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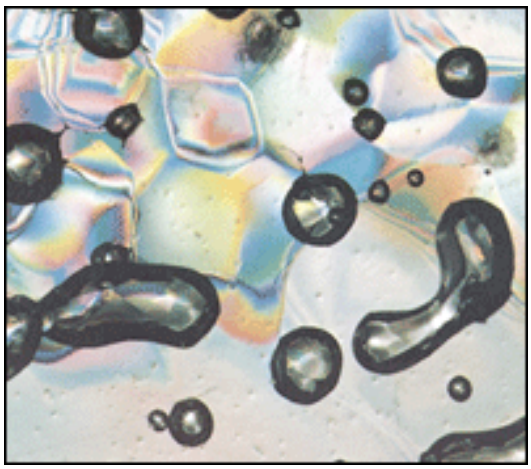
Ice Core Extends Climate Record Back 650,000 Years



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Researchers have recovered a nearly two-mile-long cylinder of ice from eastern Antarctica that contains a record of atmospheric concentrations of carbon dioxide (CO_2) and methane--two potent and ubiquitous greenhouse gases--spanning the last two glacial periods. Analysis of this core shows that current atmospheric concentrations of CO_2--380 parts per million (ppm)--are 27 percent higher than the highest levels found in the last 650,000 years. The ice core data also shows that CO_2 and methane levels have been remarkably stable in Antarctica--varying between 300 ppm and 180 ppm--over that entire period and that shifts in levels of these gases took at least 800 years, compared to the roughly 100 years in which humans have increased atmospheric CO_2 levels to their present high. "We have added another piece of information showing that the timescales on which humans have changed the composition of the atmosphere are extremely short compared to the natural time cycles of the climate system," says Thomas Stocker of the University of Bern in Switzerland, who led the research.

The core is a result of the European Project for Ice Coring in Antarctica (EPICA) and it extends the climate record 210,000 years further back than what previous ice cores from Vostok Station on the same continent had documented. Scientists can determine ancient atmospheric concentrations by measuring CO_2 and methane levels in tiny air bubbles trapped in such ice, formed when the ice fell to the earth as snow. By comparing the EPICA

air bubbles data to that from other ice cores and marine sediments, researchers can create a reliable picture of the climate over time.

This record also seems to show that the rise in methane levels in the last 10,000 years--thought by some to be a result of human agriculture--could simply be the result of natural variability in the decomposition of plants in boreal forests and wetlands.
The research appears in the current issue of *Science* and presents a larger target for climate modelers to hit in fine-tuning their computer simulations. Therefore, it may ultimately help predict what climate changes the future holds. But this cold, gray ice already makes clear that humans have steered the atmosphere into unusual territory. --*David Biello*