



CLIMATE WATCH

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SUN MAY BE KEY TO CLIMATE CHANGE

An article in the November 26 issue of *Science* magazine said that Dr. Sallie Baliunas, chair of the George C. Marshall Institute and researcher at the Harvard-Smithsonian Center for Astrophysics, "broke the mold" of climate research with her recent research findings that hint at a possible link between solar activity (sun spots) and global temperatures. Her findings were published in a recent issue of *Energy*.

Many astronomers see Baliunas' new data as offering the promise of new insight into the mysteries of solar variability. "No one else has data that can answer those questions," said Harvard's Dr. John Stauffer.

The suggestion that the sun, not greenhouse gases, may be driving climate change was first proposed in a study that researchers from the Danish Meteorological Institute published in *Science* on November 1, 1991. Comparing temperature records from the Northern Hemisphere with the length of the sunspot cycle from 1860 to the present, the Danish team found that the sunspot cycle decreased and increased in a mirror image of the temperature pattern.

"[Some] people call it an exercise in curve fitting.... They said there was no physics in it," Dr. Robert Jasnow of the Mount Wilson Observatory and co-author of the *Energy* paper told *Science*.

Those who hold that view may soon have to take another look. In June of last year, 200 scientists from

Continued on page 4

TIMES WRITER HIGHLIGHTS CHINA'S RISING EMISSIONS

In a December op-ed for the *New York Times*, Philip M. Boffey, a staff editorial writer for the paper, focused on the environmental problems China is facing in its economic expansion and posed the situation as a challenge to the United States and other developed nations.

"One American projection even suggests that China could pass the U.S. in carbon emissions by the year 2025....," Boffey wrote, adding, "The outlook would be even worse had China not done an exemplary job of controlling its energy appetite despite furious economic expansion...holding energy growth to half the rate of economic growth. But most analysts think the easy part has been accomplished and that further efficiency gains will be much harder."

As evidence that Chinese officials are committed to using energy more efficiently, Boffey cites current programs,

such as a large hydroelectric plant by the Yangtze River that will produce power without emitting carbon dioxide, a tree-planting program that has increased forest coverage for the first time in years and experiments with cleaner home heating approaches. Vice Minister of Electric Power Zha Keming "believes that nuclear power...could become [China's] chief energy source in 50 years," according to Boffey.

Despite these programs and a statement by China's top environmental official that all countries should work to lower carbon emissions "even before global warming is fully proved," Boffey noted that in China itself global warming is not a high priority: "And when most Chinese officials are asked what environmental problems are most acute, they invariably cite urban air pollution, population growth, clean

Continued on page 4

PCSD TO DEFINE PRINCIPLES

In April, the President's Council on Sustainable Development (PCSD) task force expects to publish a set of principles that will guide environmentally sustainable growth in the United States.

The final guidelines will resolve questions and comments the PCSD receives on a draft set of principles that it distributed via a news release and published in the *Federal Register* after its January meeting in Seattle. At the meeting, the PCSD examined Earth Summit Agenda 21, sustainable development efforts in Australia and Canada, and recommendations from non-governmental organizations, such as the Washington, DC-based Global Tomorrow Coalition.

Among the guidelines included in the draft are the following:

- "Where environmental damage may be large or irreversible, prudent action is required, even in the face of scientific uncertainty."
- "National security now depends on environmental and economic security as much as on military defense."
- "Development should respect the finite nature of many of the nation's resources."
- "The elimination of poverty is essential to economic progress and environmental equality."

Continued on page 4

Executive Director's Column

OUTLOOK ON U.N. CLIMATE TREATY

By John Shlaes

On March 21, 1994 — just three years after its first negotiating session, the U.N. Framework Convention on Climate Change will go into effect. All signatories as well as ratifiers of this treaty will be legally bound by its provisions — measures that will have international influence on energy, environmental, economic and regulatory policies for years to come.

However, many in the international community are already calling for revisions to the treaty to establish new goals and targets and a new "web" of international regulations that would mandate national and international caps on emissions or mandate the stabilization of greenhouse gas "concentrations," which would require major reductions of emissions. Surely these kinds of measures could severely damage the ability of U.S. industry to sustain economic growth and develop new markets. At the same time this approach also would stifle the objective that many have, which is to work with others throughout the world to improve the environment while simultaneously contributing to worldwide economic sustainability and promoting the principle that policy actions should be driven by advances in the state of knowledge about climate change.

