

# MONTHLY POLICY REVIEW

Vol. 2, Issue 1, January 2002

Prepared by Mark Shafer, Oklahoma Climatological Survey

We have yet another look beginning with this issue of the OCS Monthly Policy Review. In order to be able to treat policy issues more in-depth, we have chosen to have a feature “focus area” only once per quarter. We will continue to issue monthly reviews, but the “off-months” will be limited to summaries of news articles of a timely nature. An example of a focus area is the energy summary in the December issue (Volume 1, Issue 2).

The quarterly focus will appear in the third month of each quarter (i.e., March, June, September, and December). The topic will be selected based on recommendations from OCS staff and others. All input received one month prior to publication date will be considered (i.e., February 1, May 1, August 1, and November 1). Suggested topics may be submitted to Mark Shafer ([mshafer@ou.edu](mailto:mshafer@ou.edu)) at any time.

Remember -- the purpose of these reviews is to stimulate ideas about new opportunities in which OCS may become engaged. This may include research projects, grants, new products, administrative savings, or external collaboration (i.e., panels, conferences and meetings, state agency activities, etc.), to name a few such opportunities. Rewards may be tangible, such as grants, but need not be, such as promoting OCS involvement in state activities. The articles are designed to present a summary of activities in the public arena that influence the meteorological and climate communities.

The bottom line is that this publication should be relevant to a wide range of OCS staff and should address issues of importance to you. Your feedback is essential to this goal. If you come across interesting news articles that you think might be relevant to this publication, please send them to me (an e-mail, link, or newspaper clipping is fine). Although I keep tabs on a number of news sites, I do not always catch everything of importance.

Sincerely,  
Mark Shafer  
Staff Climatologist / Policy Analyst

### **POLICY-RELEVANT NEWS**

- **TASK FORCE REPORT SPARKS STATE DEBATE**  
By Tom Lindley, The Oklahoman, 2002-01-04
- **NASA BUDGET FIASCO REACHES NEW DEPTHS**  
By Jeff Hecht, NewScientist.com, 21 December 01
- **PEW OCEAN COMMISSION TO FOCUS ON AGRICULTURAL RUNOFF**  
From [OceanSp@ce](mailto:OceanSp@ce), December 4, 2001
- **U.S. ARMY CORPS OF ENGINEERS OPENS WETLANDS LETTER FOR COMMENT**  
From [OceanSp@ce](mailto:OceanSp@ce), December 27, 2001

### **AGENCY PROGRAMS / INITIATIVES**

- **NOAA ANNOUNCES NEW "ENVIRONOMICS" PROGRAM THAT LINKS WEATHER, CLIMATE TO ECONOMY**  
From NOAA News, October 24, 2001
- **EPA GREEN POWER PARTNERSHIP**  
From U.S. Department of Energy Green Power Network

### **OTHER NEWS**

- **2001 IN REVIEW MARKS WARMER TEMPERATURES, ACTIVE HURRICANE SEASON**  
From NOAA News, December 17, 2001
- **BRITISH RESEARCHERS SEEKING CLIMATE CLUES IN ANTARCTICA**  
From [OceanSp@ce](mailto:OceanSp@ce), December 27, 2001
- **MODIS INSTRUMENT ON NASA'S TERRA SATELLITE IMPROVES GLOBAL VEGETATION MAPPING, MAKES NEW OBSERVATIONS POSSIBLE**  
NASA GSFC, December 20, 2001 - RELEASE NO: 01-126
- **COTTON DOESN'T SHRINK FROM CLIMATE CHANGE**  
NASA GSFC, December 10, 2001 - Release No. 01-118
- **EARTH STRETCHED BY SEASONAL WATER MOVEMENT**  
By Jeff Hecht, NewScientist.com, 28 December 01
- **NOAA INVESTIGATES GIANT DEEP-SEA 'MYSTERY SQUID'**  
From NOAA News, December 20, 2001

## **TASK FORCE REPORT SPARKS STATE DEBATE**

By Tom Lindley, The Oklahoman, 2002-01-04

By the time a legislative task force took its first major step Thursday toward deregulating electricity in Oklahoma, the atmosphere was as charged as the subject matter.

It was a contentious day for the nine members of the Electric Restructuring Advisory Committee, who voted 6-to-3 at the state Capitol to adopt an interim report focusing on electric transmission issues.

Task force member and Corporation Commission Chairman Denise Bode accused some task force members of playing "hide the ball" by excluding from the written report a study that predicts consumers could pay 5 percent to 25 percent more under deregulation.

Sen. Kevin Easley, who heads the task force appointed last year by the Legislature, said Bode was playing politics.

Easley, D-Broken Arrow, also said he didn't have confidence in the study authorized by the Corporation Commission.

After a debate involving Bode on one side and Easley and Attorney General Drew Edmondson on the other, the committee approved the 57-page interim report - three days after its legislatively imposed deadline.

Both Bode, a Republican, and Edmondson, a Democrat, have announced they are candidates for the attorney general's post in this year's election.

Bode wanted to include language in the written interim report that was based on a \$150,000 Oak Ridge National Laboratory study analyzing the state's power market.

The task force voted down Bode's motion, 5-to-4, arguing the study didn't directly relate to the scope of the task force's mission.

A majority of members also were satisfied the Oak Ridge study would be available to policy-makers and the public on the task force's Web site.

