Arctic shows no signs of greenhouse warmth

With all the debate concerning greenhouse warming, wouldn't it be nice if the planet came with an alarm that would sound, unequivocally, when the expected climate troubles begin?

Many researchers have looked to the Arctic for just such a sign because computer models suggest that greenhouse warming should affect the polar regions more than the tropics. But an extensive study of temperatures over the Arctic Ocean indicates this region has not warmed over the last four decades, a group of U.S. and Russian scientists report this week.

"We just don't see what the models predict. That's interesting because perhaps the models are missing something," says Jonathan D. Kahl of the University of Wisconsin-Milwaukee. Kahl and his colleagues published their findings in the Jan. 28 NATURE.

To Kahl's group, the absence of Arctic warming reveals weaknesses in the global warming predictions made on the basis of computer models. But those who work with the models take a different view, rejecting the whole premise that the Arctic should warm before the rest of the globe.

Kahl's group studied two different sets of temperature records from the lower atmosphere and at the Earth's surface. The early set, spanning the years 1950 to 1961, comes from U.S. Air Force missions that flew over the Arctic, dropping meteorological instruments attached to parachutes. The second data set, running from 1954 to 1990, consists of temperature measurements made by Russian teams stationed on drifting ice islands for periods of several months to several years. As they moved through the Arctic, the Russian teams launched balloons carrying meteorological instruments. In total, Kahl's team studied 27,000 temperature recordings over the central and western Arctic Ocean.

For most seasons, the researchers found no statistically significant temperature trends at the surface or at altitudes of 1.4 and 2.8 kilometers. Of particular interest, they report that surface temperatures for the western Arctic Ocean actually showed a significant *cooling* in winter and autumn, while the lower atmosphere warmed by a significant amount in winter in both the central and western Arctic.

Kahl calls these findings important because they do not match the large warming predicted for the Arctic by climate models. "One of the fundamental results that these models have is that the Arctic atmosphere should warm up more quickly than the rest of the world," he says.

Yet climate modeler Jerry Mahlman comments, "That's a funny assertion, to say the least." While the models do predict that the high latitudes should warm more than other parts of the world, they also show the polar regions warming at a slower rate than the rest of the globe, says Mahlman, director of the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory in Princeton, N.J.

What's more, the Arctic climate varies naturally much more than the climate elsewhere, making it difficult to detect any trends by looking at the Arctic, Mahlman says. "In some ways, the polar regions would be the last place I would look for a warming signal, not the first," he says.

John E. Walsh of the University of Illinois at Urbana-Champaign also says that the observations by Kahl's group may not conflict with model results. Because the Russians located their floating stations on thick pack ice, their records do not reveal temperature trends over regions of thin and broken ice, where models generally show greater warming.

Other temperature data from the Arctic do show a warming over the last 30 years, particularly over the land areas, Walsh says. The Arctic land warming matches some of the newer model simulations, he adds. — *R. Monastersky*

This could be your brain on booze

It's a truth that the Mothers Against Drunk Driving know all too well: Alcohol slows reflexes and impairs muscle coordination. But despite the great strides neuroscientists have made in the last few years in understanding the brain, the exact cause of alcohol's ability to intoxicate has remained a mystery.

Now, a group of researchers has uncovered clues that might explain why knocking back one nightcap too many can make it tough to walk a straight line. While studying the brains of a special breed of rats with a low tolerance for alcohol, Peter H. Seeburg and his colleagues at the University of Heidelberg in Germany have identified a molecule on the surface of nerve cells that responds abnormally to the sedative drug diazepam, better known by the trade name Valium. Because an experimental drug that can restore sobriety in drunken rats also appears to act through this same molecule, the researchers believe it may be the arbiter of alcohol's disabling effects in people as well as rats.

The molecule constitutes one of five subunits that together make up a nerve cell's receptor for GABA (gamma-aminobutyric acid), a body chemical that usually shuts off nerve-cell activity. A region at the base of the brain known as the cerebellum controls motor coordination by using GABA as a molecular "off switch" to inactivate previously stimulated muscle nerves.

Seeburg's team found that so-called alcohol-non-tolerant rats have a mutant form of the alpha subunit of a GABA receptor. In the Jan. 28 NATURE, the researchers report that cells bearing this mutant subunit exhibit an enhanced sensitivity to diazepam. Moreover, they discovered that a drug known as Ro15-4513 — which was once developed by the Swiss-based pharmaceutical company F. Hoffmann-La Roche, Ltd. to reverse intoxication (SN: 12/6/86, p.358) — could block this enhanced sensitivity by binding to the same site on the mutant subunit as diazepam.

Seeburg concludes that his team has "identified one of the little cog-wheels in the molecular machinery that brings about the loss of motor control in alcohol intoxication." He suggests that when the mutant subunit is exposed to alcohol, it perturbs the normal action of the GABA receptor, disrupting the cerebellum's fine control of muscle movement and causing individuals to stagger and fall. However, he admits that the finding rests only upon "converging lines of evidence."

Neuroscientist Stuart Cull-Candy of University College in London comments that the new finding sheds more light on the function of the different types of GABA receptors in the cerebellum than upon the brain's reaction to alcohol. "The work strongly indicates that the GABA subunit can inhibit cerebellar processes," he says. However, in an editorial accompanying the new report, he and University College colleague Mark Farrant write, "Although the evidence is highly suggestive, there is as yet no proven link between mutation of [the alpha subunit of GABA] and the altered behavior of [alcohol-non-tolerant] rats."

Seeburg and his colleagues are now conducting experiments designed to demonstrate conclusively the alpha subunit's involvement in intoxication. They have begun determining whether the mutant GABA receptor subunit is more sensitive than its normal counterpart to alcohol. Although the results have so far turned up negative, he says, "In my view, all of the chips aren't in yet." — *C. Ezzell*