The treaty does not bind the United States or any other nation to stabilization of greenhouse gas emissions, nor does it require specific reductions of emissions to a certain level within a time period. The treaty does commit countries to the "aim" of returning emissions to "earlier levels" by the year 2000. In addition, the treaty

requires all developed countries to prepare National Action Plans showing how past and future actions will reduce the future growth of emissions. It also begins to address ways that developed countries can assist lesser developed nations, through technology and "know how," to develop an inventory of their greenhouse gases and a plan to reduce them. The flexibility in the treaty language recognizes that every country varies in economic, social and geophysical circumstances, and it allows for the design of a program that will sustain economies and forge new relationships while working toward the reduction of global greenhouse gas emissions. This flexible approach also recognizes that the scien-

tific community still has a great deal more to learn about man-made greenhouse gases and their impact on the worldwide climate.

For some countries, like the United States, the stakes in this issue are very high. U.S. industry, which invests over \$100 billion annually in environmental protection and has increased its energy efficiency by almost 40 percent in the past 20 years, could suffer both economically and, more importantly, competitively if a mandate is established to cap emissions at 1990 levels. Several economists have said that for the United States to stabilize emissions by the year 2000 would result in a 1.5 percent to 2 percent reduction in GNP and potential job losses of between 500,000 and 1 million because its economy relies on fossil fuels. At the same time, use of fossil fuels by developing countries is projected to increase dramatically through the year 2025 and beyond as more energy is



COUNTRIES THAT HAVE RATIFIED THE TREATY

Algeria	Czech Republic	India	Monaco	Saint Kitts and Nevis	Tuvalu
Antigua and Barbuda	Denmark	Japan	Namibia	Saint Lucia	Uganda
Armenia	Dominica (accession)	Jordan	Netherlands	Seychelles	United Kingdom
Australia	Ecuador	Maldives	New Zealand	Spain	USA
Barbados	EEC	Marshall Islands	Norway	Sri Lanka	Uzbekistan (accession)
Canada	Fiji	Mauritius	Papua New Guinea	Sudan	Vanuatu
China	Germany	Mexico	Peru	Sweden	Zambia
Cook Islands	Guinea	Micronesia	Portugal	Switzerland	Zimbabwe
Cuba	Iceland	Mongolia	Republic of Korea	Tunisia	

required to support their economic growth. The 1992 supplemental report of the Intergovernmental Panel on Climate Change indicated that 68 percent of total energy-related CO₂ emissions will come from non-OECD (Organization for Economic Cooperation and Development) countries by 2025. However, while the emissions of lesser developed countries will go up as a percentage of total emissions, emissions from the United States and other developed countries will continue to decline under the treaty as it is currently written, with the United States projected to contribute only 10 percent of the world's total emissions by 2050.

Developing countries will need to draw on the technology and investment capital of developed countries in order to sustain their economic growth and, at the same time, mitigate the increase in emissions that will come with this growth. Given the existing energy efficiency in the United States and the rest of the developed world, the marginal cost of reducing greenhouse gas emissions by increasing energy efficiency is far less in developing countries than in the developed world. For this reason the developing countries' role in the process is very important, and special consideration should be given to ways to help developing countries upgrade their environmental policies, industrial performance and resource management practices.

The Climate Convention contains a wide range of issues such as these that have yet to be resolved. These issues in many ways will begin to redefine long-standing relationships among countries as well as among countries and international institutions. The world's industries will be faced with new concepts and markets while confronted with all the implications of competing in a global economy. In a very short time frame, "groundrules" will be developed on such issues as joint implementation, the role of new "subsidiary bodies" to help administer the treaty, financial aid to lesser developed countries, relationships with major worldwide scientific bodies such as the Intergovernmental Panel on Climate Change, and requirements for establishing emissions inventories and reduction measures. Discussions on these issues will continue in Geneva this month at the

SCIENCE UPDATE

NEW ICE CORE CHANGES OUTLOOK ON HISTORICAL CLIMATE

New research casts doubt on the much publicized analysis of a core extracted from the Greenland ice sheet, which suggested that future global warming might lead to disruptive spells of cold in countries bordering the northern Atlantic Ocean.