"Making it available on the Internet is making it available to only the very elite," she said.

Easley said he believed Bode's actions were for political purposes, not for information for policy-makers or the public.

"We are working very hard to get a consensus on this report," he said. "We've got 120 changes from the attorney general and the Corporation Commission, and now one is controversial ... on a report (the Oak Ridge study) that I believe is fatally flawed."

The Oak Ridge study predicted that to avoid losing money new power plants would have to raise prices without losing market share.

As a result, the "average prices to consumers could be 5 percent to 25 percent higher than regulated rates," the study said.

It also predicted if all the proposed 20-plus plants were built, the excess capacity would not be sustainable in a restructured market and would create the potential for highly volatile prices.

Bode said it was important to include information from the study in the written interim report because Oklahoma could end up having a system without knowing the full impact of new generation facilities and the cost of those facilities to rate payers.

"It's the only portion of the analysis that outlines the impact," she said. "I don't understand why you're trying to hide the ball on this."

Saying he was offended by her comments, Easley said he has been holding public hearings on electric deregulation since 1995.

"We've been very public about this issue," he said.

He also questioned the accuracy of the Oak Ridge study.

"I personally have problems with the study," he said. "I think it is fatally flawed."

He said the model used by the laboratory had not been previously used on electricity issues.

Edmondson said the Oak Ridge study went beyond the scope of the task force's mission.

"We were charged with producing an interim report on transmission," he said. "It may be appropriate to include the Oak Ridge study in the final report, not on an interim report."

Because task force members were focused on Oklahoma's electric transmission system, Edmondson said, "nobody was paying any attention to it (the Oak Ridge study) other than as far as what it addressed as to transmission."

The task force, which has been meeting since August, is scheduled to make a final report to the Legislature in December.

Based on the impact of deregulation on California consumers last year, the Legislature postponed until 2003 the debate on how the retailing of electricity will be carried out.

Bode said the Corporation Commission, which funded the Oak Ridge study, was being excluded from the deregulation process.

"We made a good faith effort to provide information just like everyone else has been providing," she said. "And we are the constitutional body that is asked to look out for, not only the utilities, but the consumers."

Bode was joined by task force members Rep. Larry Rice, D-Pryor, and Rep. John Wright, R-Broken Arrow, in opposing the interim report.

Secretary of State Mike Hunter, who represented the governor's office, Jerry Johnson of the Oklahoma Tax Commission, state schools Superintendent Sandy Garrett, and Sen. Jerry Smith, R-Tulsa, joined Easley and Edmondson in supporting the report.

The report concluded that transmission facilities in Oklahoma will likely require expansion and upgrades, but the uncertainty of the future of electric transmission expansion, operation and regulation makes it difficult to pinpoint solutions.

It also stressed the importance of determining who will manage and control the planning, upgrading and operating of transmissions systems in Oklahoma.

To help make the right decision, state officials must participate in proceedings at federal and regional levels and study the possible impact of changes to the transmission system, the report said.

Task force members also raised concerns about the importance of maintaining low prices and benefits for all customers.

Related Information:

Task Force Interim Report: <http://www.restructureok.net/nss-folder/interimreportfinaldraft/>

## **NASA BUDGET FIASCO REACHES NEW DEPTHS**

Jeff Hecht, NewScientist.com, 21 December 01

<http://www.newscientist.com/news/>

NASA's budgetary fiasco has reached the stage where researchers are squabbling over amounts that are "not even peanuts, but the salt on one peanut" compared to the multi-billion dollar overruns on the International Space Station.

The flash point was a NASA decision to stop spending \$550,000 a year to run a deep-space radar system at the 305-metre Arecibo radio telescope in Puerto Rico. That radar discovered ice at the poles of Mercury and revealed the first double asteroid, but its funding comes from NASA's program to survey potentially hazardous objects approaching the Earth.

Earlier in December, NASA quietly said it would stop radar funding from 1 January 2002, but on Thursday the space agency backtracked, and said it would spend a total of \$400,000 during this fiscal year, which ends 30 September 2002.

The U-turn came a day after the NASA Advisory Council endorsed the recommendations of an independent task force to scale back the ISS program. The Advisory Council said the huge cost overruns "cannot be excused and must not be ignored".

### **Dangerous asteroids**

The \$400,000 now pledged to Arecibo is a tiny sum compared to the overall NASA budget of about \$14 billion. However, asteroid researchers consider it a crucial element in NASA's annual \$3.55 million program to hunt for dangerous asteroids.

"One single radar measurement can increase the precision of an orbit by a factor of 10 to 1000," helping scientists predict the paths of objects for centuries into the future, says Richard Binzel of the Massachusetts Institute of Technology. The funding required for proper asteroid hunting is "not even peanuts, but the salt on one peanut", he says.

Other observations include high-resolution studies of asteroids passing close to the Earth, and studies of the surface of Saturn's moon Titan, says Don Campbell, head of the Arecibo radar astronomy group. Both the Division of Planetary Sciences of the American Astronomical Society and the Planetary Society spoke out against the proposed cuts.

### **Error corrected**

In a teleconference, NASA chief scientist Ed Weiler said low-level NASA officials had decided to cut the radar operation budget in order to leave more money for research grants.

