Fall 2003

Outlook

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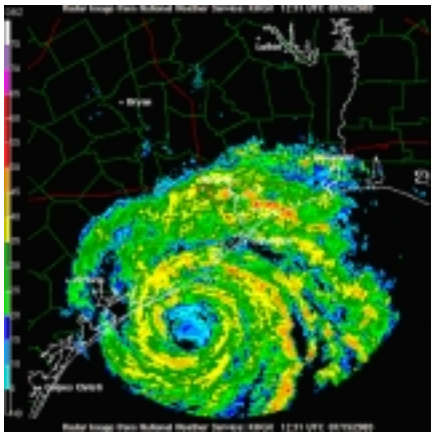
A Look Back at the Hurricane Season of 2003

As of mid October, the National Hurricane Center had used all the names from Ana to Nicholas. In the Spring 2003 issue of Outlook, WWT predicted 12 to 14 named storms for this year and we have had all 14. We predicted 6 hurricanes, 3 of which were expected to become intense. We have had 5 hurricanes, 2 of which had winds reach 140 miles per hour or higher. These were Fabian and Isabel. Isabel was the strongest with 160 mile per hour winds at its maximum intensity.



Above is a radar image of Hurricane Claudette immediately before landfall.

Five of the topical systems, Fabian, Isabel, Kate, Nicholas and Mindy formed in the far Eastern Tropical North Atlantic. Three of the systems, Ana, Danny, and Juan formed in the Western or Central Subtropical North Atlantic. Claudette formed in the Caribbean Sea and five systems, Bill, Erika, Grace, Henri and Larry originated in the Gulf of Mexico or the Bay of Campeche.

Bill, Claudette, Erika, Grace, Henri and Isabel struck the U.S. mainland. Fabian struck Bermuda and came close to Cape Race, Newfoundland. Juan struck Nova Scotia immediately west of Halifax. Larry drifted south over the Bay of Campeche and crossed Southeast Mexico near the Isthmus of Tehuantepec. Ana, Danny and Kate stayed out over water and had no direct effect on land areas. Mindy brushed the Dominican Republic and Southeastern Bahamas before heading out to sea and dissipating. The people of the islands of the Northeast Caribbean Sea held their breath while Fabian and Isabel passed nearby on their Atlantic sides. Five tropical depressions never made it to storm status, but weakened and died, having reached only the lowest grade of the tropical cyclone scale.

Fall and Winter Outlook, 2003 – 2004

A dual influence of both La Niña and El Niño is expected during the coming fall and winter months. While much of the Pacific Ocean, north of 15 degrees South latitude, is warmer than normal (El Niño), there are a few areas that are cooler than normal (La Niña). These cool spots are mainly the eastern most part of the Pacific, along the coasts of North, Central and South America and in an east-west section near 40 degrees North latitude. A mixture of weather patterns typical of both of these phenomena can be expected through next March. (see reverse side for map)

A stronger than usual high-pressure area over the Northwestern United States and Western Canada is likely to be a regular feature on upper level maps for the fall and winter. At times, this is expected to weaken and shift southeastward, but should rebuild in

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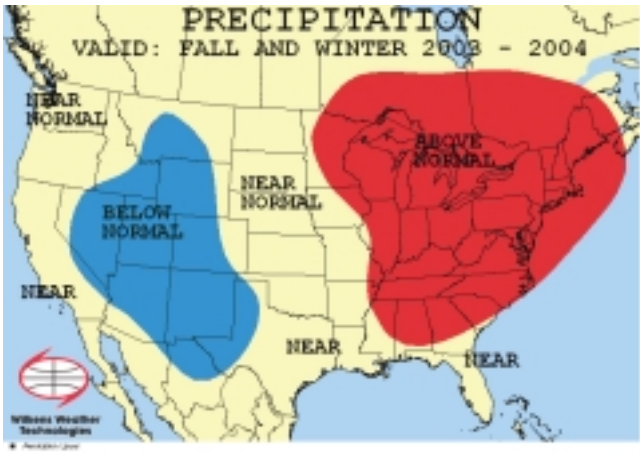
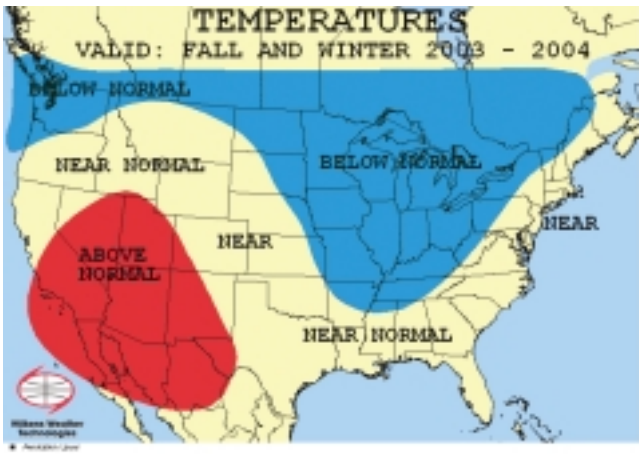
Fall and Winter Outlook, 2003 – 2004, Cont.

or near the same spot later on. This will result in a persistent cold airflow from Central Canada toward the South-Central, Southeast and East Coast States. Occasional warm spells are likely to develop in these areas, modifying their long-term negative temperature anomaly somewhat.

