, Caribbean will profoundly influence North America's winter

Montserrat Island in the Caribbean erupted on December 1st and the eruption reached a height of 12.2 km (7.6 miles) by December 3. When the Arctic air mass plunged south in the first week of December, it met the wet, ashy Gulf air and snowed out in Houston and New Orleans. The Montserrat Volcano Observatory warns that the Hills may have another large eruption over the next few weeks.

Volcanic activity has been a "wild card" cooling the weather and increasing storminess in North America. It will continue to cool conditions through mid-January.

2. The North Atlantic Oscillation is turning negative.

Climatologists argue about the impact of volcanoes. What they don't argue about, however, is the effect of the Atlantic and the North Atlantic Oscillation.

The North Atlantic Oscillation (NAO) is a large atmospheric pattern that has been studied since the 1770s. Basically it is the contrast between the semi-permanent low atmospheric pressure around Iceland and the high atmospheric pressure further south near the Azores Islands. When the difference between these air pressures is high, we call it a positive NAO and get certain types of weather around the Atlantic Basin. When there is very little difference, we call it a negative NAO and get a very different pattern. The NAO may switch from negative to positive several times a month. This winter, it has been very negative.

A negative NAO creates very cold dry weather for eastern North America. Typically the polar winds slow down, allowing the Arctic air mass to plunge deep into North America and Europe. The Southeastern US gets very little precipitation and Southern Europe has heavy snow and floods. Historically, negative NAO years are very bad for Southern hydroelectricity.

It is very hard to predict the NAO. The best models of Europe and the US are forecasting an increasingly negative NAO from early January to the middle of the month.

If these models are correct, then early January will see cold weather through the Great Lakes and Eastern Canada, as well as the Midwest, Northeast and Mid-Atlantic states. The Southeast should receive below average precipitation, setting up the scenario of another dry springtime.

3. The La Niña is returning.

Normally the tropical Pacific cycles between warm and cold. If the temperatures become too extreme, the warm tropical Pacific becomes an El Niño and the cool tropical Pacific becomes a La Niña. Last winter, the Pacific had a La Niña. Logically the ocean should oscillate back to warm.

It didn't. We are developing another La Niña.

The official forecast is that there is a 50-50 chance of the Pacific remaining neutral or cooling into a La Niña. However, when one discusses the Pacific with the oceanologists, the majority feels we are cooling into a La Niña that will last through springtime into summer. The sub-surface water temperatures are very cool and these will continue to well up and cool the tropical Pacific.

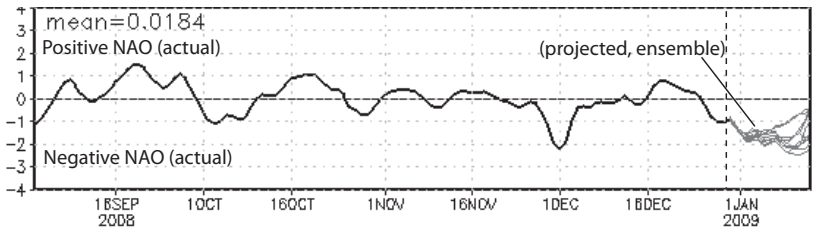

fig. 3 **Most computer models show a negative NAO in the coming weeks**

above: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml, lower right: http://www.idea.columbia.edu/NAO

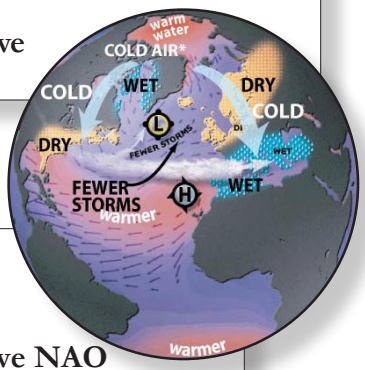

fig. 4
Negative NAO -and its consequences

If it does, then North America can expect a tremendously variable jet stream. The weather will experience extremes of cold and heat, one right after the other. Typically large portions of central North America experience increased storminess, increased precipitation, and an increased frequency of cold-air outbreaks. Meanwhile, the southern states experience less storminess and precipitation. Most of the continent has a cold mid-winter and a warmer than average late winter-early spring.

When all the natural factors are combined, they shape a cold mid-winter, and a warm late winter and spring. Western Canada and the Pacific Northwest should be cool and snowy in spring but the rest of the continent should have above average temperatures. More ominously, California and the southern tier of states should be dry. The only wild cards in this forecast are the Russian volcanoes, which can help to create enormous cold fronts any time in winter and spring. .

