

environmental sciences

Maybe the atmosphere hasn't changed

Core samples taken from ice sheets of Greenland and Antarctica have shown that recently deposited ice contains twice the mercury concentration and twice the carbon monoxide level in trapped bubbles as older, deeper portions of the ice sheets. Some researchers have concluded that these data reflect a general increase of these two pollutants in the atmosphere due to the industrial revolution. Two separate studies now dispute that assertion and indicate that global concentrations of carbon monoxide and atmospheric mercury may have remained almost constant for thousands of years.

Reporting in the Aug. 20 *JOURNAL OF GEOPHYSICAL RESEARCH*, a team of researchers from the Stanford Research Institute and Washington State University show that some as-yet-unexplained oxidation process apparently increases carbon monoxide levels of trapped bubbles before they are entirely cut off from the atmosphere. As yearly layers of snow are compressed, an intermediate layer of frozen material, not yet compacted into glacial ice, forms, called firn. The authors suggest that some atmospheric gases can still penetrate the porous firn and somehow convert methane to carbon monoxide.

One such process, involving atmospheric hydroxyl radicals, has already been suggested by Bernard Weinstock and Hiromi Niki of the Ford Motor Co., who say such natural production of carbon monoxide is 25 times greater than production from combustion. Such a theory would explain why the carbon monoxide concentrations in the ice are even higher than present-day atmospheric concentrations, while methane levels are lower, but it does not explain why the final concentrations of carbon monoxide change are different at various levels of the ice sheet.

The reexamination of the mercury data is reported by Roderick A. Carr and Peter E. Wilkniss of the U.S. Naval Research Laboratory in the Aug. 31 *SCIENCE*. They say the original contention that mercury levels increased with time was based on experiments conducted in Greenland at two separate sites, which at the time could not be calibrated directly with each other. For the conclusion—that the atmospheric mercury level was also increasing—to be valid, mercury would have to be evenly spread over a wide area at any given time. However, the present authors report that, based on their new data, mercury is spread very spottily about the ice sheet, probably because of volcanic activity. They conclude that the mercury content of Greenland glacial ices has not increased dramatically.

Hazard discovered in camp lanterns

Campers who use the roughly 17 million mantles sold each year for pressurized camping lanterns may be exposing themselves unknowingly to hazardous amounts of beryllium and the products of radioactive thorium. Kyle Griggs of the Lawrence Livermore Laboratory reports in the Aug. 31 *SCIENCE* that a new lantern mantle releases enough beryllium to potentially endanger health if used in a small, confined space such as a camper. Most of the toxic material is burned off during the first 15 minutes. Beryllium is added to mantles to strengthen the ash that remains after initial burning. Radioactive thorium is also added to the mantles to increase their incandescence and though the thorium itself is not released during the initial burning, certain products ("daughters") of its radioactive decay can become airborne. Griggs emphasizes the need for lantern users to burn new mantles initially in a well ventilated area and to handle spent mantles with extreme care.

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earth sciences

Oceans approach man as CO producer

Man's consumption of fossil fuels is certainly a large source of carbon monoxide in the atmosphere, perhaps the major one. A three-year survey of the oceans in the Northern Hemisphere suggests, however, that the sea may release almost as much CO to the air as man.

As recently as 1970, V. J. Linnenbom, J. W. Swinnerton and R. A. Lamontagne of the Naval Research Laboratory in Washington determined that the ocean could be providing as little as five percent as much CO to the atmosphere as does man. In the Aug. 20 *JOURNAL OF GEOPHYSICAL RESEARCH*, however, the same scientists report that the sea's share could be as much as 85 percent of man's.

Using measurements of seaborne CO from 14 locations between 8 degrees and 78 degrees north latitude, the team has found that the Northern Hemisphere's waters apparently are contributing an amount equal to about 34 percent of the estimated 260 trillion grams of CO released annually by man. If production in the oceans of the Southern Hemisphere, which are far larger, is at a similar rate, the oceans of the world are providing about 220 trillion grams of CO per year, about 85 percent of man's portion.

Africa and South America split with a reason

As their almost congruent facing coastlines attest, Africa and South America were formed in the world's geologic youth by the splitting of a vast supercontinent into two masses which slowly moved apart. But why did the split occur where it did? "The answer could lie in purely random phenomena," note W. S. Fyfe of the University of Western Ontario and O. H. Leonardos Jr. of the Federal University of Rio de Janeiro, Brazil, "but time after time ancient trends and structures seem to control later events."

The geologists' theory, reported in the Aug. 24 *NATURE*, is that the location of the rift was due to a hot mantle plume rising up beneath a dense, rocky belt that spanned the crust beneath the original great continent. Basalt pushed up by the plume thickened the barrier-like layer from underneath, distorting the plume until it was forced to move sideways, which in turn created a spreading ridge. Along this ridge the supercontinent snapped, leaving traces of the hard, thick path which still remain in the rocks at the base of the Atlantic coastlines of Africa and Brazil.

Earth's tidal bulge smaller than thought

The bulging or displacement of the earth due to the gravitational pull of the sun and moon is apparently less than had been believed, judging from precise laser tracking of the Beacon Explorer C satellite.

Laser beams reflected from mirrors aboard the satellite were used to calculate deflections in the satellite's 1,000-kilometer-high orbit during five months of 1970. After subtracting the direct effects on the satellite from the gravity of the sun, moon and earth, as well as the sun's radiation pressure, geodesists found that the remaining deflection, due to the effects of earth's bulging from solar and lunar attraction, suggested an earth bulge of about .245 seconds of arc. The prior consensus, says David E. Smith of Goddard Space Flight Center, who reported the work with his colleagues in the Aug. 24 *NATURE*, was that the bulge would be about .3 seconds of arc. The smaller displacement, Smith says, may be due to the fact that the oceans, which are more fluid than the solid earth and would thus contribute to a higher displacement, are restricted by the blocking action of the continents.