Buying time in the war on global warming

President Bush has received a birthday present three months early. Two climate researchers reported this week that the world will suffer little by waiting a decade to begin reducing emissions of greenhouse gases – a finding that apparently justifies the President's go-slow policy on the issue of global warming.

Many experts, however, view the new study as too simplistic to serve as a guide for political decisions. "It's hard to call this a piece of work that could give you high confidence in whether you could wait 10 years or not," says Warren M. Washington, a computer modeler at the National Center for Atmospheric Research in Boulder, Colo.

The new results emerged from a series of climate simulations performed by Michael E. Schlesinger and Xingjian Jiang of the University of Illinois at Urbana-Champaign, who describe the work in the March 21 NATURE. The two researchers used a simple climate/ocean model to forecast how global temperatures would respond to different emissions-reduction scenarios. They chose the simple model instead of a complex general-circulation model because the larger one would have required thousands of hours of computing time, Schlesinger told SCIENCE NEWS.

Many environmentalists and scientists have lobbied for a quick international response to limit greenhouse gas emissions, insisting that immediate action is necessary in order to forestall dramatic climate warming. But the new simulations present a cooler conclusion. They suggest that the world's nations can wait 10 years before reducing greenhouse gas emissions and still obtain at least 95 percent of the benefits derived from immediate cuts in emissions. Because a decade's delay would incur such a minor penalty, Schlesinger and Jiang suggest that researchers have time to launch a "crash program" to resolve some critical scientific questions on climate change.

Other climate modelers call that picture far too rosy, arguing that the Illinois model doesn't include the kind of climate factors that could drastically speed the pace of global warming. For example, a warming of the ocean's surface layer might slow the currents that carry heat down into the deep ocean – an effect that would accelerate a temperature rise. But this kind of feedback effect, says Washington, is not easily incorporated in the simple type of climate model used by Schlesinger and Jiang.

Even complex models that do include such feedback effects may not simulate them accurately, notes climatologist James Hansen of NASA's Goddard Institute for Space Studies in New York City. Regardless of the model used, therefore, scientists cannot forecast sudden "nonlinear" reorganizations in the climate system, he says. "That makes it very prudent to be very careful about how hard we're pushing the climate system, because we just don't know when it might respond in a very nonlinear way," Hansen says.

If nations defer action, they will have to adopt much more painful emission-reducing programs in the future, he contends. – *R. Monastersky*

Astronomy panel talks dollars and sense

Peering out with infrared, optical and X-ray eyes, telescopes survey the cosmos, bringing into focus such celestial residents as globular clusters, white dwarfs and quasars. Despite the beckonings of the universe, however, astronomers say tight purse strings limit the number and extent of their studies. That lament seems as old as the stars, but a scientific panel has now taken a step beyond fiscal grumbling with a plan for making the best of a limited budget.

The panel of 15 astronomers, appointed by the National Research Council, spent two years considering hundreds of projects and consulted nearly 1,000 astronomers. This week, they presented the results of their work: a list of what they deem the highest priorities for U.S. ground- and space-based research through the year 2000. Together, the projects would cost an estimated $3 billion.

Instead of focusing solely on new instruments, panel chairman John N. Bahcall of Princeton (N.J.) University says the committee concluded it had "a moral obligation" to give overall priority to maintaining and refurbishing existing national observatories – an area in which funding has not kept pace with inflation in the past decade.

"[Current] investment in the infrastructure of astronomy is a national disgrace," asserts Bahcall. To remedy that, his panel recommends that the National Science Foundation (NSF) add $15 million a year for the next nine years to its annual expenditures to upgrade large telescopes and related equipment, currently funded at about $25 million annually. In addition, the panel calls for NSF to increase its annual funding for individual astronomy grants, particularly those funding young investigators, by $10 million a year.

The panel report, sponsored by NASA, NSF and other federal research and development agencies, also recommends an "increased emphasis in the astronomy research budget on small and moderate programs," stressing the need for smaller, more frequent space missions equipped with state-of-the-art instruments. In addition, Bahcall maintains that NASA could solve some of its recent organizational and equipment problems and prevent future glitches by working more closely with astronomers rather than treating them as unwanted collaborators.

The Earth-orbiting Space Infrared Telescope Facility won the panel's approval as first priority among proposed large-scale projects. This instrument, 1,000 times more sensitive than ground-based infrared telescopes, would play a key role in detecting newly forming stars and galaxies, the panel maintains.

The group recommends funding for three other large-scale projects. In order of ranking, these include: an 8-meter optical telescope in the Southern Hemisphere; the Millimeter Array, a group of millimeter-wavelength telescopes for detecting planet-forming regions around young stars; and an 8-meter telescope atop Hawaii's Mauna Kea, primarily for infrared use.

Among programs considered moderate in scope, the panel gives highest priority to research in adaptive optics – efforts to improve ground-based telescope resolution by compensating for atmospheric distortion. Other recommendations include: more frequent Explorer telescope missions; construction of SOFIA, a 2.5-meter telescope that would probe far-infrared radiation from its vantage point inside a Boeing 747; and a space mission aimed at a 1,000-fold improvement in the precision with which scientists locate celestial bodies.

Small-scale projects highlighted in the report include a program to detect neutrinos from supernovas, and a new version of the Fly's Eye telescope – an array that would analyze the most energetic cosmic rays ever detected.

Although the President has enthusiastically supported a lunar mission, Bahcall says that project did not make the priority list because the panelists concluded that in the short term, scientists could conduct astrophysical research just as easily from Earth as from the moon. Another contender that missed the boat: twin gravitational-wave detectors that NSF proposes to begin funding next year.

Congressional staffers and NSF administrators say they welcome the panel's report as a cogent guide to planning on a tight budget. "It's not just a wish list; it's not saying, 'We want it all,'" one congressional budget analyst told SCIENCE NEWS. "This will have an impact in helping us decide what to fund." – *R. Cowen*