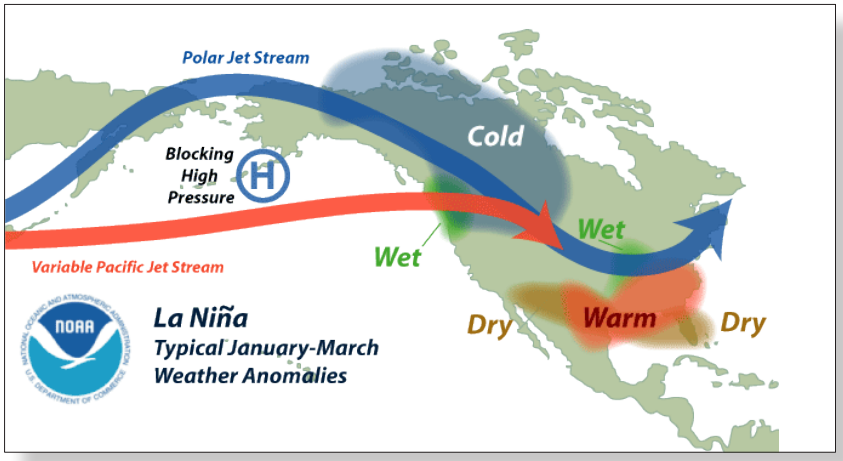

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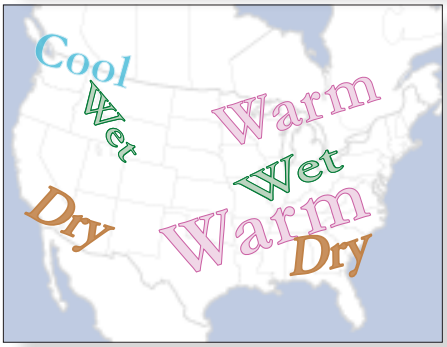
fig. 5, above, figs. 6 & 7, right

Mid Winter



Late Winter / Early Spring

Cool 2°C or more lower than normal temperatures	**Warm** 2-4°C or more higher than normal temperatures	**Wet** 125% or more of normal moisture
Cold 5°C or more lower than normal temperatures		**Dry** 75% or less of normal moisture

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Asia - The Changing Outlook on the Monsoon

SUMMARY: Natural weather factors should bring Asia several decades of good monsoon seasons. The Asian/Atmospheric Brown Cloud, however, is warping the monsoon. This has important economic implications since the difference in rainfall means the difference between rural prosperity and rural poverty for the 3 billion people in Monsoon Asia.

2008 was not a good year for Asia. The year began with weather disasters and soaring rice prices. The end of the year saw the beginning of a worldwide recession. Will 2009 be any better?

Asia's Monsoon – The Basics

[NOTE – For more information on the Asian monsoon, see the July 2008 issue of the Browning Newsletter]

Over 3 billion people, half the world's population, depend upon the yearly cycle of monsoon rainfall. This is particularly true in Asia, where the Asian – Australian Monsoon System stretches from Pakistan to the Philippines north to Korea, Japan and Northern China. Most of Asia's population lives in lands dominated by monsoons. If the patterns of the cycles are disturbed, as they were in 2007, tens of millions of Asians suffer.

Monsoons are seasonal wind patterns. The winds are shaped by differences in continental and ocean temperatures and air pressure. Land heats up and cools down more quickly than water. In summer, the land is warmer 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 moisture over land.

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. Now dry winds blow from land to water. Typically the winds during the

"dry season" are not as constant, allowing some moisture from other sources, especially along the coastlines.

In the Eastern Hemisphere, there are five monsoons connected by the flow of air and currents in the Indian and West Pacific Oceans:

- **The Indian Monsoon**
- **The Southeast Asia Monsoon**
- **The Pacific Northwest Monsoon**
- **The Australian Monsoon**
- **The Madagascar Monsoon.**

All five of these systems have been dramatically changing over the past fifty years. They have been shaped by the interaction of the Indian, Pacific, even the Atlantic oceans. All three have undergone long-term changes. This means Asian peasants are farming under very different conditions than their grandparents.

