



Blame the Heat

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It's no secret that 2005 was a ferocious hurricane season. A record 28 tropical storms and hurricanes--including four category-5s--lashed through the Atlantic, Gulf of Mexico, and Caribbean, leaving an appalling toll of death, misery, and destruction in their wakes. A new analysis shows that global warming was largely responsible for the number and intensity of the hurricanes. As global temperatures continue upward, we can expect more of the same, the authors warn.

Scientists have identified a 60-to-80-year cycle of warming and cooling ocean temperatures--the causes of which are unclear--called the Atlantic Multidecadal Oscillation (AMO). This cycle appears to correlate weakly with the frequency and strength of hurricanes, which are fueled by heat released when moist air over water rises and condenses. During much of last year's hurricane season, sea-surface temperatures (SSTs) across the tropical Atlantic, the birth zone of many hurricanes, exceeded the 1901-1970 average by a record 0.9 degrees Celsius. Two previous studies found that hurricane frequency, duration, and intensity have spiked since the 1970s in concert with rising SSTs, but whether the AMO or global warming was the prime culprit for warmer water remained unclear.

To sort things out, climatologists Kevin Trenberth and Dennis Shea of the National Center for Atmospheric Research, Boulder, Colorado, used data on SSTs, collected worldwide since the early 1900s. They subtracted the global average SST from the elevated temperature in the tropical Atlantic hurricane zone--effectively separating the global warming fraction from the AMO. They found that global warming accounted for about 0.45 degrees Celsius of last year's unusually high SST, while the AMO explained less than 0.1 degrees Celsius of the rise. (The aftereffects from the 2004-2005 El Niño and year-to-year variability accounted for the rest.) The results show that the AMO is actually much weaker now than it was during the 1950s--another active hurricane period--when SSTs were lower than they are now, the authors report today in *Geophysical Research Letters*. Trenberth acknowledges that many

factors contribute to hurricanes, but, he says, unlike other variables, only rising sea temperatures, attributable to human activities, are "guaranteed to continue."

The analysis makes it clear that the record warmth in tropical North Atlantic Ocean temperatures during the past decade is mainly a reflection of global warming, says John Wallace, an atmospheric scientist at the University of Washington, Seattle. But "to be fully convinced that greenhouse warming is responsible [for enhanced hurricane activity], I will need to see similar evidence for other ocean basins, such as the Northwest Pacific, where tropical cyclones are most numerous."

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