

## **El Niño/Southern Oscillation**

El Niño translates from the Spanish as "the little boy" or "the Christ child," and is so called because the weak warm ocean current occurs along the western coast of South America around Christmas. El Niño is a very good example of the complex, intimate exchange between winds in the atmosphere and ocean currents.

In most years, strong, prevailing trade winds blow westward dragging the Earth's warmest surface waters across the Pacific to Australia and Indonesia. But every few years the trade winds weaken or change direction. Within a few weeks, the ocean responds to these changes. Without winds to hold it back, the warm waters to the west slosh back towards the coast of South America. This begins an El Niño. Some years the water warms up as much as 5°C or more.

The atmosphere then responds to the rise in ocean temperature. The moist air above the warm waters also warms. It becomes buoyant enough to form clouds and tropical storms. The atmospheric stirrings cause heavy thunderstorms over the central Pacific, which in turn drive the jet streams that guide weather systems across the earth.

At one time, El Niño was thought to affect only South America's Pacific Coast, bringing flooding rains to Peru and ruining the fishing. Now we know El Niño can do very strange things to the world's weather for a year or even longer.

In some areas, El Niño means fairly predictable weather. For instance, it is almost sure to cause droughts in northeastern Brazil, eastern Australia and southern Africa, produce floods and mudslides in Ecuador, quiet the hurricane season in the Atlantic Ocean, delay the Indian monsoon, and bring copious winter rains to southern California.

In Canada, El Niño's impacts are considered marginal, showing up most clearly during wintertime in western Canada. But, El Niño is both good and bad news for Canadians. For example, in British Columbia schools of hungry mackerel riding the El Niño wave may devour young sockeye stock. For skiers, El Niño's usually snow-free winter is not welcome news. On the other hand, an El Niño year also correlates with a wetter spring and a warmer summer, making for good crop weather. When El Niño occurs, it seems to have something for everyone.

### **La Niña vs. El Niño**

La Niña and El Niño are phases of the climate cycle called the El Niño/Southern Oscillation which describes the ocean and atmospheric patterns occurring in and over the equatorial Pacific Ocean.

El Niño is characterized by warmer than normal sea-surface temperatures west of South America that endure for several seasons, whereas La Niña represents the opposite cooler phase. Both phenomena have a large impact on the jet stream and weather patterns around the world.

El Niño and La Niña events vary in intensity and occur every two to seven years. La Niña and El Niño can be thought of as opposite ends of a seesaw or teeter-totter. The water temperatures in

the east-central equatorial Pacific go up and down over a period of many months and years as part of a natural cycle that involves motions in the ocean and atmosphere. The last La Niña episode occurred from the fall of 2007 through spring of 2008.

### **La Niña and Canadian winter**

La Niña winters tend to have large month-to-month variations in temperature, precipitation and storminess across Canada. A more highly variable jet stream pattern over the east Pacific Ocean can often bring wetter and snowier than normal conditions to British Columbia.

Additionally, the jet stream pattern tends to allow more cold-air outbreaks to occur from Western Canada through the Great Lakes. During a La Niña winter, the orientation of the storm track across eastern North America favors increased precipitation across Ontario and Quebec.

La Niña conditions in the Pacific Ocean can impact the hurricane season in the Atlantic Ocean. Generally, La Niña conditions are associated with an increased number of hurricanes in the Atlantic, particularly those that originate from waves of low pressure that move westward from Africa and cross the tropical Atlantic Ocean.

Hurricanes require very uniform winds from the ground to the jet stream level, and La Niña conditions tend to support this requirement. The opposite occurs during El Niño when increased wind shear across the tropical Atlantic Ocean tends to disrupt hurricane development.