

The average global temperature in 2005 was 14.6 degrees Celsius, making it the warmest year ever recorded on Earth's surface, according to data from NASA's Goddard Institute of Space Studies.<sup>1</sup> (See Figure 1.) The five warmest years since recordkeeping began in 1880 have all occurred since 1998.<sup>2</sup> The average global temperature has risen nearly 1 degree Celsius in the past century.<sup>3</sup> More than half of that warming—a rise of 0.6 degrees—has occurred in the past 30 years, meaning that this warming trend is accelerating.<sup>4</sup>

In 2005, the average atmospheric carbon dioxide (CO<sub>2</sub>) concentration reached 379.6 parts per million by volume, an increase of 2.6 parts per million—0.6 percent—over the record high in 2004.<sup>5</sup> (See Figure 2.) Average CO<sub>2</sub> concentrations have climbed 20 percent since measurements began in 1959. The rise in 2005 represents the largest annual increase ever recorded.<sup>6</sup>

Although seemingly small, the rising temperature threatens to have profound consequences in the years ahead. Already, in September 2005 sea ice in the northern hemisphere was at its lowest levels in recorded history.<sup>7</sup> Greenland's glaciers lost nearly 53 cubic miles of ice in 2005 alone.<sup>8</sup> During the summer, heat waves kept temperatures above 38 degrees Celsius (100 degrees Fahrenheit) for 39 consecutive days in Arizona, and much of Europe was hit with forest fires, followed by torrential rains and severe flooding.<sup>9</sup> Abnormal algal blooms cost U.S. Gulf Coast residents \$3 million a week in lost revenues from tourism, fisheries, restaurants, and related activities.<sup>10</sup> Likewise, Kuala Lumpur experienced a downturn in the tourism industry and was forced to shut its largest harbor as a result of wild fires brought on by drought and extreme heat.<sup>11</sup>

Already, climate change is forcing entire communities to move or risk losing their livelihoods. For example, changing weather patterns are believed to be responsible for decreasing rainfall in the Gobi Desert that has helped it expand by 26,000 square kilometers a year and forced tens of millions of Chinese farmers to retreat.<sup>12</sup> Inuit natives in communities from

Canada, Greenland, Alaska, and northern Russia were forced to move northward to follow prey in 2005 as a result of the warmest winter on record in the Arctic region.<sup>13</sup>

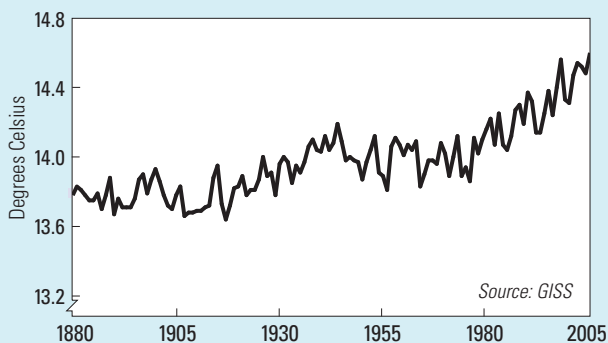
There is broad consensus in the scientific community that the rise in global temperatures is due to emissions of greenhouse gases such as CO<sub>2</sub>—the primary source of which is the burning of fossil fuels.<sup>14</sup> CO<sub>2</sub> emissions from fossil fuels increased a record 4.5 percent in 2004, to 7.57 billion tons. (See Figure 3.) Research that measures gases present in ancient Antarctic ice cores has revealed that CO<sub>2</sub> levels are now 27 percent higher than at any point up until the start of the Industrial Revolution.<sup>15</sup>

The United States, with about 5 percent of the world's population, accounts for the largest share of CO<sub>2</sub> emissions from human activities—25 percent of global emissions.<sup>16</sup> China is the second largest emitter, although emissions per person there are far lower than in the United States.<sup>17</sup> The largest sources of U.S. emissions are coal-burning power plants, followed by automobiles.<sup>18</sup> Globally, transport-sector emissions are growing most rapidly, due to dramatic rises in car ownership in developing countries.<sup>19</sup>

