

# Warming Ocean Drove Catastrophic Australian Floods

HIGHER SEA-SURFACE TEMPERATURES FUEL MORE EVAPORATION AND RAINFALL *by Véronique LaCapra*

Extreme rainfall in Australia's northeast state of Queensland led to devastating floods in 2010 and 2011 that killed 35 people and caused more than \$2 billion in damages. In a rare event, a large low-lying lake system in the country's interior called Lake Eyre filled up with so much water, it caused a temporary drop in global sea level.

New research by Woods Hole Oceanographic Institution physical oceanographer Caroline Ummenhofer and Australian scientists suggests that long-term warming of the Indian and Pacific Oceans is increasing the risk of heavy rains in the region.

"The sea-surface temperatures around Australia during 2010 and 2011 were on average 0.5°C warmer than they were 60 years ago," said Ummenhofer. "While many past studies have found a global warming link to heat extremes, this study is one of the first to show how ocean warming can impact a heavy rainfall event."

In the Southern Hemisphere summer of 2010 to 2011, rainfall totals were 84 percent above average in Australia's northeast, and soil moisture was the highest on record since 1950.

During that period, Australia was surrounded by warm sea surface temperatures, particularly in the Pacific Ocean east and northeast of Australia and in the Coral Sea and Indian Ocean to the west and northwest.

At the same time, the region also experienced a strong La Niña event. During La Niñas, the western Pacific Ocean warms up and rainfall in northeast Australia typically increases.

Ummenhofer and her Australian colleagues ran experiments with atmospheric circulation models, comparing conditions with and without ocean warming. Their results suggested that additional long-term ocean warming makes extreme rainfall in northeast Australia three times more likely during strong La Niña events.

"The additional warming of the oceans has profound impacts on the atmosphere," said Matthew England from the University of New South Wales, who participated in the study. "It increases the amount of moisture in the atmosphere and can intensify rain-producing circulation conditions." ▲

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The Brisbane Flood of 2011 inundated 28,000 homes and was the worst natural disaster in the history of the city in Queensland, Australia. Scientists say warming ocean temperatures are increasing the risk of extreme rainfall and flooding in northeast Australia.