1. **The Indian Ocean** - Over the last fifty years, the Indian Ocean has been getting notably warmer. This has distorted and magnified the power of the monsoons. In particular, the monsoons have been producing increasingly intense rainfalls. This has been very bad for coastal cities like India's Mumbai (formerly Bombay) and China's Hong Kong.
2. **The Pacific Ocean** – The Pacific Ocean is both the largest and most complex of the Earth's seas. Besides its normal currents, it has periodic cycles. These range from the very short Madden Julian Oscillation to the multi-year El Niño/La Niña cycle to the 50 – 70 year Pacific Decadal Oscillation (PDO).

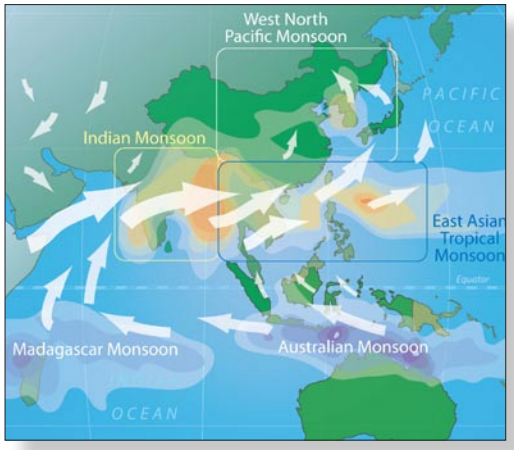


fig. 8 **The Asian-Australian Monsoon Systems**

© Browning maps

Basically the PDO is a shift of warm and cool waters in the Pacific. In the warm phase, the tropics and eastern Pacific waters are warm and the polar and western waters are cooler than normal. In the cool phase, the reverse is true. Since 2006 the PDO has been in its cool phase. The tropical ocean currents and waters off the western coasts of the Americas are cooler. The Western Pacific and the polar waters are warmer. It will stay this way (with occasional exceptions during El Niños) for the next 20 to 30 years.

When the PDO is in its cool phase, the water temperatures around Asia and in the Indian Ocean go up. Any global warming over the next two to three decades will be felt much more intensely in East Asia. This will mean much more rainfall for western India, central and northern China, Japan and parts of Australia. Unfortunately, it also means drought in western North America.

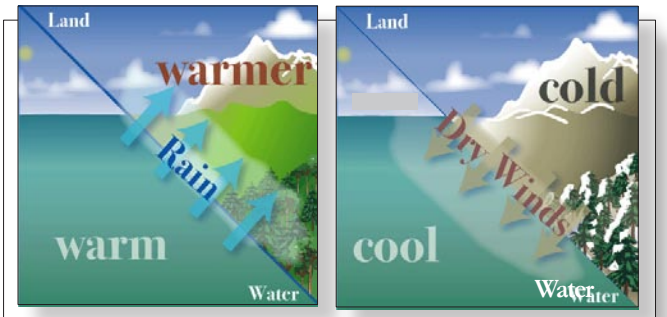
3. **The Atlantic Ocean** – The Atlantic Ocean is warming up. The ocean's largest current, the Atlantic Thermohaline Current (the Gulf Stream) has increased its speed and is carrying more warm equatorial water north. This process began in 1995 and will probably last 15 – 20 more years. Its impact is global.

According to "Impact of the Atlantic Multidecadal Oscillation on the Asian Summer Monsoon", by Riyu Lu, Buwen Dong and Hui Ding, (*Geophysical Research Letters*, 2006), this will increase the Southeast and Northwest Pacific Monsoons. It will prolong the Indian summer monsoon.

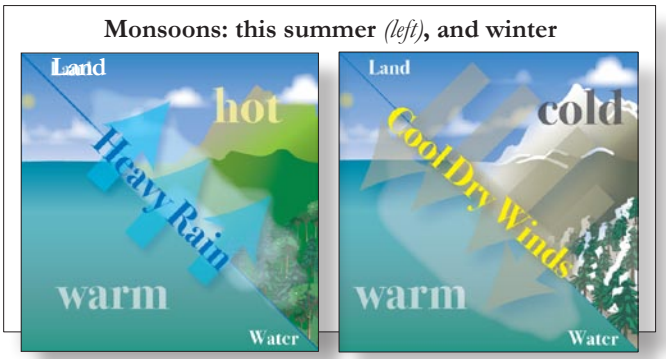
This means the oceans surrounding the Eurasian continent are all warming at the same time. This will warm Asian summers and increase the strength of the Indian, Southeast Asian, Australian, and Northwest Pacific monsoons. The monsoons have grown stronger and more reliable, but much of this change has come in the form of more extreme rainfall, with accompanying landslides and flooding. Given the long-term oscillations in both the Atlantic and Pacific, this pattern will continue strongly for another 15 to 30 years.