"An error was made, and the error was corrected at higher levels," he said. Early next year NASA will try to get the National Science Foundation to agree to pick up the Arecibo radar budget, says Colleen Hartman, director of solar system exploration at NASA's office of space science. NSF already provides \$9.5 million a year to operate the Arecibo facility.

The root problem is that gave NASA no extra money in 1998 when it asked the space agency to track down 90 percent of all potentially hazardous objects in the decade through to 2008. NASA officials had to fund the asteroid hunt by cutting other space science projects. Although NASA funds four major ground-based asteroid surveys, the asteroid budget remains tiny compared to the cost of even small space missions.

## **PEW OCEAN COMMISSION TO FOCUS ON AGRICULTURAL RUNOFF**

<http://www.oceanspace.net/index.cfm?issue=138>

Des Moines, Iowa (USA) -- The first independent review of U.S. national ocean policies in more than 30 years will visit here next Monday, December 10, to study the effects of agricultural runoff on America's coastal waters. Members of the Pew Oceans Commission will hold a public hearing with local and national scientists, officials, farmers, conservationists, and the public at the Embassy Suites Hotel, 10 East Locust Street, Des Moines.

The Presidential Commission on Ocean Policy (the "Watkins Commission" after its chairman, Admiral James D. Watkins) has already met twice in Washington, D.C., and heads to Charleston, South Carolina, in January for a series of regional meetings around the United States.

The visit to land-locked Iowa may seem a slight departure for the Pew group, which has visited coastal cities in California, Hawaii, South Carolina, Alaska, Maine, Washington, Maryland, and New York. However, according to a spokesman, activities far from the shore also contribute to the decline in ocean health. For example, urban and agricultural runoff contributes to the loss of coastal habitats and worsening water quality. Most notably, scientists have linked nitrogen runoff from Midwest farms that drain into the Mississippi River to a "dead zone" in the Gulf of Mexico. By meeting with Iowans, commission members aim to better understand the nature of the problem and find potential solutions. The commission will travel to New Orleans in March 2002. "Poorly planned coastal development, polluted runoff from our cities and farms, and overfishing have taken their toll on the health of our oceans, which should concern all Americans whether we live along the coast or in the heartland," said Leon Panetta, former White House chief of staff and current chair of the Pew Oceans Commission. "As we develop our recommendations for Congress, the Bush administration, and the nation, it is important that we come to Iowa and learn firsthand about the delicate balance between our farms and our coastal waters. Improving the stewardship of our land and oceans is our common national bond." More at <http://www.pewoceans.org/>.

## **U.S. ARMY CORPS OF ENGINEERS OPENS WETLANDS LETTER FOR COMMENT**

<http://www.oceanspace.net/index.cfm?issue=140>

Washington, D.C. (USA) -- The U.S. Army Corps of Engineers is asking other U.S. federal agencies to comment on a recently issued regulatory guidance letter that sets standards for mitigating permitted impacts to the aquatic ecosystem. The comment period ends March 1, 2002. Mike Parker, assistant secretary of the army (civil works), who provides civilian oversight of the Corps, will oversee any revisions, according to a spokesman.

"We want to make a sincere effort to address the concerns that have been raised in order to ensure proper protections to the aquatic ecosystem," said Brig. Gen. Robert Griffin, the Corps' director of civil works. "A primary concern was that the Corps had backed off from the policy of 'no net loss' of wetlands. That was certainly not the guidance letter's intent, so we need to make sure the language is clear and direct." The guidance letter may serve as a reference document pending additional review.

The spokesman said the Corps had prepared the guidance letter in response to recommendations in a report from the U.S. National Research Council/National Academy of Sciences, which recommended ways to improve the Corps' mitigation procedures. Mitigation can offset adverse impacts by restoring former wetlands, enhancing existing ones, establishing new wetlands where none existed before, or preserving high-value wetlands threatened for development.

Regulatory Guidance Letter 01-1 and the National Research Council/National Academy of Sciences report are accessible online at [http://www.usace.army.mil/civilworks/hot\\_topics/rglmitigation.htm](http://www.usace.army.mil/civilworks/hot_topics/rglmitigation.htm). Access the regulatory program web site at <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/>.

## **NOAA ANNOUNCES NEW "ENVIRONOMICS" PROGRAM THAT LINKS WEATHER, CLIMATE TO ECONOMY**

Data Show Effect of Climate Conditions on Corn and Soybean Yield and Residential Energy Needs

<http://www.noaaneews.noaa.gov/stories/s795.htm>

*[Note: Gary McManus is investigating this topic for the Climate Information Group]*

October 24, 2001 — NOAA today unveiled two new indices that evaluate the effect of climate conditions on corn and soybean yield and on residential energy needs. The development of the indices is part of NOAA's "Environomics" program, an effort to better understand the impact of weather and climate on socioeconomic sectors of the nation. The indices were developed by NOAA's National Climatic Data Center in Asheville, N.C., which maintains the world's largest weather database.

Anecdotal statements about the weather are often used to explain variations in economic activity, and these statements are often based on perceptions about the weather that may or may not be valid. Through NOAA's Environomics program, relationships between the nation's climate and vital economic sectors of the nation are clearly defined using climate indices, which enhance the understanding of how year-to-year variations and trends in weather and climate affect associated sectors.

