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## Katrina and Her Policy Waves

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A year on, global warming alarmists are still exploiting Hurricane Katrina and the intense hurricane season of 2005 for political purposes. Contrary to what they say, the science linking global warming with hurricanes remains a field of active inquiry and dispute. Moreover, diverting precious resources into policies designed to reduce global warming rather than strengthen our resiliency in the face of hurricanes actually harms people in hurricane-prone areas. Instead, government policies should concentrate on reducing perverse incentives that encourage development in hurricane-prone areas.

**Introduction.** One year on from Hurricane Katrina, the worst event of the intense hurricane season of 2005, environmental activists are using the hurricane’s memory to promote their political agenda. For example, on August 9, Environmental Defense had this<sup>1</sup> to say:

“Katrina-like events will become more common and more widespread unless the emissions of global warming pollutants are capped. The link between global warming and hurricanes is yet another reason for Americans to insist on meaningful legislation to cap our greenhouse gas emissions.”

On August 20, in an emotional *Washington Post* op ed, Mike Tidwell of the self-styled “U.S. Climate Emergency Council” went further:

“Barring a rapid change in our nation’s relationship to fossil fuels, every American within shouting distance of an ocean—including all of us in the nation’s capital—will become de facto New Orleanians. Imagine a giant floodgate spanning the Potomac River just north of Mount Vernon, there to hold back the tsunami-like surge tide of the next great storm. Imagine

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the Mall, Reagan National Airport and much of Alexandria well below sea level, at the mercy of ‘trust-us-they’ll-hold’ levees maintained by the Army Corps of Engineers. Imagine the rest of Washington vulnerable to the winds of major hurricanes that churn across a hot and swollen Chesapeake Bay, its surface free of the once vast and buffering wetland grasses and ‘speed bump’ islands that slow down storms.”

These appeals share several factors: They depend on fear, they overstate the science, and they advance policy goals that will do little to protect vulnerable populations. In doing so, they represent an immoral exploitation of the victims of Katrina.

**Fear.** Roger Pielke, Jr. of the University of Colorado, a leading researcher in the field of hurricane damage, compared Mr. Tidwell’s article to something you might find in the *Weekly World News*.<sup>2</sup> Tidwell’s is an extreme example, but the Environmental Defense article and other popular treatments of global warming—such as former Vice President Al Gore’s movie *An Inconvenient Truth*—all seek to persuade by exciting feelings of alarm in their audience. And they rely on this *argumentum ad metum* (appeal to fear) fallacy because their central scientific argument is weak.

**The Science.** Claims of a definite link between hurricanes and global warming rely on the simple hypothesis that, as waters warm, storms get stronger. In fact, *some* storms *may* get stronger, but others may get weaker. There are two main types of storms: hurricanes (tropical cyclones) and winter (frontal) storms. Global warming is likely to affect each type differently.

Hurricanes draw their energy from the sea, and require warm sea surface temperatures (SSTs) to form. Some hurricanes may get stronger, and the area of hurricane formation may expand, as the oceans warm. However, once SSTs reach about 83°F, as routinely happens in the Gulf of Mexico every summer, any hurricane has the potential to become a major—Category 3, 4, or 5—storm, if other conditions are present.<sup>3</sup> Such conditions include high humidity (dry air dissipates the hurricane’s thunderstorm core) and low wind shear (strong winds in the upper troposphere rip hurricanes apart).<sup>4</sup> Whether, or to what extent, global warming is actually increasing the strength or frequency—or both—of hurricanes is an empirical question, discussed below.