The Asian/ Atmospheric Brown Cloud – The ABC of Rainfall

Natural weather factors should create a heavier Asian monsoon. However, the human factors of pollution are distorting where and how the rain falls. The additional moisture over Asia is meeting the Asian



Monsoons: normal summer *(left)*, and winter patterns



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figs. 9 & 10

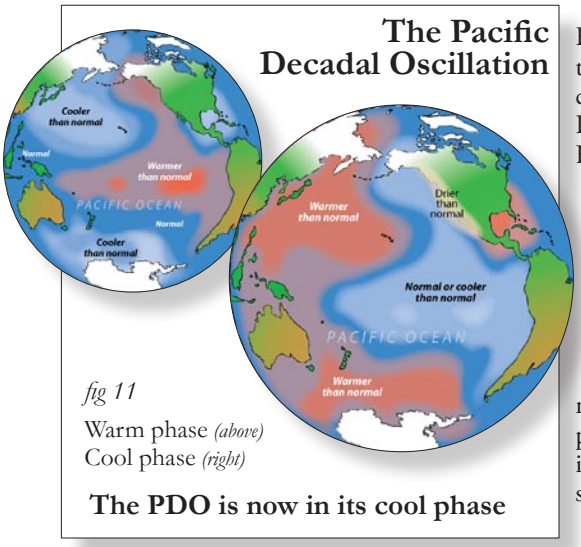


fig 11

Warm phase *(above)*
Cool phase *(right)*

© Browning maps

Brown Cloud.

The Asian Brown Cloud or **ABC** is not confined to Asia. Indian scientists first discovered it and it is technically called the Atmospheric Brown Cloud. It isn't a cloud and is frequently grey. It's smog, a thick hazy mixture of fog, dust and pollution. Typically ABCs are created by burning biomass, slash and burn agriculture or industrial usage of oil and coal. Its greatest impact is on the billions of people living in Asia.

Smog or ABCs have five regional hotspots:

1 **East Asia**, covering Eastern China (industrial pollution);

2 **South Asia**, from eastern Pakistan, through India and Bangladesh into Myanmar (industrial pollution);

3 **Southeast Asia** (slash and burn agriculture);

4 **Southern Africa** (slash and burn agriculture); and

5 **The Amazon Basin** in South America (slash and burn agriculture).

There are hotspots too in North America over the eastern seaboard and in Europe - but winter precipitation tends to remove them and reduce their impact.

Unfortunately, in Monsoon Asia – from Pakistan to Northern China, wintertime is the dry season. There is less precipitation to moderate the impact of the haze. From January to March, ABC builds to a thick three-kilometer (1.86 mile) cloud that stretches from the Arabian Peninsula to China and (occasionally) Korea and Japan.

This November the United Nations Environmental Program published ***Atmospheric Brown Clouds: Regional Assessment Report with Focus on Asia.*** A team of 200 Asian, American and European scientists, led by Professor Veerabhadran Ramanathan, studied the cloud and reported that it is causing the glaciers in the Himalayas to melt and weather systems to become more extreme.

The panel of scientists were surprised at how extensive the ABC was and how rapidly the debris was carried by prevailing winds. Originally computers could only model CO2 and greenhouse gasses being carried throughout the globe. Now satellite pictures have shown that ABCs can be carried halfway around the world in as little as a week.

The chemistry of the cloud is complex. Many of its components, particularly black carbon, soot and ozone, warm the air. Other chemicals, especially sulfur and some organics, reflect sunlight and cool the surface. Overall, it appears that the brown clouds are reducing the impact of global warming by 20 – 80%, depending on location. In other words, in winter when the haze is heaviest, it makes the winters colder. For example, most of the globe is getting warmer but polluted Southern China has actually gotten slightly cooler.

Overall the ABC haze is dimming Asian skies. Studies report that China and India have been dimming 3-4% per decade since 1980. The effect is particularly severe around 13 cities, two African – Cairo and Lagos and eleven Asian - Bangkok, Beijing, Dhaka (Dacca), Karachi, Kolkata (Calcutta), Mumbai, New Delhi, Seoul, Shanghai, Shenzhen and Tehran. The bigger question is how this reduced sunlight is affecting crops.