Thomas Karl, director of NOAA's National Climatic Data Center, said, "Climate indices developed through the Environomics program provide quantitative information regarding climate's influence while providing historical perspective on how weather and climate conditions affecting our economy and society today compare with conditions of the past."

The period of high energy demand and prices of the late 1970s coincided with extremely cold winters that contributed to higher residential energy usage. The Residential Energy Demand Temperature Index (REDTI), which provides information related to climate sensitive residential energy demand, reflects this increased demand through historically high index values and can be used in part to explain the cause of the historically high energy demand of that time. By providing continuing updates to the index, a clearer understanding of future fluctuations in energy demand will be possible.

The REDTI tracks both unusually hot and unusually cold conditions. It varies from year to year due to variability and trends in temperature, and it responds most strongly to temperature conditions in heavily populated regions. REDTI values range from 0 to 100. Values greater than 90 indicate a much above average temperature-related energy demand and values less than 10 reflect much below average conditions.

The REDTI for the 2001 April-September season was 34, indicative of slightly below average residential energy demand for cooling and heating. Based on the 107 year record, the population-weighted REDTI value of 34 ranks as the 19th lowest value.

The nation's warm season (April-September) 2001 ranked as the fourth warmest such period since 1895, the first year of complete climate records. The preliminary national average temperature was 67.4 F (19.7 C), which was 1.6 F (0.9 C) above the long-term mean. Although the area-weighted national temperature gave the season a rank of fourth warmest on record, the persistence of average to cooler than average temperatures in some of the most heavily populated regions of the U.S. contributed to a REDTI that was below average. Energy usage statistics for 2001 will be available from the Department of Energy's Energy Information Administration in 2002.

While the REDTI provides information on the impacts of temperature on energy demand, the Moisture Stress Index (MSI), was developed to quantify the effect of soil moisture conditions on crop yield. It provides historical perspective on conditions such as moisture stress, that are closely associated with corn and soybean yields and is a source of information for explaining the cause of lower national yields.

The MSI ranges from zero to 100 and specifically measures the proportion of the nation's corn or soybeans affected by severe to catastrophic drought or catastrophic wetness. Values near zero indicate that few productive corn or soybean growing areas were affected by severe drought or catastrophic wetness. This index reflects conditions during July and August and is weighted by the mean (1991-2000) annual crop productivity within 344 climate

divisions in the contiguous U.S. Although a number of factors affect the success of a single crop growing season, drought or excessive wetness during critical phases of crop growth have a significant impact on the nation's corn and soybean yield.

Although warmer than average temperatures coincided with drought in some parts of the country during the warm season months of 2001, conditions in the heart of the major corn and soybean crop growing regions were generally normal to wetter than normal. The corn MSI for the 2001 crop growing season was eight, and the soybeans MSI was seven. This means that severe to catastrophic drought or catastrophic wetness affected only 8 percent and 7 percent of the nation's corn and soybeans, respectively. Both index values were below average and reflect favorable soil moisture throughout a large part of the crop growing regions during July and August (the reproductive season).

The MSI for corn exceeded 40 during the drought-plagued growing seasons of 1983 and 1988 and 30 during the catastrophically wet summer of 1993, years in which corn yields were less than 75 percent of the 2000 yield. The 2001 growing season (May-September) followed several years in which national corn and soybean yields were generally high, according to the U.S. Department of Agriculture. The low values of this year's corn and soybean MSI indicate that conditions associated with this index were again favorable for good corn and soybean yields. National crop yields for 2001 will be available from the United States Department of Agriculture following the harvest season.

NOAA is dedicated to enhancing economic security and national safety through the prediction and research of weather and climate-related events and providing environmental stewardship of our nation's coastal and marine resources.

#### Relevant Web Sites

More Information about the Calculation of NOAA's Environomics Indices and the Most Recent Values

<http://lwf.ncdc.noaa.gov/oa/climate/research/climanomics/climanomics.html>

Media Contact:

Patricia Viets, NOAA, (301) 457-5005



## **EPA GREEN POWER PARTNERSHIP**

<http://www.epa.gov/greenpower/>

EPA's Green Power Partnership is a new voluntary program designed to reduce the environmental impact of electricity generation by promoting renewable energy. The Partnership will demonstrate the advantages of choosing renewable energy, provide objective and current information about the green power market, and reduce the transaction costs of acquiring green power.

Commercial, nonprofit, and public organizations can become Partners by committing to procure an amount of renewable energy that is proportional to their annual electricity use. In return, EPA will provide a network of providers and Partners, technical information, and public recognition.

EPA recognizes organizations that switch to green power as environmental leaders who are establishing the choice for renewable energy as the next step in sustainable business practice. To learn about innovative organizations that are using green power now, see information about our Founding Partners.

Green Power Partnership  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave, NW (Mail Code 6202J)  
Washington, DC 20460

## **2001 IN REVIEW MARKS WARMER TEMPERATURES, ACTIVE HURRICANE SEASON**

<http://www.noaanews.noaa.gov/stories/s842.htm>

December 17, 2001 — Working from the world's largest statistical weather database, NOAA scientists noted that 2001 is projected to be the second warmest on record for the globe. The scientists also report 2001 saw the fifth most active Atlantic hurricane season, drought in parts of U.S. and record cold in Siberia and western Asia.

