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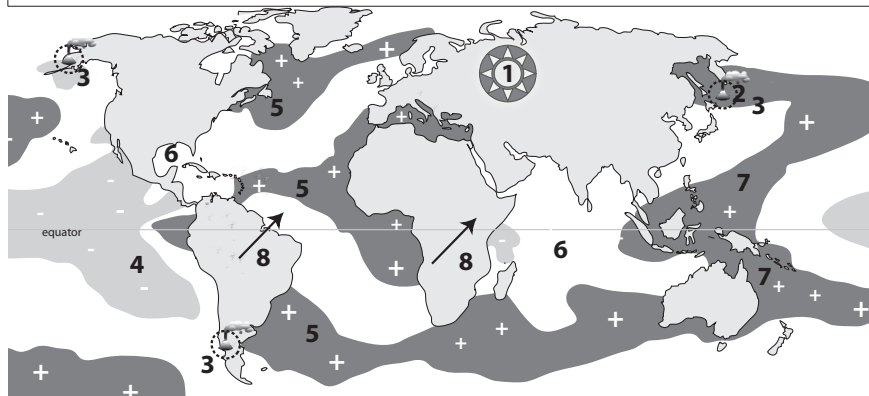
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NEWSLETTER

Climate Change

SPECIAL EDITION
COMMODITY CLASSIC

Natural Factors Shaping Spring's Weather



- 1 The sun is beginning a new solar cycle.
- 2 Large volcanic eruptions put climate changing debris in the stratosphere in 2009 and 2010.
- 3 Several volcanoes continue to have small and medium-sized eruptions.
- 4 A strong La Niña that has passed its peak.
- 5 Most of the Atlantic is unusually warm (a positive AMO).
- 6 The Indian Ocean Dipole is neutral.
- 7 The waters off of East Asia and Australia are warming (a cool PDO/IPO).
- 8 The high altitude Quasi Biannual Oscillation (QBO) winds are westerly.

FIG.1

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1. The climate is determined by:

- How much solar radiation the Earth receives (the Sun).
- The patterns of where the solar radiation falls or is reflected (Clouds/ Volcanoes).
- Where the heat from the solar radiation is stored (Oceans/Urban Heat Islands).

2. Methodology - Look at the natural factors shaping the upcoming weather and use

- Historical records,
 - Tree & coral rings,
 - Lake sediment and
 - Glacial core records
- to learn how these factors affected climate in the past.

3. The last time we had natural factors in this alignment we had:

- Severe springtime droughts in the South that eases up in the Gulf states during summer
- Severe heat waves and wildfire outbreaks in the in the Western US
- Good crop conditions through most of the Midwest and the Central and Southern Plains
- A very active hurricane season that had several hurricanes in the Gulf oil and gas production regions of the US and Mexico.

4. The three major factors that have been shaping North American weather since May have been:

- The volcanic activity in the North Pacific
- The cool La Niña in the Pacific
- The warm Atlantic

5. The volcanic activity in the North Pacific – If a volcanic eruption is large enough, its ashes and chemicals screen out incoming sunlight. The debris can linger in the atmosphere for weeks or even years. It also gathers moisture, forming heavy clouds and causing heavy rainfall downwind in

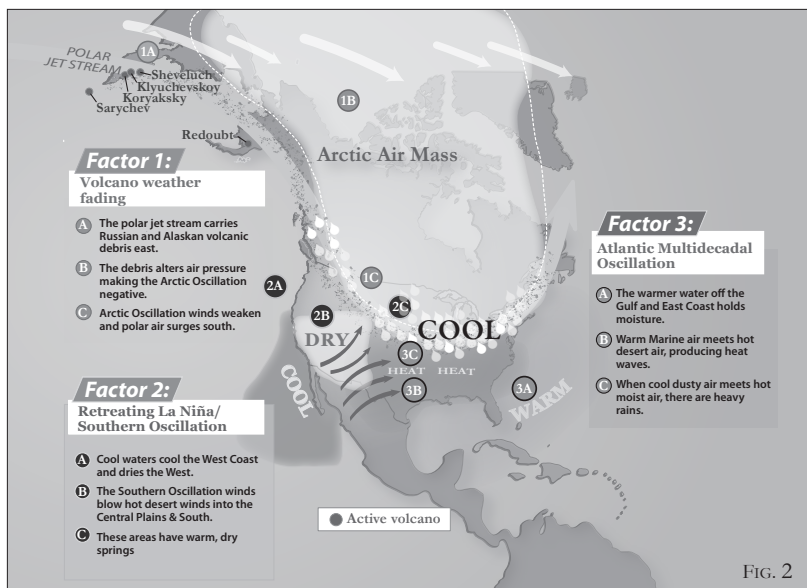
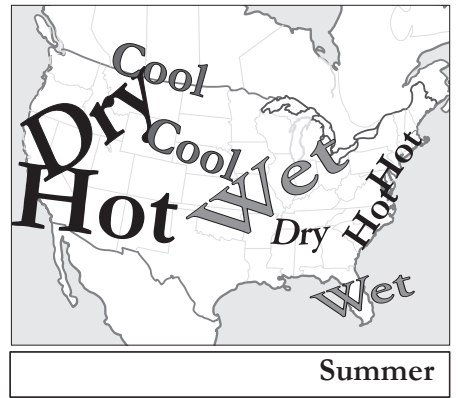
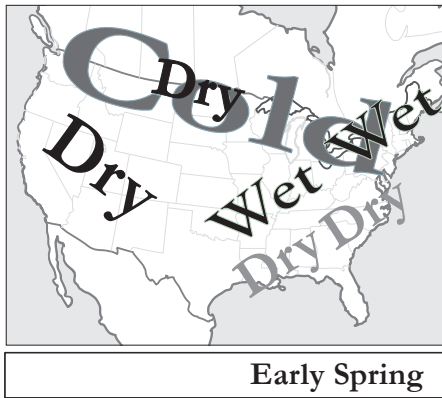