Winter storms draw their energy from the collision between cold and warm air fronts. If, as climate models predict, higher northern latitudes warm more than do lower tropical latitudes, the temperature differential between colliding air masses should decrease, reducing the intensity of some winter storms.<sup>5</sup>

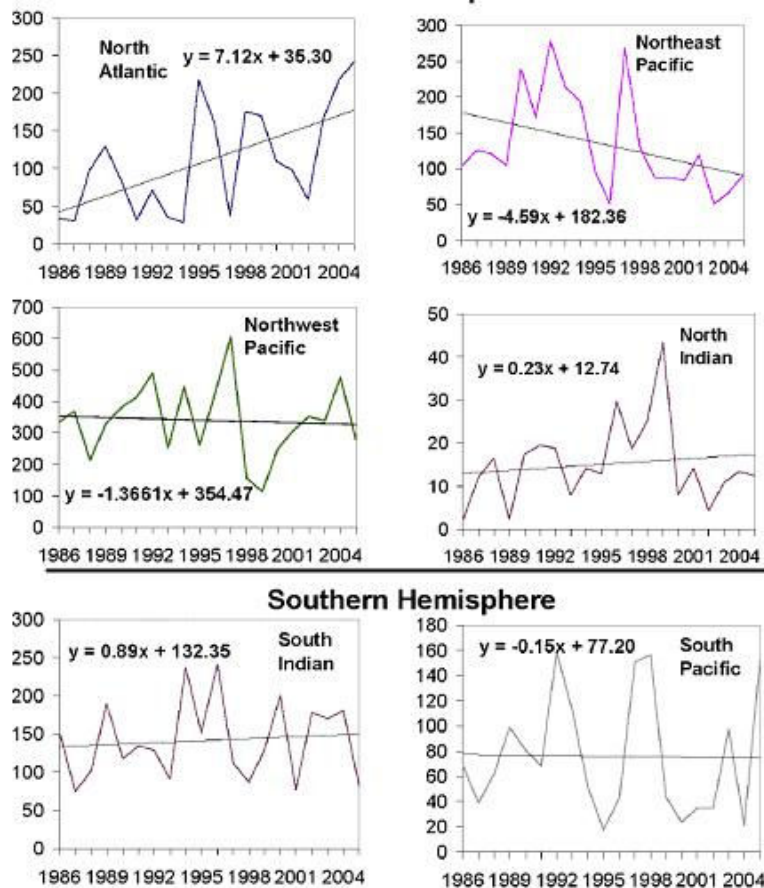
Alarmists assert that there is a “scientific consensus” that global warming has been linked to an increase in the duration and intensity of hurricanes (Al Gore says as much in his movie *An Inconvenient Truth*). But the scientific jury is still out on these matters. Kerry Emanuel of MIT found that hurricane strength, a combination of wind speed and storm duration, which he calls the “power dissipation index” (PDI), increased by 50 percent

since the mid-1970s, and that the increase is highly correlated with rising SSTs.<sup>6</sup> However, other experts question these results.

The University of Colorado's Roger Pielke, Jr. finds that once hurricane damage is normalized for changes in population, wealth, and inflation, there is no long-term change in hurricane damage—which runs counter to the hypothesis that hurricanes are becoming more destructive.<sup>7</sup> Christopher Landsea of the National Oceanic and Atmospheric Administration (NOAA), noting no trend in the PDI for land-falling U.S. hurricanes, suggests that Emanuel's finding may be an "artifact of the data"—a consequence of advances in satellite technology, which have improved detection, monitoring, and analysis of non-land-falling hurricanes.<sup>8</sup>

Philip Klotzbach of Colorado State University found "a large increasing trend in tropical cyclone intensity and longevity for the North Atlantic basin and a considerable decreasing trend for the North Pacific," but essentially no trend in other tropical cyclone-producing ocean basins.<sup>9</sup> See Figure 1.