Even more importantly, the aerosols (solid matter like dust, ash and pollution in the air) in the ABCs are absorbing moisture and creating irregular precipitation. In the words of the report, "The net effect is an extension of cloud life-times." What this means is moisture remains in clouds and is blown away from some regions. The report calculated that the cloud could cut rainfall over northwest Pakistan, Afghanistan, western China and western central Asia by up to 40%.

When the moisture finally precipitates out, it is in heavier, more extreme rains and snowfalls. In both China and India extreme rain events of more than 100 mm a day have increased and very heavy rainfall of more than 150 mm a day have nearly doubled. Think of last winter's disastrous Chinese New Year snowfall in Southern China – the report expects more of those types of incidents.

In other words, the ABC is causing some areas to experience intense, flooding rains or disastrous snows, while other regions are left in drought.

Much of the polluted moisture has precipitated out at higher elevations. According to the UN report, high levels of black carbon have settled on the glaciers of the Hindu-Kush- Himalayan-Tibet glaciers. Dark surfaces absorb more heat. Scientists estimate that the carbon coating is heating the snowpack .6˚C (1˚F) as much as all other forms of climate change combined. The darker snows are melting faster and the size of the Asia's mountain snowpack is shrinking. This is endangering glaciers that provide the headwaters for major river systems including the Ganges, Brahmaputra, Mekong, Yangtze and Huang Ho rivers.

The UN report then examined the impact of all these climate changes on Asian crops. The increase of ozone in the atmosphere was reported as causing the loss of around $5 billion a year across China, the Republic of Korea and Japan. Wheat, rice and soybeans were considered particularly sensitive and different parts of Asia were losing between 10 – 40% of their crops just from ozone. Other effects, such as damage from dimming and toxic pollution, were reported but their full cost could not be estimated. Overall, the report suggested that pollution could be cutting India's winter rice harvest by as much as 10%.

A final portion of the report estimated the pollution is responsible for hundreds of thousands of deaths a year from respiratory disease.

Several aspects of this report were ex-

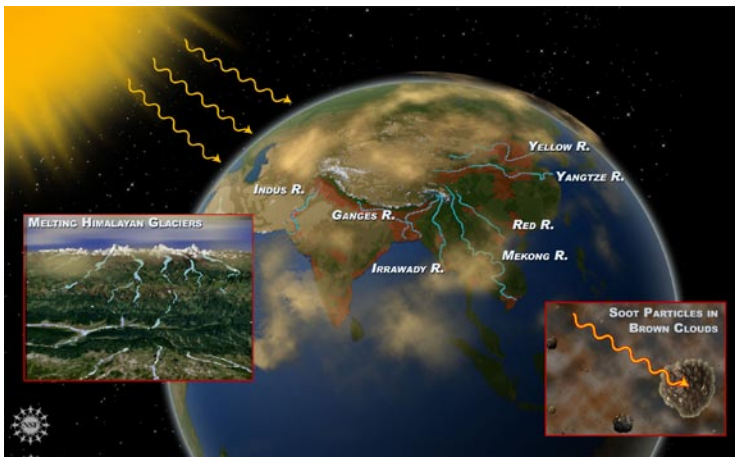
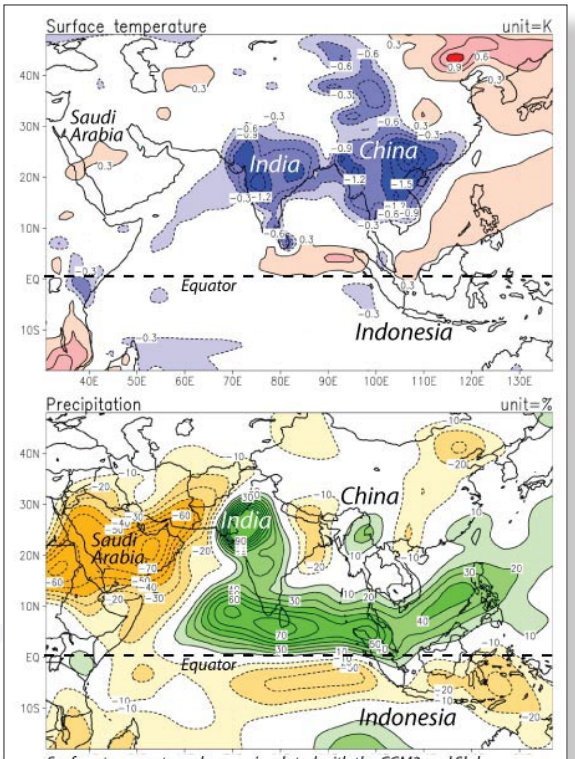