### **Global Temperatures**

Based on data received through the year and depending on conditions throughout the remaining two weeks of December, the average annual global temperature is projected to be 57.8 F (14.4 C), which is 0.9 F (0.5 C) above the 1880-2000 long-term average, which would make 2001 the second warmest year on record. The warmest year on record, 1998, occurred during a strong El Niño event and was 1.2 F (0.7 C) above the long-term average. Other years in the top five warmest are 1997, 1995 and 1990. During the past century, global surface temperatures have increased at a rate near 1.1 F/Century (0.6 C/Century), but this trend increased to a rate approaching 3.0 F/Century (1.7 C/Century) during the past 25 years.

### **U.S. Temperatures**

Annual temperatures for the contiguous U.S. are expected to be near 54.0 F (12.2 C), which is above the long-term (1895-2000) average of 52.8 F (11.6 C). Warmer than average temperatures dominated much of the western half of the U.S. throughout most of 2001, while the Southeast experienced cooler than normal conditions during the summer months. Nevada had its record warmest May, August, September and fall season (September-November) in 2001. New Mexico also had its warmest fall on record. Nationally, 2001 had the second warmest November on record; 1999 was the warmest. Alaska experienced its warmest winter (Dec '00-Feb '01) on record with more than a 12.0 F (6.7 C) departure from the long-term (1918-2000) average. U.S. temperatures have risen at a rate of 0.9 F/Century (0.5 C) over the past 100 years. Within the past 25 years, U.S. temperatures increased at a rate of 1.6 F/25 years (0.9 C/25 years).

### **Active Hurricane Season**

Although the Atlantic hurricane season had a late start, there were 15 named tropical storms in 2001, nine of which became hurricanes with four reaching major hurricane strength. This was the fifth most active season since 1871. On average, between nine and ten named storms form with six growing to hurricane strength and two developing into major hurricanes. A tendency for greater hurricane activity has occurred over the past seven years after more than two decades of generally below-average activity.

Scientists at NOAA's Hurricane Research Division, part of the Atlantic Oceanographic and Meteorological Laboratory in Miami, believe this may be due to a natural ocean cycle called the Atlantic Multidecadal Mode, a North Atlantic and Caribbean sea surface temperature shift between warm and cool phases that lasts 25 to 40 years each. The scientists conducted research that shows warmer sea surface temperatures in the North Atlantic combined with a decrease in vertical wind shear contributed to conditions for more hurricanes over a several-year period.

Five or more major hurricanes (winds in excess of 111 mph) occurred in 1995, 1996 and 1999. Prior to 1995, five or more major Atlantic hurricanes had not occurred in one season since 1964. A new record number of hurricanes for November was set in 2001 as Michelle, Noel and Olga all were active in the Atlantic Basin during the month. The contiguous U.S. has not been hit directly by a hurricane now for the past two years, although tropical storms have caused significant damage, as evidenced by Tropical Storm Allison. This storm, the costliest tropical storm on record (\$5 billion in damage), caused severe flooding in Texas and Louisiana before moving across the Southeast and up the East Coast.

Even though the Atlantic hurricane season was above average for the fourth consecutive year, it appears that there were fewer tornadoes in 2001 than average. Eight very strong to violent tornadoes (winds in excess of 158 mph) occurred between March and August 2001. This was much less than the 1950-2000 average of 38. Throughout the past 50 years, there has been little observed trend in very strong to violent tornado activity.

### **U.S. Drought, Floods and Wildfires**

Drought conditions, brought on by an atmospheric circulation pattern during the winter 2000-2001 that deflected storm systems away from the West and inhibited the flow of Gulf moisture from the Eastern states, plagued much of the western, East Coast and New England states in 2001. April 2001 was the driest such month on record for both New York and Maine and during Autumn, drought conditions intensified along the Eastern seaboard due to the lack of Gulf moisture and Tropical activity. Maine will likely have its driest year in the 1895-2001 record. Year-to-date precipitation for Maine is 3.62 inches below the driest annual value of 30.98 inches set back in 1965.

The Great Lakes and Northern Great Plains states experienced wetter than normal conditions. Precipitation across the Great Lakes and northern Great Plains states was abundant with flooding along the Mississippi River in April, while Tropical Storms Allison and Barry caused significant flooding along the Gulf Coast states, ending drought conditions in this region.

The wildfire season in the U.S. began later than usual, but escalated rapidly. The level of activity for the season was similar to the 10-year average (1990-1999), although Florida, Nevada, Washington and Oregon had more active seasons than is typical. Dry conditions contributed to the increased wildfire activity in these states. This near-average season follows the worst fire season in more than 50 years last year in the southern and western regions of the country. Almost 3.5 million acres have burned during the 2001 season.

### **Global Satellite Data**

Data collected by NOAA's TIROS-N polar-orbiting satellites and analyzed by the National Aeronautics and Space Administration and the Global Hydrology and Climate Center at the University of Alabama in Huntsville indicate that temperatures in the lower half of the atmosphere (lowest 8 km) were near average over the globe. Based on eleven months of data, satellite measurements of the globe indicate that 2001 ranks as the 10th warmest since records began in 1979. The global satellite temperature record continues to show significantly less warming than global surface temperatures as recently reported in the Intergovernmental Panel Report on Climate Change (2001).

### **Additional Global Data**

Cooler than normal ocean temperatures throughout the eastern equatorial Pacific became more temperate through 2001 as the La Niña of recent years faded to neutral conditions early in the year. Temperatures in the Northern Hemisphere continued to average near record levels.