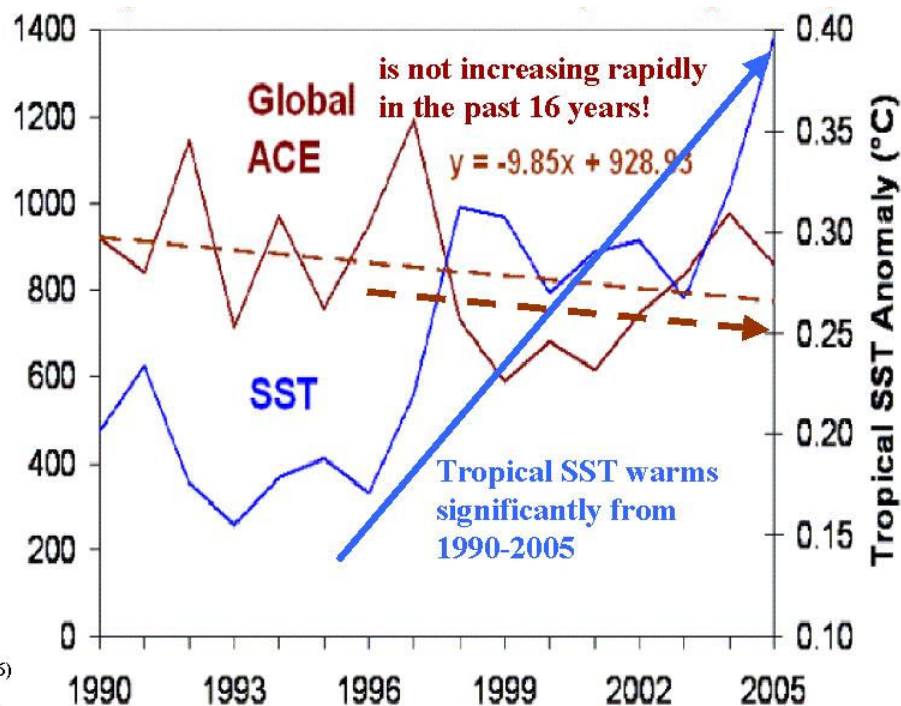
**Figure 1. Accumulated Cyclone Energy (ACE) index values for six ocean basins**  
**Northern Hemisphere**



The Accumulated Cyclone Energy (ACE) index is a measure of the energy contained in a tropical cyclone over its lifetime. From 1986 through 1984, there was an increase in the North Atlantic, a decrease in the Northeast Pacific, and not much long-term change anywhere else.<sup>10</sup>

Even more problematic for climate alarmists, although there was a slight increase in ACE worldwide during 1986-2005, Klotzbach found a slight downward trend during 1990-2005, even though tropical sea surface temperatures increased by approximately 0.2°C to 0.3°C during this period. See Figure 2.

**Figure 2. Global intensity of tropical cyclones averaged over all ocean basins (global ACE) is not increasing rapidly, as tropical SsT warms dramatically during the past 16 years.**



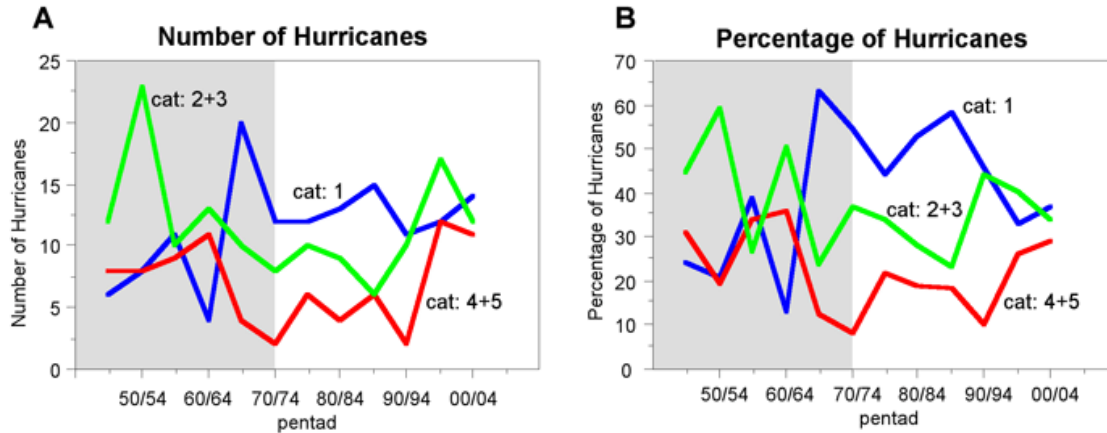
Klotzbach (2006)  
GRL, vol. 33,  
2006GL025881