fig. 12: **Melting Himalayan glaciers put Asia's rivers at risk**

http://www.nsf.gov/news/mmg/media/images/himalayan_glaciers_h.jpg



Surface temperature change simulated with the CCM3 and Slab Ocean Model (Kiehl et al., 2000)

fig.13: **The Asian Brown Cloud is altering temperature and precipitation patterns over huge areas of Asia**

http://www.rrcap.unep.org/issues/air/impactstudy/Executive%20Summary.pdf

cellent. However, like many UN reports, the study seemed predisposed to blame mankind for both the ABC and the resulting weather problems. Most of the data showed less rainfall at the end of the last century when the giant Pacific Decadal Oscillation was in a previous phase, a phase that normally reduces monsoons. Much of the content of the brown cloud is from natural dust and smoke.

It is interesting, with all the negative affects of the ABC, that the report heavily warned against eliminating the cloud. In the exact words of the United Nations Environmental Program press release:

- "If brown clouds were eliminated overnight, this could trigger a rapid global temperature rise of as much as to 2 degrees C.
- Added to the 0.75 degrees C rise of the 20th century, this could push global temperatures well above 2 degrees C - considered by many scientists to be a crucial and dangerous threshold.
- Thus simply tackling the pollution linked with brown cloud formation without simultaneously delivering big cuts in greenhouse gases could have a potentially disastrous effect."

In short, the UN reports that the Atmospheric Brown Cloud is killing hundreds of thousand people a year. It is causing floods, drought, and reducing the flow of rivers that hundreds millions of people depend on. Crop production is being reduced by 10% to 40%. But, it concludes, don't reduce the pollution unless you simultaneously reduce carbon emissions. Apparently the global warming theory is more important than saving Asia's rivers or hundreds of thousands of lives each year. This strange conclusion undermines the entire report.

Monsoons and Man

Natural factors should be strengthening the monsoons. Dust, smoke and pollution may be weakening the monsoons. History shows us that whatever affects the strength of the monsoons may also affect the strength of Asia's governments.

Indeed, an article published in the November 7 issue of ***Science*** magazine shows that monsoons have been influencing Asian history for the past 1800 years. Chinese history is filled with dynasties that have risen and fallen. Researchers have now identified a natural phenomenon that may have been the last straw for some of them: a weakening of the summer Asian monsoons. Such weakening accompanied the fall of three dynasties and now a weakening monsoon could be lessening precipitation in northern China.

Just like glaciers and tree rings, cave stalagmites leave a yearly record of past climates. By measuring amounts of uranium and thorium throughout a stalagmite, researchers can tell the date each layer was formed. And by analyzing the "signatures" of two forms of oxygen in the stalagmite, they can match amounts of rainfall--a measure of summer monsoon strength--to those dates.

Scientists from the University of Minnesota and Lanzhou University in China examined a 118-millimeter-long (4.6 inches) stalagmite found in Wanxiang Cave in Gansu Province, China. The stalagmite was formed over 1,810 years. The stone at its base dates from A.D. 190, and stone at its tip was laid down in A.D. 2003, the year the stalagmite was collected.

The study produced 3 extremely important findings:

1. According to the National Science Foundation (NSF) "It was unexpected that a record of surface weather would be preserved in underground cave deposits." The study showed a new way to examine

past climates in regions that scientists have been unable to study before.

2. It showed that variations in China's monsoons correlate with stability of its dynasties. The researchers discovered that periods of weak summer monsoons coincided with the last years of the Tang, Yuan and Ming dynasties, which were times of popular unrest.

Conversely, the scientists found that a strong summer monsoon prevailed during one of China's "golden ages," the Northern Song Dynasty (960–1279 AD). The ample summer monsoon rains may have contributed to the rapid expansion of rice cultivation. During the Northern Song Dynasty rice first became China's main staple crop, and China's population doubled.

3. Finally, the study shows a clear relationship between temperature and the strength of the monsoons. For most of the last 1,810 years, as average temperatures rose, so, too, did the strength of the summer monsoon. This relationship flipped in the late 20th century when global temperatures have warmed but the monsoon weakened.

