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NMAS Newsletter

# Water: Always in the News in New Mexico

Vol 99 No. 2 Summer 2013

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NMAS is now on Facebook! Visit NMAS and  
**like** us at our new page!



To find it, either search within Facebook for  
NMAS or go to:

<http://tinyurl.com/ln99fu5>

We want our Facebook page to be an active and  
welcoming place where you can post stories about  
your scientific or educational accomplishments, com-  
ment on current items about science in the news,  
share your latest publications or a student success  
story, post pictures, and help recruit new NMAS  
members!

## ANNOUNCEMENTS

- Save the date: **November 9, 2013**. Our an-  
nual meeting this year will be on “Impacts of Cli-  
mate Change on Water” and will be co-hosted with  
NM EPSCoR. Plan to join us for the NMAS an-  
nual meeting, banquet, award ceremony, and dis-  
tinguished lecture. The event will take place in the  
Marriott Hotel in Albuquerque. Complete infor-  
mation will be in the next NMAS newsletter.

- The nomination forms for the NMAS **Outstand-  
ing Science Teacher** will be sent out to the school  
superintendents right after Labor Day. The dead-  
line for nominations to be returned to the Com-  
mittee will be **October 4**. Anybody can nomi-  
nate a teacher (not just superintendents). A nom-  
ination form will soon be ready for the website,  
but people can contact Harry Pomeroy: [francis@  
plateautel.net](mailto:francis@plateautel.net). Please show “OST Nomination”  
in the subject line.

- We are exploring ways in which you will be able to  
renew your membership online at your convenience.  
More information about this will be forthcoming.

- If you would like to join the NMAS board and  
make a positive contribution to the Academy, please  
contact one of the current members (*contact info on  
the next page*) with your intention. NMAS needs  
your energy and ideas!

- Want to contribute to the NMAS Newsletter?  
Please send to the Editor any personal contribu-  
tions or story ideas that you think deserve to be  
mentioned to the NMAS community.

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**Editor, New Mexico Journal of Science**  
Dr. Kurt Anderson

**NMAS Webmaster**  
Mr. David Duggan

## NMAS MEMBER NEWS

NMAS welcomes new and returning members, officers, and board members.

### Our thanks to those who have made donations to the NMAS this year

#### General Fund 2013

Harry and Mona Pomeroy  
Anonymous (through United Way)

#### Endowment 2013

Richard Nygren (through United Way)  
David Duggan (through United Way)  
Hal Behl  
Robert L. S. Amai  
Mercedes M. Agogino  
Relf Price  
Vicente Romero (new Life Membership)  
Mel and Pauline Eisenstadt

*Why not plan ahead today to make the NMAS a part of your legacy!*

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FROM THE NMAS TIME CAPSULE . . .

**NMAS VP Engineered Elephant Butte:** Elephant Butte Dam has been in the news lately due to dropping water levels. It was the largest dam in the U.S. and the largest artificial lake in the world when it was constructed in the early 1900s. It was designed to hold water for southern New Mexico agricultural needs. The consultant on the project, Fayette Jones, a civil/mining engineer, was Vice President of NMAS and former president of New Mexico School of Mines (now NM Tech). After examining the site that had been selected, Jones realized that the rock would not hold water. His solution was to borrow the newly invented diamond drill equipment from the copper mines near Santa Rita, drill hundreds of holes into the rock, and force hundreds of tons of concrete into the crevices . . . the foundation held!

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#### New Mexico Academy of Science

Founded in 1902 to foster scientific research and scientific cooperation, increase public awareness of the role of science in human progress and human welfare, and promote science education in New Mexico. NMAS has been in continuous existence since 1915, and became formally associated with the New Mexico Museum of Natural History and Science in 1995.

*Affiliated with the American Association for the Advancement of Science (AAAS)*

*Member of the National Association of the Academies of Science (NAAS)*

## PRESIDENT'S MESSAGE - JULY 2013

Kurt Anderson

### A Water Crisis in New Mexico

Years of drought and record temperatures are imposing severe strains on New Mexico's water users, especially agricultural users. For New Mexico 2012 was the hottest year on record and, as of June 2013 we've just experienced the driest 12-month period in 118 years. These conditions appear to be part of a long-term trend that forecasts suggest will continue throughout the 21st century.