Alarmists also assert that there has been an increase in the frequency of the most damaging category 4 and 5 hurricanes. Again, the science here is in dispute. Peter Webster<sup>11</sup> of Georgia Tech and colleagues found a significant increase in the number of major hurricanes during 1970-2004. In contrast, Philip J. Klotzbach<sup>12</sup> of Colorado State University found only a “small increase in global Category 4-5 hurricanes from the period 1986-1995 to the period 1996-2005,” and considers it likely that “improved observational technology” accounts for the small increase he observed.

University of Virginia climatologist Patrick Michaels found that, in the Atlantic basin, the hurricane formation area with the best data over the longest period, the “trend” observed by the Webster team disappears once data going back to 1940 are included.<sup>13</sup> As Figure 3

shows, the number and percentage of intense storms from 1940 to 1970 were about equal to the number and percentage of intense storms from 1970 to 2004.

**Figure 3. Number and Percentage of Hurricanes 1940-2004.**



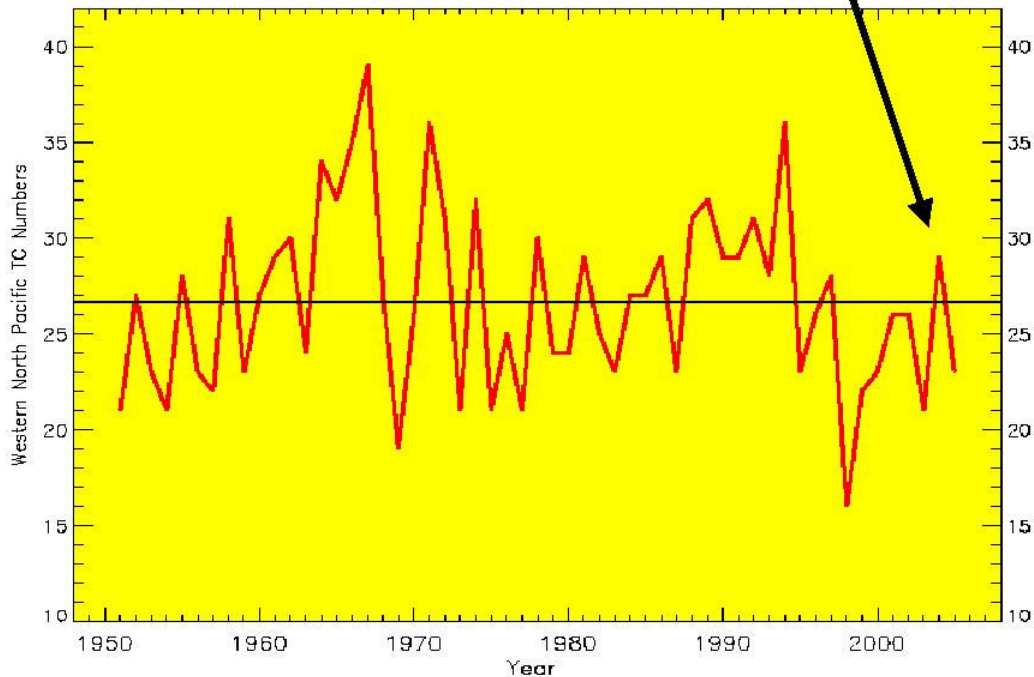
The gray shaded area illustrates the data in the 30-year period prior to the period analyzed by Webster et al. The pre-1970 data comes from the National Hurricane Center.<sup>14</sup> As Michaels notes: “When taken as a whole, the pattern appears to be better characterized as being dominated by active and inactive periods that oscillate through time, rather than being one that indicates a temporal trend.”