This is an extremely important correlation. Increasingly scientists have been correlating past events throughout the world with changes in the global temperatures. Now they are correlating with events in Asia.

- The dry period at the end of the Tang Dynasty (618 – 907) coincided with a Latin American drought that has been linked to the fall of the Mayan civilization (250 to 900).
- The lush monsoons of the Northern Song Dynasty coincided with the beginning of the Medieval Warm Period (800 - 1300) in Europe and Greenland. During this time--the late 10th century--Vikings colonized southern Greenland.
- Centuries later, a series of weak monsoons ended the Yuan dynasty (1271 to 1368) as Europe and Greenland shivered through what geologists call the Little Ice Age (1315 - 1880). The cold destroyed the Viking colonies in Greenland (1450 AD).

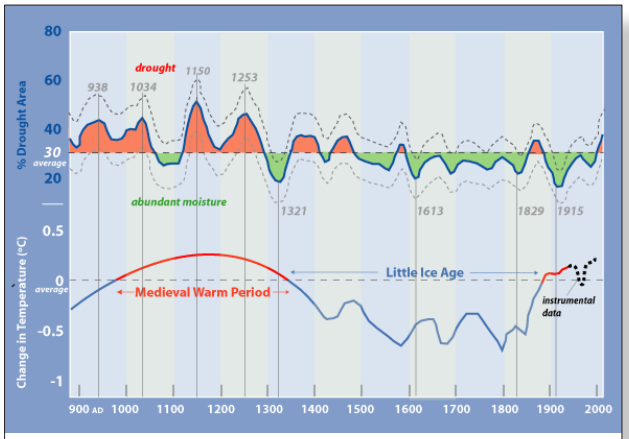


fig. 14 **For Western US, warmth means drought**

Browning Maps © 2007 data sources: top: http://www.ldeo.columbia.edu/res/div/ocp/drought/medieval.shtml bottom: RS Bradley & JA Eddy, based on JT Houton, et al Climate Change Assessment, Cambridge University Press, Cambridge, 1990 and IPCC 1990 and Mann 1999 and Moburg 2005

It is also interesting and important to notice that the strong and weak monsoons in East Asia are completely opposite to the droughts and moisture in western North America. When global temperatures are high, like the Medieval Warm Period, China had a strong monsoon and tree rings show the West was dry. During the Little Ice Age, the western states and provinces had ample precipitation but China endured deadly dry spells.

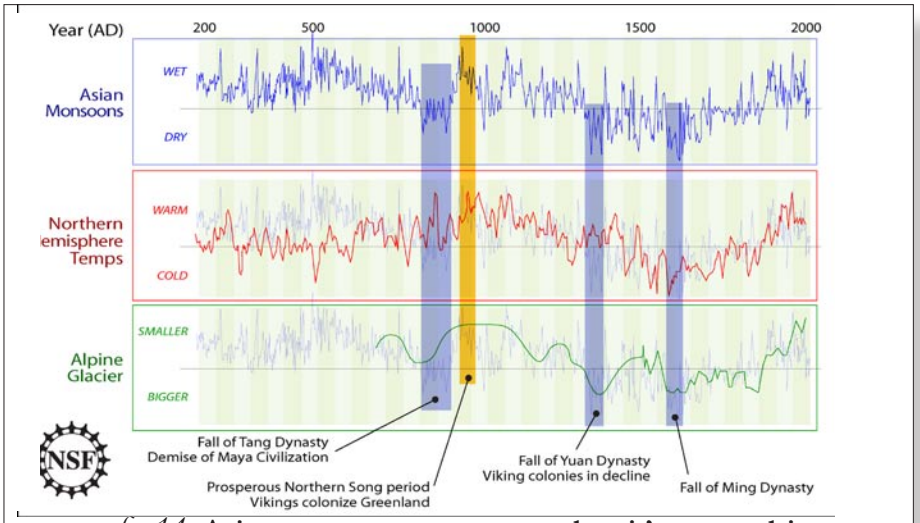


fig 14: **Asian monsoons are wetter when it's warm, drier when cool. Dynasties rise and fall on such changes.**

http://www.nsf.gov/news/mmg/media/images/monsoon1_h.jpg

Conclusions

Weather = Natural Factors + Human Factors

It's a simple equation. Scientists argue how important the each factor is, but the two interact to create the weather.

