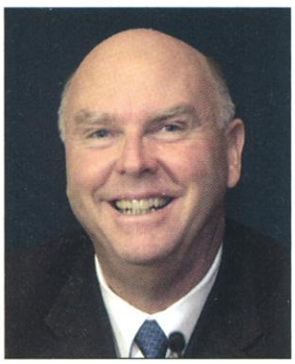
Genome Research Institute assistant director Kathy Hudson, will focus initially on reproductive genetics, as required by its 3-year, $9.9 million grant from Pew. Venter's comment: "The more voices, the better."

Bioethicist Thomas Murray, director of the Hastings Center in Garrison, New York, says the Hopkins center was carefully planned and "fills an important need." Murray hasn't seen TCAG's agenda, but he offers Venter this advice: "Define your mission clearly" and guarantee the center its independence.



Ethics and energy. Venter is moving into new research areas.

Unlike TCAG, Venter's energy and environment shop, IBEA, may rely extensively on government support. Staff scientists will explore microbial genomics to look for solutions to environmental problems, for example, by degrading toxic chemicals and sequestering carbon dioxide from the atmosphere. They will also study clean energy products, such as hydrogen. This project, according to Venter, received encouragement from Ari Patrinos, head of biological and environmental research in the Department of Energy's (DOE's) science office. Indeed, Patrinos says, IBEA's agenda matches DOE's own research goals very closely: "If [Venter's] record is any indication, we expect big things from him again."

–ELIOT MARSHALL

CLIMATE CHANGE

A Single Climate Mover for Antarctica

Weird things are afoot at the bottom of the globe. The Antarctic Peninsula's Larsen ice shelf has suffered a torrid 2.5°C warming during the past half-century (*Science*, 29 March, p. 2359). A Rhode Island–sized chunk of the ice shelf drifted away from the peninsula and broke up in recent months as glaciologists watched, some Antarctic glaciers are thinning, and sea ice is retreating—all as greenhouse warming would have it. Meanwhile, however, other glaciers are thickening. In places, sea ice is actually advancing, and most of Antarctica is not warming at all or is even cooling. What gives?

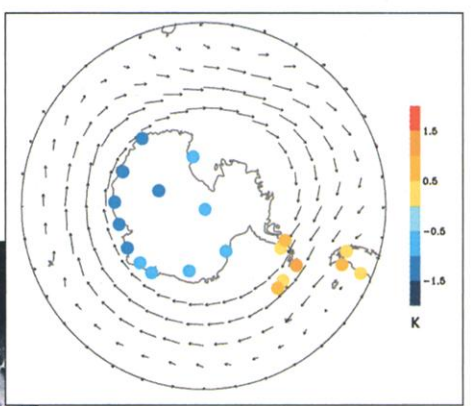
Meteorologist David Thompson of Colorado State University in Fort Collins and atmospheric chemist Susan Solomon of the National Oceanic and Atmospheric Administration's (NOAA's) Aeronomy Laboratory in Boulder, Colorado, have an explanation. On page 895, they build a case that a climate master switch in the atmosphere over the high southern latitudes is driving the wacky climate shifts of Antarctica. And the hand on the switch, they suggest, may be our own. Humanmade chemicals drive the formation of the yearly Antarctic ozone hole, which, they argue, throws the climate switch—called the Antarctic Oscillation (AAO)—in the atmosphere below.

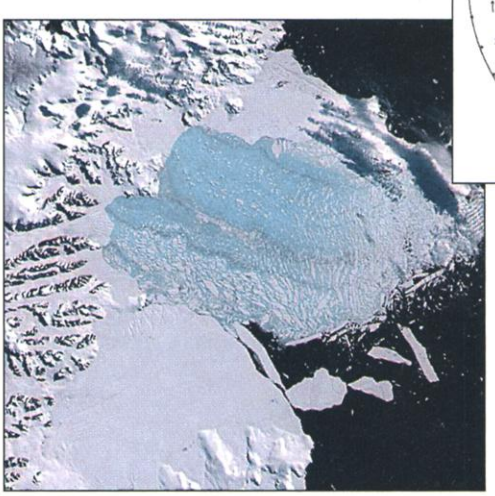
The work is "the strongest evidence yet" that a shift in the AAO "could explain a number of different components of [Antarctic] climate trends," says meteorologist David Karoly of Monash University in Clayton, Australia. The idea that Antarctic ozone loss is behind the AAO shift is getting a more cautious reception.