Hurricanes are heat engines, so it is likely that global warming will increase the number, strength, or formation area of hurricanes—or a combination of these—to *some extent*. But by how much is unclear. Thomas Knutson of NOAA and Robert Tuleya of Old Dominion University estimated in a 2004 study that a 2.0°C rise in maximum SSTs would increase hurricane wind speed by about 6 percent over 80 years.<sup>15</sup> Comments UVA’s Michaels, “That means global warming is likely to be responsible, right now, for at best, an increase of about 0.6 percent in hurricane wind speeds—raising a decent hurricane of 120 mph to 120.7 mph, a change too small to measure.”<sup>16</sup>

Knutson and Tuleya came to pretty much the same conclusion: “From our standpoint, the small 0.9 degree Fahrenheit [or about 0.4°C] warming observed in the Atlantic since 1900 implies only a 2-3 miles per hour intensity increase to date. Such a small increase is hard to detect. It is difficult to attribute the upswing in strong hurricane activity this past season to global warming. Season-to-season variability is very large.”<sup>17</sup>

The Atlantic is not the only region to suffer hurricane-strength storms. Alarmists often claim that Japan has seen an increase in typhoon activity due to global warming. Figure 4 shows the number of tropical storms and typhoons (Tropical Cyclones) over the Western North Pacific, from 1950 through 2005. The data simply do not reveal a linear trend corresponding to the gradual increase in atmospheric CO<sub>2</sub> levels. Further, whether a particular storm “hits” Japan—its trajectory—depends on local meteorological factors, not on average global temperatures.

**Figure 4. Direct TC data from Western North Pacific (1951-2005) do not confirm the impression given by Al Gore for tropical cyclones and typhoons over WNP//Japan to be extremely active in 2004.**



Matsuura et al. (2003) *Climate Dynamics*, vol. 21, 105-112; updated data courtesy from Professor Tomonori Matsuura (February 3, 2006)

Australia, meanwhile, suffers from cyclones. Alarmists point to Cyclone Monica of April 2006, which was stronger than both Katrina and Rita, as proof that global warming is making storms stronger everywhere. Monica attained wind speeds of 180 mph, making it the strongest cyclone of 2006. But it was neither the strongest cyclone ever measured or an indication that storms are getting stronger. At least five U.S. hurricanes had equal or greater wind speeds, including Hurricane Doug, attaining a wind speed of 185 mph on September 6, 1950, and Hurricane Camille, attaining a wind speed of 190 mph on August 17, 1969.<sup>18</sup> More importantly, Australia's hurricane season in 2006 was not exceptional. According to NOAA:

“The tropical cyclone season in the Australian region has been near average with the development of 12 storms, two more than average. Although final assessments of tropical cyclone strength are continuing, it is thought that 25 percent of these storms reached Category 5 strength on the Australian scale.”<sup>19</sup>

Another alarmist rhetorical gambit is to point out that during the 2005 hurricane season, there were so many storms that NOAA ran out of assigned names for them. If there are more than 21 named tropical cyclones in the Atlantic basin in a season, additional storms will be assigned letters from the Greek alphabet.<sup>20</sup> The use of Greek letters to name storms in 2005 was “the first time in history,” as Al Gore says in *An Inconvenient Truth*. But the current way of naming storms only goes back to 1950<sup>21</sup>. Hurricane detection

capabilities have improved dramatically since the 1950s, to say nothing of prior decades and centuries. Today, we can track storms that never hit land, which are common but were once ignored. So, while 2005 had a record number of *named* Atlantic basin hurricanes, this does not tell us much beyond the fact that 2005 was a very active hurricane year. Furthermore, 2005 was not the first year hurricanes and tropical storms continued into December. It also happened in 1878, 1887, 1888, 1925, 1953, 1975, 1984, 1989, 1998, 2001, and 2003.<sup>22</sup>