On the flip side, there will likely be times when low pressure from the Eastern North Pacific Ocean moves eastward across the Western U.S., providing periods of below normal temperatures and above normal rain/snow to balance out the predominantly warm, dry weather. Occasional warm spells in the East will precede such systems and large, strong winter storms can form in the Plains, Mississippi River Valley or the Ohio River Valley when Arctic air flows down and adds its energy to the Pacific weather system. When very cold air arrives in the Eastern U.S. first, these winter storms can occur in the Northern Gulf of Mexico region or the Southern U.S.

For the most part, the Subtropical Jet Stream and the Polar Jet Stream will flow across North America and the nearby oceans independent of one another. Occasionally, they will join forces and produce the most anomalous weather of the fall and winter months. That is, they will bring unusually cold air to the South, unusually warm air to the North, with strong storms in-between the two and abundant precipitation, whether liquid or frozen.





Cause and Effects of El Niño and La Niña on North America

El Niño conditions have been observed since at least the 1600s off the Peruvian coast. La Niña conditions were discovered later. Both originate in the Western Tropical Pacific Ocean where normal trade winds are easterly.

An El Niño (Warm Phase) originates when easterly trade winds subside and become westerly. This generates eastward-moving energy waves causing the sea surface temperatures to warm slightly in the Eastern Pacific. This scenario is the warm extreme of a climate fluctuation known as the El Niño Southern Oscillation, or ENSO

A La Niña – (Cold Phase) is the cold extreme of ENSO. It occurs when the tropical surface waters in the Eastern Pacific Ocean become cooler than average due to abnormally strong easterly trade winds.

Convective showers and thunderstorms in the Western Pacific are shifted farther east than normal during an El Niño event. Convection is shifted farther west in the Western Pacific during a La Nina episode. These changes in the Tropical Pacific can impact mid-latitude jet stream patterns and consequently, the paths of high and low pressure areas. As a result, there are global consequences including the timing of floods, droughts, and extreme temperatures. Some of the consequences for North America are summarized on the right.

Typical Effects of El Niño (Warm Phase) on North America

	Colder	Drier	Warmer	Wetter
Fall	Manitoba, Ontario and Quebec, Canada; SW US (AZ, NM, southern CA); Mexico	Coastal NE (WA, OR, & Northern CA)	Coastal BC Canada	S. Coastal Alaska, SW US; US Gulf Coast
Winter	Northern Canada; Southern 1/3 of US, Mexico	Coastal WA, IL and IN	Western Canada; North Central US plains states (MT, ND, SD, MN, IA, MI, NE)	U.S. Gulf Coast (very wet)
Spring	Mexico; South Central U.S. (AZ, NM, West TX); Alaska	Coastal NW U.S.	Canada; N & NE U.S. (MN, Great Lakes, New England)	SE and Eastern US (Very Wet); Northeast coastal; South coastal Alaska
Summer	South TX	East Coast North of GA; SD, MN, WS; Northern sections of LA, MS, AL and AR; OK; North TX & North FL (very dry)	Great Lakes	Mexico; Northern ND; South Central Canada

Typical Effects of La Niña (Cold Phase) on North America

	Colder	Drier	Warmer	Wetter
Fall	Western Canada; Western U.S.	TX	East and Central non coastal U.S (a triangle from MI south to TX & GA).	NW Coastal U.S. (WA, OR, northern CA)
Winter	Canada; Western U.S.	Coastal CA; Southeast U.S. coast from NC south	East central; Southeast and south Central U.S.	NW Coastal U.S. (WA, OR); Southeast and south central non-coastal U.S.)
Spring	North Central Plains; Great Lakes; Eastern Canada	Northern FL; Central Plains	SE Atalantic coast	U.S. Gulf Coast (Very Wet); NW Coastal U.S.
Summer	Southern U.S. from southern CA to FL; Coastal OR; West coastal Canada	Great Lakes and New England; TX & south FL	Great Lakes and New England	Coastal OR; Southeast U.S.