To link stratospheric ozone loss to climate change at the surface, Thompson and Solomon first turned to atmospheric observations from weather balloons routinely launched from seven sites around Antarctica. The instrumented balloons tracked the erratic atmospheric seesaw of the AAO, which raises atmospheric pressure alternately over the pole and in a ring passing over the Southern Ocean and the tip of South America. These pressure shifts alternately accelerate and slow the ring of westerly winds that encircle Antarctica, as Thompson and J. Michael Wallace of the University of Washington, Seattle, suggest happens in the Arctic (*Science*, 9 April 1999, p. 241). The AAO clearly swings erratically from one phase to the other week to week, month to month, and year to year, but the balloon data from 1969 to 1998 show that recently it has been spending more and more time in its positive, strong-wind phase, just as the Arctic Oscillation (AO) has.

Having shown that the AAO high above the polar region has shifted, Thompson and Solomon demonstrated that the shift could explain most of the climate change at the surface. Comparing the pattern and amplitude of the AAO trend with those of the climate change, they found that the AAO's shifts in circulation—including winds and air rising over the continent—could account for 90% of the summertime cooling over Antarctica and about half of the summertime warming over the Antarctic Peninsula and the southern tip of South America. The rest of the peninsula's warming may be linked to changes as far away as the tropical Pacific.

To trace the changes back to the stratosphere, Thompson and Solomon compared trends in stratospheric "climate" with the AAO trend. Researchers had already established that the springtime loss of ozone—which normally absorbs solar energy and warms the lower stratosphere—had cooled the lower stratosphere by 6°C each spring. That cooling, in turn, strengthens the stratospheric vortex of westerly winds, a stratospheric analog of the AAO's ring of westerlies in the lower atmosphere. Thompson and Solomon compared the timing of ozone-induced cooling and vortex intensification in the stratosphere with similar changes in the lower atmosphere and at the surface. The stratospheric shifts seemed to break through to the lower atmosphere at roughly the times of the year—late spring and early summer, and fall—when seasonal circulation changes temporarily break down the usual barrier between the wispy stratosphere and the dense lower atmosphere. That timing "seems pretty good evidence [that] ozone is important" in driving the AAO and thus climate change, says Thompson, "particularly during the late spring."





Hot times. Warming (yellow) and winds (arrows) induced by the Antarctic Oscillation doomed part of the Larsen ice shelf.

Pinning most of the contradictory Antarctic climate changes on a changing AAO "seems reasonable" to meteorologist Martin Hoerling of NOAA's Climate Diagnostics Center in Boulder. He and others are reluctant, how-

CREDIT: (TOP TO BOTTOM) BERND KAMMERER/AP; D. THOMPSON *ET AL.*; AP PHOTO/NASA

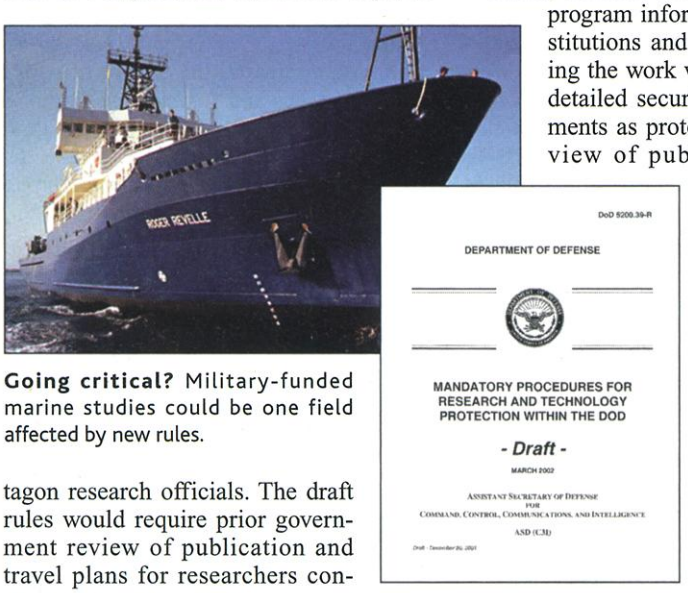
ever, to extend a linkage to the overlying stratosphere just yet. "You certainly can't rule out a role for ozone" in climate change, says meteorologist James Hurrell of the National Center for Atmospheric Research in Boulder. "But I think other things may be contributing." He and Hoerling have shown that, in climate models, the recent warming of the tropical ocean drives the AO into its positive phase (*Science*, 27 April 2001, p. 660). Now the big riddle about the patchwork of Antarctic climate change seems to have shifted from "What is the culprit?" to "What could be pushing the AAO to such an extreme?"