**The Policies.** Alarmists are using scare tactics and overstatements of the science to promote specific policies, most prominently a worldwide reduction in fossil fuel use to reduce the greenhouse gas emissions that contribute to some extent to a warming atmosphere. The Kyoto Protocol, which the United States has rejected, is the flagship for such policies. However, since Kyoto would avert an immeasurably small amount of global warming by 2050 (0.07°C),<sup>23</sup> Kyoto-style approaches can provide *no protection* from hurricanes in the policy-relevant future. It is disingenuous for activists to claim that a hurricane-warming link justifies changes in U.S. energy policy. Indeed, hyping such a link can be counterproductive—if people seek protection from hurricanes via climate change policy, they are apt to neglect the practical preparedness measures that can actually save lives.

The alarmists' position begs the question of whether, if greenhouse gas reduction policies had been put in place 20 years ago, Hurricane Katrina would not have happened or nearly as destructive. Yet no reputable scientist has yet stated that Katrina happened because of global warming. This underscores the simple truth that hurricanes, including very damaging ones, will happen whether or not greenhouse gas reduction policies are put in place.

The scientific community recognizes this. Ten hurricane scientists, including Kerry Emanuel and Peter Webster, recently issued a "Statement on the U.S. Hurricane Problem"<sup>24</sup> in which they urge policy makers not to let the debate about the "possible influence" of global warming on hurricane activity "detract from the main hurricane problem facing the United States: the ever-growing concentration of population and wealth in vulnerable coastal regions." Contributing to that problem, they argue, are federal and state insurance and disaster-relief programs that "subsidize" development in high-risk areas.

Although optimistic that "continued research will eventually resolve much of the current controversy over the effect of climate change on hurricanes," the hurricane experts emphasize that, "the more urgent problem of our lemming-like march to the sea requires immediate and sustained attention." Consequently, they "call upon leaders of government and industry to undertake a comprehensive evaluation of building practices, and insurance, land use, and disaster relief policies that currently serve to promote an ever-increasing vulnerability to hurricanes."

United States hurricane policy must not be dictated by global warming concerns. Diverting resources that would otherwise be spent on protecting vulnerable communities

into climate change policies would unnecessarily increase those communities' hurricane vulnerability. In preparing for hurricanes, global warming policies constitute both a red herring and a white elephant.