FIG. 2



Cool 2°C or more lower than normal temp.	Hot 5°C 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

FIGS.3-5
**If the North Pacific
Volcanoes continue erupting**

summer and blizzards in winter. Over the past two years, the volcanoes in Alaska and Russia have been very active. This year Russia has had small and moderate eruptions almost every week, but overall, the region's eruptions appear to be fading.

6. La Niña –A strong La Niña has shaped global weather since last summer. Most scientists think it will fade away by early summer. Many expect it to return next winter.

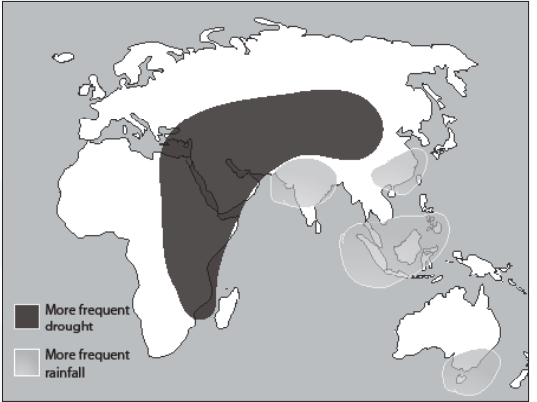


FIG. 9 **The PDO & the Eastern Hemisphere**

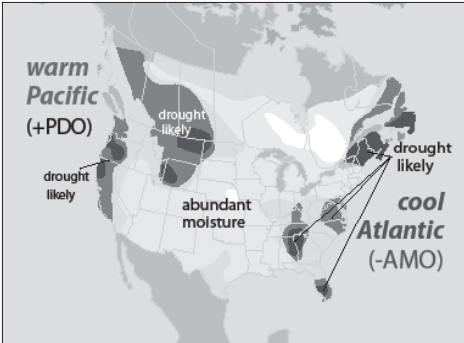


FIG. 6 **A benign combination - Mid-1970s to the late 1990s**

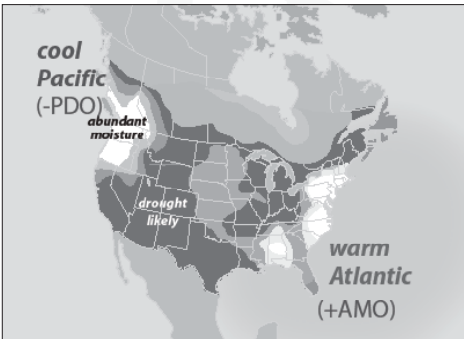


FIG. 7 **The next decade - during average years and La Niñas**

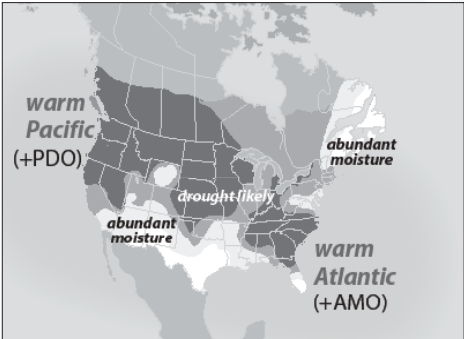


FIG. 8 **The next decade - during El Niños**

7. The Warm Atlantic - The Atlantic has entered the warm phase of a long-term cycle. The Gulf Stream and other tropical currents are flowing faster and bringing more tropical water to the North Atlantic. The cycle, the Atlantic Multidecadal Oscillation (AMO) lasts 60 – 70 years and this warmth should last 15 to 20 more years.

8. The impact of the volcano eruptions and La Nina will probably continue to linger through spring. The warm Atlantic will last for 10 – 15 years. In the five years with conditions most similar to this year we saw:

- Better global crop production (except for winter wheat) and lower prices.
- Heat waves and drought increasing through most of the Western states.
- The Texas drought breaking in mid-summer, with excellent rainfall in late summer
- A warm late autumn and good harvest conditions for most of the Midwest but heavy autumn rains in the spring wheat regions.

- A cold, dry winter in the southern tier of states
- A 40% possibility of next year being another La Niña.

9. Just like the Atlantic, the Pacific has a long-term oscillation, the Pacific Decadal Oscillation (PDO). Scientists say that it has entered its cool phase in 2006. This phase puts cooler water in the tropics and along the western coasts of the Americas and hotter waters around Asia and the poles.

10. The long-term changes due to the combined changes in the Atlantic (a warm AMO) and in the Pacific (a cool PDO except during El Niños) will create a decade or more of more extreme weather, especially for the Western and Central states.

11. The combination of a warm AMO, a negative PDO and an increasingly warm Indian Ocean makes precipitation extremes more common in Europe, Asia and Africa.

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