

The dark side of a nighttime warming

If global warming strikes mostly at night, as it has in recent decades, it could pump up the destructive power of summer storms, according to a French scientist.

Meteorologists noted several years ago that daily minimum temperatures have climbed faster than daily maximums during the 20th century, indicating that the effects of global warming in this century have occurred mostly at night (SN: 1/4/92, p.4). To see what this might mean, Jean Dessens of the Université Paul Sabatier in Campistrous looked at statistics on hail damage gathered by French insurers since 1946. He compared the annual losses caused by hail to a record of average summer minimum and maximum temperatures.

The hail losses showed substantial correlation with the nighttime temperatures, Dessens reports in the May 15 *GEOPHYSICAL RESEARCH LETTERS*. The rise in nighttime temperatures could account for much of the 45 percent increase in hail damage since 1981.

While most researchers consider global warming a threat to society, some meteorologists have proposed that a hike in daily minimum temperatures could actually yield benefits—prolonging the growing season and reducing the need for home heating. Dessens' study, however, suggests that even a nighttime warming can cause problems.

The search for early dirt

Earth was all wet early on, with a single ocean unbroken by any continents. When continental crust finally emerged from the waves, it fundamentally changed all aspects of the planet, from the internal convective roilings to the external soup of gases in the atmosphere. A group of Australian geologists has now identified the oldest evidence of dry land, pushing back the time when scientists believe continents rose up out of the oceans.

Roger Buick of the University of Western Australia in Nedlands and his colleagues discovered a distinct geologic feature called an unconformity, created when layers of sediments build up on an area previously eroded by wind and water. Using the decay of radioactive uranium in the rocks as a clock, the scientists dated the unconformity to 3.46 billion years ago, a half billion years more ancient than the next oldest evidence of dry land, they report in the June 15 *NATURE*.

Geologists working in Canada have found pieces of continental crust from even further back, about 3.96 billion years ago (SN: 10/7/89, p.228). But because such rocks formed deep in the crust, they cannot reveal whether the ancient continental surface sat above sea level. In the Australian case, the presence of an unconformity clearly indicates a land surface reaching above sea level. "The fact that it had an erosion surface means it was exposed to the atmosphere and to weathering," says Buick.

Geologist Paul F. Hoffman of Harvard University calls the Australian find important because it could offer insight into the composition of Earth's early atmosphere. Scientists have speculated that the atmosphere in the planet's first billion years must have been a supergreenhouse, containing hundreds of times more carbon dioxide than today's air. The abundance of this heat-trapping gas would have helped keep oceans from freezing early in the planet's history—a time when the infant sun emitted much weaker light than it does now.

Geochemists can gauge the carbon dioxide content of the ancient atmosphere by studying fossilized soil, or paleosol, preserved in ancient rocks. The Australian rocks appear to contain paleosol, says Buick, who plans to enlist Harvard's Heinrich D. Holland to examine the rocks. Buick also hopes to look below the unconformity for what would be the earliest evidence of life on the planet.

Newest estrogen mimics the commonest?

Phthalates, compounds best known for their ability to make plastics flexible, are the most abundant industrial contaminants in the environment. Two new studies now demonstrate that at least a couple of them possess a hormonal alter ego: They activate receptors for estrogen, the primary female sex hormone.

Both studies also established the estrogenicity of BHA, a preservative commonly added to food to retard rancidity.

In recent years, scientists have been compiling a list of emasculating agents that work by mimicking estrogen. Susan Jobling of Brunel University in Uxbridge, England, and her colleagues collared the three new prospects while assaying 20 common sewage contaminants. They were scouting sources of the estrogenicity that teammate John P. Sumpter had observed in wastes from sewage-treatment plants (SN: 1/8/94, p.24).

Nine of these pollutants bind to estrogen receptors. The researchers incubated cells with each of the nine to see whether any of them triggered the receptor's normal activity. BHA, butyl benzyl phthalate (BBP) and di-n-butyl phthalate (DBP) not only appeared estrogenic, but also stimulated the growth of breast cancer cells in culture, the group reports in the June *ENVIRONMENTAL HEALTH PERSPECTIVES*.

At the same time, researchers at Tufts University School of Medicine in Boston and the University of Granada in Spain were studying some of the same compounds. Their findings, to be published in the same journal later this year, also identify BHA and BBP as estrogens. However, while DBP did not exhibit estrogenicity in their assays, a third plasticizer—diphenyl phthalate—did.

Where does one find phthalates? DBP serves as a dispersant in some insect repellents and appears in plastic plumbing pipes and food wraps. Indeed, the British team cites studies finding up to 500 micrograms of DBP per kilogram of food wrapped in plastic. BBP goes into vinyl floor tiles, adhesives, synthetic leather, and the papers and cardboard designed for contact with liquid, dry, and fatty foods. That last application may explain how butter and margarines end up laced with BBP at concentrations exceeding 45 milligrams per kilogram, as cited in "Male Reproductive Health and Environmental Chemicals with Estrogenic Effects," a new report by the Danish Environmental Protection Agency in Copenhagen.

No one knows if the newly unmasked environmental estrogens pose a risk to humans or wildlife. Jobling's team points out that our bodies may readily deactivate or break down the compounds.

Chlordane's lingering neurotoxicity

After learning that outdoor use of chlordane—a highly toxic termite killer—could taint the indoor air of treated structures for a year, the U.S. Environmental Protection Agency got the manufacturer to halt sales in 1987. But significant indoor contamination could persist through at least 1991, tests of some treated Houston dwellings found. Moreover, residents of the buildings suffer protracted neurotoxicity, a new study shows.

The 109 people who were studied performed more slowly on tests of dexterity and motor skill, and exhibited poorer short-term memory, vocabulary skills, and balance than 174 unexposed individuals of the same age and education level. Chlordane-exposed individuals also experienced more asthma, shortness of breath, hair loss, seizures, and other health impairments. Kaye H. Kilburn of the University of Southern California School of Medicine in Los Angeles and consultant John C. Thornton of Mahopac, N.Y., report their findings in the soon-to-be-released July *ENVIRONMENTAL HEALTH PERSPECTIVES*.

At least some of the symptoms probably stem from brain damage, the researchers' data indicate. At a minimum, they conclude, "chlordane use should be prohibited worldwide."