## Notes

- <sup>1</sup> Bill Chameides and Lisa Moore, "How Climate Change adds to storms' ferocity," <http://www.environmentaldefense.org/article.cfm?contentid=5315&campaign=486>
- <sup>2</sup> "Bunk on the Potomac," Aug. 20 2006, [http://sciencepolicy.colorado.edu/prometheus/archives/climate\\_change/000905bunk\\_on\\_the\\_potomac.html](http://sciencepolicy.colorado.edu/prometheus/archives/climate_change/000905bunk_on_the_potomac.html)
- <sup>3</sup> Patrick Michaels, "Donald Kennedy: Setting Science Back," *World Climate Report*, January 20, 2006, <http://www.worldclimaterreport.com/index.php/2006/01/20/donald-kennedy-setting-science-back>.
- <sup>4</sup> Robert Hart, *Hurricanes: A Primer on Formation, Structure, Intensity Change and Frequency*, George C. Marshall Institute, 2006, p. 2, <http://www.marshall.org/pdf/materials/409.pdf>.
- <sup>5</sup> Richard Lindzen, "Climate of Fear: Global warming alarmists intimidate dissenting scientists into silence," *Wall Street Journal*, April 12, 2006, <http://www.opinionjournal.com/extra/?id=110008220>.
- <sup>6</sup> Emanuel, K., 2005a. Increasing destructiveness of tropical cyclones over the past 30 years. *Nature*, 436, 686-688.
- <sup>7</sup> Roger A. Pielke Jr., et al., 2006. Reply to "hurricanes and Global Warming—Potential Linkages and Consequences". *Bulletin of the American Meteorological Society*, 87,628-631.
- <sup>8</sup> Congressional Briefing, Center for Science and Public Policy, May 1, 2006.
- <sup>9</sup> Philip J. Klotzbach, 2006. Trends in global tropical cyclone activity over the past twenty years (1986-2005). *Geophysical Research Letters*, 33, L010805, doi:10.1029/2006GL025881.
- <sup>10</sup> Patrick Michaels, "Hurricane/Global Warming Linkage Takes Another Hit," *World Climate Report*, May 26, 2006, <http://www.worldclimaterreport.com/index.php/2006/05/26/hurricane-global-warming-linkage-takes-another-hit>.
- <sup>11</sup> Peter J. Webster, et al., 2005. Changes in tropical cyclone number, duration, and intensity in a warming environment. *Science*, 309, 1844-1846.
- <sup>12</sup> Philip J. Klotzbach, 2006. Trends in global tropical cyclone activity over the past twenty years (1986-2005). *Geophysical Research Letters*, 33, L010805, doi:10.1029/2006GL025881.
- <sup>13</sup> Patrick Michaels, "Global Warming and Hurricanes: Still No Connection," *Capitalism Magazine*, September 24, 2005, <http://www.capmag.com/article.asp?ID=4418>.
- <sup>14</sup> [http://www.aoml.noaa.gov/hrd/data\\_sub/hurdat.html](http://www.aoml.noaa.gov/hrd/data_sub/hurdat.html).
- <sup>15</sup> Knutson and Tuleya, 2004. Impact of CO2-induced Warming on Simulated Hurricane Intensity and Precipitation: Sensitivity to the Choice of Climate Model and Convective Parameterization. *Journal of Climate*, Vol. 17, No. 18: 3477-3493, <http://www.gfdl.noaa.gov/reference/bibliography/2004/tk0401.pdf>.
- <sup>16</sup> Patrick Michaels, "Global Warming and Hurricanes: Do Not Believe the Hype," *World Climate Report*, October 31, 2005, <http://www.worldclimaterreport.com/index.php/2005/10/31/hurricanes-and-global-warming-do-not-believe-the-hype>.
- <sup>17</sup> Michelle Nery, "The Inside Track on Hurricane Season," *Quest*, Fall 2005, <http://www.odu.edu/ao/instadv/quest/hurricane.pdf>.
- <sup>18</sup> <http://lwf.ncdc.noaa.gov/oa/satellite/satelliteseye/educational/cat5hur.html>.
- <sup>19</sup> NOAA Magazine, <http://www.noaanews.noaa.gov/stories2006/s2632.htm>.
- <sup>20</sup> [www.nhc.noaa.gov/aboutnames.shtml](http://www.nhc.noaa.gov/aboutnames.shtml).
- <sup>21</sup> Some historic hurricanes were named after a Saint if they hit inhabited land on a Saint's Day. For the early part of the last century, they were named sequentially. In 1950, an alphabetical list of names was adopted. This was replaced by a list of female names in 1953. See [http://www.sptimes.com/2004/06/06/HurricaneGuide2004/Hurricanes\\_moved\\_from.shtml](http://www.sptimes.com/2004/06/06/HurricaneGuide2004/Hurricanes_moved_from.shtml)
- <sup>22</sup> UNISYS, Atlantic Tropical Storm Tracking by Year, <http://weather.unisys.com/hurricane/atlantic/index.html>.
- <sup>23</sup> Tom M.L. Wigley, "The Kyoto Protocol: CO<sub>2</sub>, CH<sub>4</sub> and climate implications," *Geophysical Research Letters*, vol. 25, 1998, pp. 2285-88. For this estimate, Wigley assumes a climate sensitivity of 2.5°C for a doubling of CO<sub>2</sub> concentrations over pre-industrial levels.
- <sup>24</sup> [http://wind.mit.edu/~emanuel/Hurricane\\_threat.htm](http://wind.mit.edu/~emanuel/Hurricane_threat.htm).