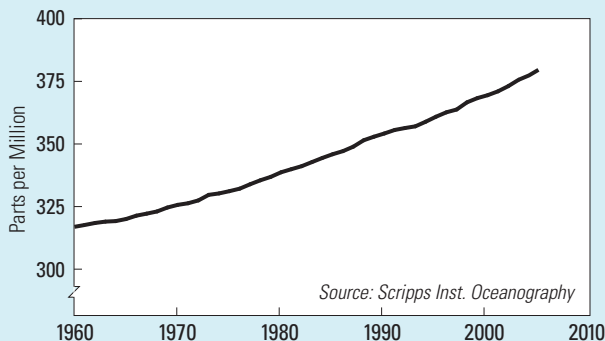
Some experts fear that climate change is already set in motion and will be difficult to reverse and that this will lead to more severe storms, drastic reductions in agricultural yields, biodiversity loss, and threats to human health—the effects of which tend to hit lower-income communities more than richer ones.<sup>20</sup>

In 2005, efforts to address climate change globally met with varying degrees of success. To meet its commitment under the Kyoto Protocol to cut greenhouse gas emissions by 8 percent, Europe launched an Emissions Trading Scheme in January 2005.<sup>21</sup> Although this does not yet include several carbon-intensive industries or the transport sector, total CO<sub>2</sub> trade in the inaugural year was worth 9.4 billion euros, and the volume of CO<sub>2</sub> traded reached 799 million tons.<sup>22</sup> While the United States remains outside the Kyoto Protocol, a growing number of state and city governments are taking action to reduce emissions.<sup>23</sup>

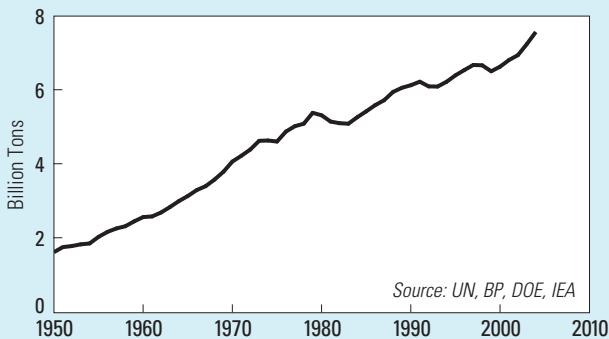
**Figure 1 . Global Average Land-Ocean Temperature at Earth's Surface, 1880–2005**



**Figure 2. Atmospheric Concentrations of Carbon Dioxide, 1960–2005**



**Figure 3. Carbon Emissions from Fossil Fuel Burning, 1950–2004**



**Global Average Temperature and Carbon Emissions from Fossil Fuel Burning, 1950–2005, and Atmospheric Concentrations of Carbon Dioxide, 1960–2005**

Year	Carbon Dioxide (parts per mill. by vol.)	Temperature (degrees Celsius)	Emissions (bill. tons of carbon)
1950	n.a.	13.87	1.63
1955	n.a.	13.89	2.04
1960	316.9	14.01	2.58
1965	320.0	13.90	3.14
1970	325.7	14.02	4.08
1975	331.2	13.94	4.62
1980	338.7	14.16	5.32
1981	339.9	14.22	5.16
1982	341.1	14.03	5.11
1983	342.8	14.25	5.10
1984	344.4	14.07	5.27
1985	345.9	14.03	5.43
1986	347.2	14.12	5.60
1987	348.9	14.27	5.73
1988	351.5	14.30	5.95
1989	352.9	14.19	6.07
1990	354.2	14.37	6.14
1991	355.6	14.32	6.23
1992	356.4	14.14	6.10
1993	357.0	14.14	6.10
1994	358.9	14.25	6.23
1995	360.9	14.37	6.40
1996	362.6	14.25	6.55
1997	363.8	14.40	6.68
1998	366.6	14.56	6.67
1999	368.3	14.33	6.51
2000	369.5	14.32	6.64
2001	371.0	14.47	6.82
2002	373.1	14.55	6.95
2003	375.6	14.52	7.25
2004	377.4	14.48	7.57
2005 (prel)	379.6	14.60	n.a.

Source: GISS, BP, IEA, CDIAC, DOE, and Scripps Inst. of Oceanography.

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