Drought conditions continued across portions of Pakistan, Afghanistan, India and Iran as the region has suffered from an extreme lack of precipitation for more than three years. In Afghanistan, the drought is perhaps the worst in 30 years. Much of Siberia and western Asia experienced their harshest winter in decades. Temperatures ranged from -60 F (-51 C) to as low as -94 F (-70 C) during January and February. Heavy snows in South Korea were the worst in 20 years.

Climate data describing these and other events are available online.

NOAA is dedicated to enhancing economic security and national safety through the prediction and research of weather and climate-related events and providing environmental stewardship of our nation's coastal and marine resources.

### **Relevant Web Sites**

Climate of 2001 — Annual Review Preliminary Report

<http://lwf.ncdc.noaa.gov/oa/climate/research/2001/preann2001/preann2001.html>

NOAA's National Climatic Data Center

<http://lwf.ncdc.noaa.gov/oa/ncdc.html>

2001 Atlantic Hurricane Season Continues Trend for Heightened Storm Activity

<http://www.noaaneews.noaa.gov/stories/s826.htm>

Media Contact:

Patricia Viets, NOAA, (301) 457-5005

## **BRITISH RESEARCHERS SEEKING CLIMATE CLUES IN ANTARCTICA**

<http://www.oceanspace.net/index.cfm?issue=140>

Drake Passage, Antarctica – A BBC science correspondent reports from here that if humans really are interfering with the earth's climate and pushing up world temperatures, some of the best evidence could come from Antarctica. Researchers aboard the research vessel James Clark Ross say the Antarctic Ocean has the world's largest ocean current, carrying water clockwise around the continent and interacting with the Atlantic, the Pacific, and the Indian oceans. Mike Meredith of the British Antarctic Survey explained: "The waters that form around the antarctic spread out and move northwards into the Atlantic, reaching the latitudes of the U.K., so any changes in temperature for example will have a long-term effect on global climate.

The team is using a CTD (conductivity, temperature, depth probe) instrument to monitor the current. The instrument will descend more than 2 miles down, almost to the seabed. The whole process is repeated 30 times over the course of five days. Every year, the scientists come back and repeat the exercise in exactly the same locations.

Brian King, of the U.K.'s Southampton Oceanography Centre, says long-term ocean records are essential if we are to understand the effects any global warming might have on the planet. "Meteorological records go back hundreds of years, but ocean records go back only a couple of decades," he told the BBC. "The work we're doing now will be collecting data that in future will be used to understand and perhaps even predict climate change far better than we can now."

## **MODIS INSTRUMENT ON NASA'S TERRA SATELLITE IMPROVES GLOBAL VEGETATION MAPPING, MAKES NEW OBSERVATIONS POSSIBLE**

NASA GSFC, December 20, 2001 - RELEASE NO: 01-126

<http://www.gsfc.nasa.gov/news-release/releases/2001/01-126.htm>

Unique observations of Earth's vegetation are coming down from the Moderate-resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite. Scientists from the University of Arizona and Boston University are using these observations to refine estimates of the distribution and variability of Earth's vegetation as well as to produce some of the first-ever global maps of vital signs such as the leaf area of plants and trees and the amount of sunlight they absorb.

Alfredo Huete and his colleagues at the University of Arizona are using the new observations to produce the most commonly used satellite-based indicator of vegetation density-the Normalized Difference Vegetation Index (NDVI)-as well as an enhanced version that makes use of new electromagnetic information collected daily by MODIS. These maps display Earth's vegetation on a scale from 0 to nearly 1, with higher values indicating more dense vegetation. Most of the Sahara Desert earns a zero; rain forests hit the top of the scale. New global maps are produced daily and then are combined into a single map bi-weekly and monthly.

Traditional satellite-based mapping of vegetation vigor and amount is based on the way vegetation interacts with red and infrared light. Occasionally, however, those two signals are not enough. MODIS measures light reflected from Earth at a variety of wavelengths, and the Arizona researchers incorporate the additional information into their Enhanced Vegetation Index (EVI).

Says Huete, "We are currently conducting detailed monitoring of both rainforests and semi-arid regions, two areas where we expect the EVI to make its most significant contributions in assessment of climate- and human-induced changes in vegetation." The EVI has increased sensitivity within very dense vegetation, and it has built-in corrections for several factors that can interfere with the satellite-based vegetation mapping, like smoke and background noise caused by light reflecting off soil.

The bi-weekly and monthly vegetation index maps have wide usability by biologists, natural resources managers, and climate modelers. They can track naturally occurring fluctuations in vegetation, such as seasonal changes, as well as those that result from land use change, such as deforestation. The EVI can also monitor changes in vegetation resulting from climate change, such as expansion of deserts or extension of growing seasons.

MODIS' observations also allow scientists to track two "vital signs" of Earth's vegetation. At Boston University, a team of researchers is using MODIS data to create global estimates of the green leaf area of Earth's vegetation and how much sunlight the leaves are absorbing. Called LAI, for "Leaf Area Index," and FPAR, for "Fraction of absorbed Photosynthetically Active Radiation," both pieces of information are necessary for understanding how sunlight interacts with the Earth's vegetated surfaces-from the top layer, called the canopy, through the understory vegetation, and down to the ground.

