CO_2 and the "Ornery Climate Beast"

How might today's human-caused increases in atmospheric concentrations of carbon dioxide and other greenhouse gases change the planet? The past provides clues. Geological records show that in the past 400,000 years, atmospheric concentrations of carbon dioxide, average Earth temperature, and sea levels have risen and fallen roughly in tandem, in 100,000-year cycles paced by slight oscillations in Earth's orbit. These oscillations affect the distribution of sunlight, hardly affecting the total amount reaching Earth; yet, scientists believe, this has been enough to set in motion chains of events that raise and lower temperatures, launch and end ice ages, and trigger vast changes in sea level.

What's coming next? Carbon dioxide—the number one greenhouse gas—has much more power to affect Earth's temperature than the orbital changes do. And in just the past 150 years, humankind has boosted carbon dioxide concentrations by 32 percent. NASA planetary scientist Jim Hansen says that if we continue to increase greenhouse-gas emissions, temperatures will rise between 2 and 3 °C this century, making Earth as warm as it was three million years ago, when seas were between 15 and 35 meters higher than they are today. His predictions bear weight partly because he can verify his methods: using geological records, he has calculated past temperatures, and his results closely match the measured temperatures shown here. **DAVID TALBOT**