The original July report by the Greenland Ice Core Project (GRIP) team was based on an ice core dating from the warm period that preceded the last ice age from 115,000 to 135,000 years ago, when the global average temperature was about 4 degrees higher than today. The core seemed to reveal several repeated and abrupt coolings, with average temperatures plunging as much as 25 degrees Fahrenheit within one or two decades. The finding caused alarm because no one could explain the huge temperature shifts.

However, a more recent study by Dr. Richard Fairbanks and a team of researchers from Columbia and the University of California at San Diego has explained these apparent drops and found that the Earth's climate is remarkably stable. "It would be an overstatement to say the temperature oscillations were only half as much as they [the GRIP team] concluded, but I think it's on that

order," Fairbanks said. "We find that in the last 9,000 years the climate has been remarkably stable."

The original study assumed that all climatic evidence buried in Greenland's ice reflected the country's ancient air temperature, yet Fairbanks has evidence that the ice samples are not an untainted climatic record but a reflection of temperatures from around the world.

According to Fairbanks, the ice samples indicate where the snow that fell on Greenland centuries ago originated. The ice samples contain different isotopes of oxygen. The ratio of the heavier isotope to the lower one reveals the temperature at the time the ice was formed: the heavier the oxygen, the warmer the temperature.

However, Greenland is a major intersection where global air masses collide before dumping snow and sleet. Climatic shifts that sent rain from Hawaii to become snow in Greenland would shift the kind of oxygen isotopes discovered centuries later. In addition, moisture that traveled long distances would lose much of the heavy isotope, giving a false indication of colder temperatures, Fairbanks' team concluded. *Source: Associated Press, January 27, 1994.*

9th meeting of the Intergovernmental Negotiating Committee on Climate Change.

These continuing negotiations will offer a tremendous opportunity to put into place international relationships that will enhance the ability of countries such as the United States to provide environmental and energy technologies to developing countries through joint implementation. Joint implementation is generally defined as two or more countries working together on programs to attain the greatest greenhouse gas emission reduction at the lowest cost for both parties. U.S. industry, with a strong environmental track record and experience in transferring its technology

throughout the world, could contribute greatly to advancing this concept. As we begin to consider and evaluate this concept, it would appear that the path that will provide the greatest return is one that evaluates each project on its own merit, separate and apart from the cumulative emissions of any party to the Convention; one that focuses on "savings" or emissions reduced, avoided or sequestered by projects and not on net emissions; and one that provides technical and financial incentives for participation in the pilot program, including government assistance in obtaining acceptance by the host country government for the project and identifying sources of financial resources.

Solar Activity

Continued from page 1

30 countries gathered at the International Astronomical Union Colloquium 143 in Boulder, Colorado. The 146 presentations appeared to agree that solar variability and anthropogenic pollutants determine future climate. They also agreed that the sun's behavior must be better understood before adequate climate models can be developed. There was also a consensus that continued high-precision studies from space are crucial to understanding and projecting atmospheric and climatic changes that may be caused by the sun alone.

Cambridge University Press will publish the papers presented at the colloquium, and Kluwer Academic Publishers will include the poster papers in "Solar Physics."

For more information on the IAU colloquium or publications, contact Edgar Bering III at the University of Houston, 713/749-2848. ●

Rising Emissions

Continued from page 1

water or soil erosion." Moreover, Boffey continued, they believe that industrialized nations should "bear the brunt of cleaning up the mess" as far as carbon dioxide emissions are concerned.

To meet 75 percent of its energy needs, China burns coal, often using outdated technologies that are creating a large-scale pollution problem, according to Boffey, who experienced stinging, noxious fumes and a blinding haze in the cities he visited.

Boffey concludes that any global environmental program must include China: "...without forceful action, whatever progress is made elsewhere in curbing carbon emissions could be undercut by an enormous increase in emissions from China."

A significant part of the president's Climate Change Action Plan is the Utility Climate Challenge, which includes a program to give U.S. utility assistance to growing economies like China. Such assistance will enable these countries to build and modify power plants to the highest technology and efficiency standards, thereby lowering their greenhouse gas emissions. ●

PCSD

Continued from page 1

- "Economic and environmental policy-making must be equitable and must ensure that all segments of society share similar environmental benefits and burdens."

Made up of cabinet officers and business, labor, environmental and civil rights leaders, the PCSD was established last June to develop a U.S. sustainability strategy and highlight the nation's best projects integrating economic progress and environmental decisions. ●

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