–RICHARD A. KERR

NATIONAL SECURITY

Pentagon Proposal Worries Researchers

A proposal to impose new controls on U.S. scientists who do basic research for the military is drawing fire from universities, members of Congress, and even some top Pentagon research officials. The draft rules would require prior government review of publication and travel plans for researchers conducting nonclassified research deemed "critical" to national security. Critics say the new rules are largely redundant, and they warn that the added paperwork could scare away top scientists from working with the Department of Defense (DOD).



Going critical? Military-funded marine studies could be one field affected by new rules.

The draft rules "are a valid effort to reassess security, but they don't appear to be very well thought out," says Jacques Gansler, a former top Pentagon research administrator in the Clinton Administration and now head of the Center for Public Policy and Private Enterprise at the University of Maryland, College Park. In an internal analysis obtained by *Science*, Don DeYoung, executive assistant to the director of research at the U.S. Naval Research Laboratory in Washington, D.C., argues that the rules "can be expected to have a chilling effect" on defense research.

The Pentagon will spend about $1.4 billion on basic research this year, with more than half going to universities for fundamental work in areas such as computer science, mathematics, and engineering. Although academic researchers have traditionally faced few restrictions, universities have reported sporadic Pentagon efforts to restrict the flow of unclassified information since the 11 September terrorist attacks (*Science*, 22 February, p. 1438).

Last week, those whispers took shape in the form of a leaked 120-page draft regulation entitled *Mandatory Procedures for Research and Technology Protection Within the DOD*. The internal document, dated 25 March and first reported last week by the *Chronicle of Higher Education*, describes a multilayered plan for protecting sensitive information. The first step would have Pentagon program managers decide if DOD-funded studies at universities, companies, or military laboratories involve "critical research technologies" or "critical program information." If so, the institutions and researchers conducting the work would have to prepare detailed security plans, label documents as protected, obtain prior review of publication and travel plans, and decide whether to place restrictions on any foreign scientists involved in the project. The Pentagon would also create a centralized database to track the work it has funded.

The plan is deeply flawed, says DeYoung, who responded to a memo from senior DOD officials asking for comment. In a brisk seven-page analysis, he argues that the draft rules overstate potential threats, ignore a 16-year-old presidential order against restrictions on military-funded basic research, and duplicate existing government efforts to protect critical technologies. He also argues that the rules will lead to a counterproductive, ever-expanding definition of critical research. "In a competitive budget environment," he writes, "there will be a strong propensity for managers to designate their projects as critical."

Such fears are being echoed in Congress. "This could become another endless bureaucracy," says one Senate aide. Adds Senator Jeff Bingaman (D–NM), who sits on the Armed Services Committee, "they are trying to wall off researchers." Despite such concerns, however, lawmakers plan to wait for the Pentagon to come up with a final plan before reacting. "There isn't much appetite right now to micromanage [the military]," says a House aide. University and industry lobbyists are also keeping their powder dry in hopes that the Pentagon will modify its current proposal. DOD has been asked to extend the comment period, which was supposed to end this week.

Gansler laments the fact that the proposal comes "just as world-class researchers and companies were showing a little greater interest in doing defense research." He fears that any additional rules may cement the Pentagon's reputation as a funding source that's more trouble than it's worth.

–DAVID MALAKOFF

RESEARCH FUNDING

Europe Begins Work on Modest New Agency

STOCKHOLM—You know scientists are desperate when they clamor for new bureaucratic paws on the R&D purse strings. But rampant dissatisfaction with Europe's basic research strategy—or lack thereof—has sparked calls for a new grantmaking body to fill the void. At a meeting here last week, the continent's top science managers started to flesh out a proposal for a European Research Council (ERC). It may not be what many scientists were hoping to see, but it does reflect budgetary constraints and the reality of the European Union's byzantine politics.

The council's proponents invoke some disturbing numbers in arguing their case. European governments spend, on average, 2% of their budgets on R&D, compared with 4.2% in the United States, and the gap has widened significantly since 1995. "We have to do something, and we have to do it now," says Dan Brändström, executive director of the Bank of Sweden Tercentenary Foundation and chair of a Swedish committee on the future of research in the European Union.

Most research funding in Europe—roughly 96%—comes from national agencies. Nearly all the rest comes from a $4-billion-a-year pot known as the Framework program, administered by the E.U. But Framework targets mainly R&D that is likely to benefit industry in the near term, and industry currently favors hot fields such as genomics and nanotechnology.

That has left many disciplines out in the cold, including some that are starved for support from the national agencies. Frank Gannon, executive director of the European

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