The natural factors are shaping a stronger, wetter monsoon. To the extent manmade greenhouse gases are warming the globe, they too are creating conditions that are favorable for Asian monsoons.

However the Asian Brown Cloud composed of dust, ash and pollution makes the precipitation irregular. The mixture of natural dust and smoke with the manmade pollution from slash and burn agriculture and industrialization dries up rain in some areas and causes flooding in others.

The combination means more extreme and irregular weather, particularly for India/Pakistan and China. These regions face drought in some regions and heavier snowfall and flooding in others. Meanwhile, the black carbon deposits on the glaciers of the Asian highlands means reduced snowpack to the continent's vital rivers.

Historically, higher temperatures and heavier monsoons have brought China prosperity. If the UN report is correct however, pollution is altering the nature of the monsoon, making it more irregular and danger-

NEWS NOTES

2008 was a cold miserable year. Thousands of lives and billions of dollars were lost to the weather. It is interesting how the statistics are being reported. The UN's World Meteorological Organization is reporting that the year was the tenth warmest in history while others are declaring 2008 as the coldest year in a decade. Both are right. Most temperatures are taken inside cities, which heat up the local temperatures with their energy use. Except for occasional cold fronts, most cities were fairly toasty. The less measured rural areas, however, were quite cold and miserable. The Arctic ice cap grew for the first time in decades. The reality is that there is a growing disparity between conditions in the country, where crops are grown and in the cities, where policies are made.

2008 will go down in the record books as one of the most devastating years of natural disasters in history. Over 220,000 people died in typhoons, earthquakes and cold weather. The single costliest event in terms of human fatalities was Cyclone Nargis, which lashed Myanmar on May 2-3 to kill more than 135,000 people and leave more than one million homeless. Days later an earthquake shook China's Sichuan province, leaving 70,000 dead, 18,000 missing and almost five million homeless. The earthquake was the most expensive overall single catastrophe of 2008, causing around 85 billion dollars worth of damage. Hurricane Ike, with insured losses of 10 billion dollars, was financially the costliest disaster for the insurance industry. The World Meteorological Organization blamed all the problems on global warming, even the thousands of deaths from cold weather.

You can blame the sun for a cloudy day, at least if you are an Australian. An Australian researcher, Robert Baker of the University of New England, Armidale has linked the sun's sunspot cycle to rainfall patterns in his country over the past century. The number of sunspots on its surface--dark zones of intense magnetic activity--peaks about every 11 years, then dies down. The cycle causes swings in sea-surface temperatures--more sunspots means more solar activity, which means warmer oceans, and fewer mean chillier waters--but the effect is small.

In the December issue of *Geographical Research*, Baker reports that the amount of rainfall in most regions of Australia tracked the 22-year magnetic cycle almost exactly. At the height of magnetic activity, rainfall across most of the country was plentiful. At the other end of the cycle, many of those same regions experienced severe droughts. He found the evidence particularly compelling because even though the lengths of the magnetic cycles are not precise and can vary by several years, the rainfall patterns followed them.

Baker theorizes the connection may be that ultraviolet (UV) radiation varies with the solar cycle. The UV surges during solar minimums and that affects ocean plankton and the chemicals they produce.

Various scientists (and the *Old Farmer's Almanac*) have noted correlations between sunspot activity and agricultural cycles. The cycles are one of the factors the Browning Newsletter has been using for 33 years. Scientists are examining Baker's work and finally beginning to rethink the connection between the sun and global weather.

Landslides are miserable enough, but did you know that they can start wildfires? Investigators studying a mysterious spontaneous combustion near Santa Barbara have concluded that the culprit was a landslide. The slide exposed pyrite (fools gold), which sparks like flint when it hits other rocks. The sparks heated a nearby seam of low-grade coal and started a fire. The report indicates Landslide fires may be more common than we realize. There have been a few along the UK's Dorset coast in the last few hundred years, and there are records of a huge fire in the Dead Sea area, dating from King Solomon's time, which may have started this way.

The opinions expressed are those of the writer, and although they are based on extensive studies of physical data and phenomena, many statements published here are not entitled to be regarded as rigorously proved in a scientific sense. Some decades must pass before these issues are resolved. Meanwhile, decisions must be based on the best available information and estimates.

This newsletter will **not** contain:

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

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The BROWNING NEWSLETTER
PO Box 494
Burlington, VT 05402

phone: **1-802-658-0322**
fax: **1-802-658-0260**
e-mail: **linda@fraser.com**