Scientist Yuri Knyazikhin is part of the Boston team using the observations to create these first-ever global LAI and FPAR maps. Daily observations are combined at weekly intervals into a single map that shows leaf area and absorbed sunlight for every square kilometer of the Earth's land surface during the time period.

"The interaction of sunlight with a forest canopy or other vegetation has a large influence on climate. Knowing how much light is absorbed and distributed among the canopy, the understory, and the ground makes us better able to model and predict the energy exchange between the earth and atmosphere," says Knyazikhin. That flow of energy is what drives our climate. Year to year changes in LAI and FPAR could be a signal of longer-term climate change.

To make the LAI/FPAR maps, Knyazikhin and his team have a computer simulate what different types and amounts of vegetation would look like from space. The computer then compares the images collected by MODIS to the simulated images until it finds just the right match. Next it calculates the corresponding leaf area and absorbed radiation. In addition to their important scientific contributions, the maps have real-world uses, like assessing the grazing potential of rangelands, or identifying areas at risk for wildfires.

The Terra MODIS observations began in February 2000 and are expected to continue through at least 2004. Another MODIS is planned for launch aboard NASA's upcoming Aqua mission. In addition to its observations of vegetation, MODIS collects information on atmospheric and oceanic conditions, such as cloud cover and ocean temperature. The EVI, LAI, and FPAR observations are available free of charge from the Earth Resources Observation Systems Data Center in Sioux Falls, S.D.

Launched December 18, 1999, NASA's Terra satellite is the flagship of the Earth Observing System series of satellites, part of NASA's Earth Science Enterprise, a long-term research program dedicated to understanding how human-induced and natural changes affect our global environment.

For pictures, animations and additional information, go to:  
[http://earthobservatory.nasa.gov/Newsroom/EVI\\_LAI\\_FPAR](http://earthobservatory.nasa.gov/Newsroom/EVI_LAI_FPAR)

## **COTTON DOESN'T SHRINK FROM CLIMATE CHANGE**

NASA GSFC, December 10, 2001 - Release No. 01-118

<http://www.gsfc.nasa.gov/news-release/releases/2001/01-118.htm>

A new NASA-funded study finds that cotton yields are likely to increase in the Southeastern United States if carbon dioxide levels continue to rise as projected this century, and if farmers can adapt their agricultural practices to the resulting climate change.

Researchers from the National Center for Atmospheric Research (NCAR) entered various scenarios into their computer models to simulate the effects of elevated carbon dioxide (CO<sub>2</sub>) in the atmosphere on cotton crop yields. If carbon dioxide emissions increase at their present rate, many scientists believe that the atmospheric concentrations of greenhouse gases are likely to double compared to pre-industrial levels by the year 2060.

Along with climate change, atmospheric CO<sub>2</sub> enhances plant growth by stimulating photosynthesis. In one scenario, adaptations to farming practices resulting from a lengthened growing season, elevated CO<sub>2</sub>-induced climate change and enhanced plant growth, were all factored into model simulations. The results predicted that cotton yields would increase by as much as 26-36 percent.

"Cotton is a very important economic crop for U.S. agriculture, and the impacts of climate change on cotton production have not been examined on a regional scale before," said Linda Mearns, a co-author of the study and a researcher at NCAR's Environmental and Societal Impacts Group.

Ruth Doherty, also a co-author and researcher at NCAR's Environmental and Societal Impacts Group, added that these cotton model projections are the first of their kind, and the climate scenarios used are simplistic. For example, the climate models project climate change based on an instantaneous doubling of CO<sub>2</sub>, when in reality such increases would occur gradually over this century, possibly changing the outcomes. Still, in most of the scenarios there was a trend towards increased cotton yields in the future.

Two climate models were used in the study - a large-scale global climate model that used 300 by 300 kilometer (approx. 186 by 186 mile) grids, and a fine-scale regional climate model that used 50 by 50 kilometer (approx. 31 by 31 mile) grids. A climate model is a simplified mathematical representation of the Earth's climate system, including data on the physical, geophysical, chemical and biological processes that govern the climate system. Fine-scale models with higher resolution may be more accurate, but in order to gain information about the future regional climate, results from the global model must be used to initialize and control the regional model.

Using these two models, three scenarios were simulated. The first scenario simply looked at the impact that the climate change resulting from an instantaneous doubling of CO<sub>2</sub> would have on cotton yields in the Southeastern U.S.-including North Florida, Georgia, North Carolina, South Carolina, Alabama, Mississippi, Louisiana, Arkansas, and part of Tennessee. For this scenario the fine scale model predicted a decrease of 10 percent in cotton yield over the region, while the large-scale model showed a 4 percent increase in yields.

When the climate change resulting from CO<sub>2</sub> doubling was combined with the potential for enhanced cotton plant growth as a result of greater carbon availability, the fine scale model showed a 5 percent increase in yields, while the large scale model predicted a 16 percent increase.

Finally, when the first two factors of CO<sub>2</sub> doubling and enhanced growth were combined with farming adaptations like planting crops earlier to take advantage of a longer growing season, the fine scale model predicted a 26 percent increase, and the large scale model predicted a 36 percent increase.

The research is part of a larger project that examines the impact of different spatial scales of climate change scenarios on yields of corn, wheat, sorghum, soybean and cotton in the Southeastern U.S. The study was also partly funded by the Environmental Protection Agency.

The findings will be presented on December 10, at a poster session of the American Geophysical Union (AGU) Fall Meeting in San Francisco, Calif. A paper will be published next year in a special issue of the journal *Climate Change*.

## **EARTH STRETCHED BY SEASONAL WATER MOVEMENT**

Jeff Hecht, NewScientist.com, 28 December 01

<http://www.newscientist.com/news/>

The seasonal movement of water between north and south polar regions regularly stretches and compresses the Earth, say US researchers.

Geophysicists analysing data from the Global Positioning System were initially puzzled when a small annual Earth movement remained after they accounted for known phenomena such as tides and plate tectonics.

A careful investigation showed the effect was "hidden in the theory" describing the behavior of an elastic body like the Earth, says Geoffrey Blewett of the University of Nevada in Reno.

Each winter, snow and soil moisture accumulates in cold polar regions and the atmosphere becomes denser. The elastic body theory predicts that this extra weight should slightly compress the hemisphere experiencing winter. In the north, the maximum compression should occur in February or March, when the most water has accumulated.

The polar region should then dry out during spring and summer, while moisture settles out at the opposite pole. The result is an annual oscillation of Earth's shape. And this is exactly the pattern shown in the GPS data.

### **Hemispheric shift**

Sites near the north pole sank up to three millimeters in February and March, while regions near the equator moved about 1.5 millimeters north. Then the cycle reversed, with moisture accumulating near the south pole causing it to sink about three millimeters during the southern hemisphere's winter in August and September.

"The northern hemisphere and the southern hemisphere compress," Blewett told New Scientist. The water that "pushes down" the poles oscillates between the hemispheres.

Once they understood the oscillation pattern, the geophysicists were able to estimate that a load of about 1016 kilograms shifts between the hemispheres each year.

Journal reference: Science (vol 294, p 2342)



## **NOAA INVESTIGATES GIANT DEEP-SEA 'MYSTERY SQUID'**

<http://www.noaanews.noaa.gov/stories/s845.htm>

December 20, 2001 — Many scientific discoveries begin with scientists asking, "Hey, did you see that?" This was certainly true when a group of researchers led by NOAA spotted a 21-foot-long squid, dubbed the "Mystery Squid," while conducting an undersea project.

So named by the researchers until its true classification and naming is complete, the Mystery Squid is featured in an article in the Dec. 21 issue of the journal *Science*. Its taxonomy is under way by scientist Michael Vecchione of NOAA's National Marine Fisheries Services Systematics Laboratory at the National Museum of Natural History in Washington, D.C.

The NOAA sighting of the Mystery Squid is the most recent of a string of eight sightings worldwide as described in *Science*, and took place during a National Undersea Research Program mission in the Gulf of Mexico last year. While investigating gas hydrates at a depth of approximately 6,300 feet below the surface, a Mystery Squid drifted close to the submersible *Alvin*.

"The scientists in the submersible got a good close-up look and saw tiny suckers along some of the arms," said Vecchione, a co-author of the *Science* article. "While the squid at first did not seem to mind the presence of the submersible, it did move away after a few minutes, but not before the scientists were able to get some good images on video.

Vecchione, whose specialty is cephalopods—squids, octopods, and their relatives—knew of sightings of strange, unknown squids from around the world. He arranged for scientists from eight institutions in four countries to pool their observations and document the worldwide occurrence of these unusual animals. Of the eight squid sightings noted in *Science*, the earliest is September 1988 off of northern Brazil. The Mystery Squid has also been seen west of Africa, in the Indian Ocean, and in Hawaii, at depths ranging from 6,300 to 15,390 feet.

"These squids are not just a new species, they are very different from any squid ever seen before. None of the squids had been collected, but they have the same characteristics—extremely long, slender arms and tentacles that have 'elbows,' and very large fins extending beyond the end of the body. One of the squids was estimated to be about 21 feet long and another was 13 to 16 feet long."

Vecchione noted that scientists cannot be certain of the identity of these squids until specimens are captured. "They are very similar to the family Magnapinnidae, which has unusual slender tentacles and arms and very large terminal fins," Vecchione said in concurrence with the nine other co-authors of the article.

He suggested that the Mystery Squid could be the never-before-seen adult of the squid family Vecchione and another of the co-authors recently described and classified from two juveniles and a larval-like specimen.

"The open waters of the very deep ocean, at depths greater than about 3,000 feet, make up by far the largest but the least known ecosystem of the earth. From the number of sightings, it seems that these are fairly common large animals in very deep water. That they have not been previously observed or captured, indicates how little is known about life in the deep ocean," Vecchione said.

NOAA created an Office of Ocean Exploration this year to share ocean discoveries with the public and use new technologies to explore the ocean. One focus of Ocean Exploration is to facilitate the sharing of what is known and what is being discovered about the oceans.

"The discovery of the Mystery Squid is one of the first fruits of the expanded outreach through the Office of Ocean Exploration," said Barbara Moore, NURP director. "While Dr. Vecchione had no direct connection to the expedition, he was able to see the images that were sent back almost immediately and incorporate them in his work instead of waiting possibly years for them to be published."

NOAA's Office of Ocean Exploration was organized by presidential mandate to meet the challenges faced by the scientific community in exploring the last frontier on Earth, and provide a means of sharing information.