In 2005, according to the Office of State Engineer, about 78% of New Mexico's water was used for irrigated agriculture, 8% was provided by public water systems to their customers, and about 7% was lost from reservoirs by evaporation. Only 7% went to other uses such as power production or was pumped from private wells for mining, livestock, industry, or domestic uses. Total use was about **1.3 trillion** gallons; that's a lot of water. Surface water from rivers, lakes and streams provided about 53% of this total; groundwater, pumped from wells, the remaining 47%. For irrigated agriculture, which dominates our use, the numbers are 56% and 44%, respectively.

New Mexico agriculture depends mostly upon surface water from the Rio Grande, almost all of which arises from the snowpack which accumulates in the Colorado mountains every winter; that snowpack is currently at about a quarter of its historical level. Decreased precipitation within our state further exacerbates the situation, particularly for the Pecos River and its users. Drought conditions are forcing an increasing reliance upon pumped ground water for irrigation.

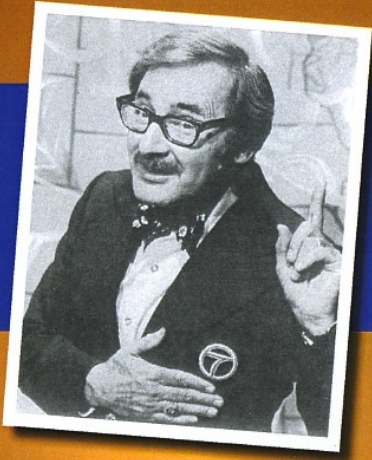
Water battles will probably dominate New Mexico's economic and political arenas in the 21st century. Increased groundwater pumping for irrigation is already bringing the agricultural sector into conflict with public and private water users who already rely on wells for most of their water. Our river systems, principally the Rio Grande, deliver most of the surface water used for irrigation, but also recharge our underground aquifers. When surface flows decline the aquifers suffer, the water table drops and wells begin to go dry. It's happening.

Agriculture's current response to drought is increased groundwater pumping and, where possible, changes in crop types or simply letting fields lie fallow. Because aquifers are finite in extent and fundamentally recharged from surface water, drilling additional deep wells provides no long term solution to a continuing drought. Conservation programs, wastewater treatment and other water recycling schemes cannot postpone the inevitable. Absent significant new sources of water imported from outside of the state, New Mexico agriculture will be forced to radically change what it grows and how it grows it.


In recognition of the water crisis facing New Mexico, the New Mexico Academy of Science, in partnership with NM EPSCoR, an NSF-funded program to stimulate competitive research in New Mexico, will host a series of talks, posters, and other presentations at its 2013 Annual Meeting to be held at the Marriott Hotel in Albuquerque on **9 November**. The theme of this all-day meeting will be "The Impacts of Climate Change on New Mexico's Water Resources." Most of the presentations will be open to the public and members of the Academy are *highly* encouraged to attend.



*The Rio Grande. Ben Prepelka*



The City of Albuquerque Transit Department/ABQ RIDE  
*Unveils its New Wall of Fame*  
Presenting New Mexico Teacher and TV Icon  
Dr. George Fischbeck as the First Inductee



Albuquerque Wall of Fame  
*Unveiling & Induction of  
Dr. George Fischbeck*  
MONDAY, JULY 8, 2013  
11:30 A.M. TO 1:30 P.M.

**I. Welcome-Rick De Reyes**

- a. Introduction of Special Guests
- b. Introduction of Bruce Rizzieri, Director of ABQ RIDE

**II. Bruce Rizzieri**

- a. Introduction of Albuquerque Mayor Richard J. Berry

**III. Mayor Richard J. Berry**

- a. Remarks on the career of Dr. George Fischbeck
- b. Introduces Dr. Kurt Anderson, President of New Mexico Academy of Science  
Dr. Kurt Anderson presents Dr. George with the NMAS' highest award, the Award for Outstanding Contributions to Science and Science Education in New Mexico

- c. Mayor Berry introduces former KABC-TV Anchor Gene Gleeson  
Gene Gleeson

- d. Mayor Berry calls on Dr. George

- e. Mayor Berry, Bruce Rizzieri and Dr. George go to plaque.  
Plaque is unveiled and pictures taken at plaque

## Former NMAS President Named First Inductee of Albuquerque's Wall of Fame

Dr. George Fischbeck was named the first inductee of Albuquerque's Wall of Fame at the Alvarado Travel Center in Albuquerque on July 8, 2013. Albuquerque Mayor Richard J. Berry honored Dr. George, and introduced a host of dignitaries, including NMAS President Dr. Kurt Anderson, who added to the induction ceremony by presenting Dr. George with the Academy's highest honor, the Award for Outstanding Contributions to Science and Science Education in New Mexico. The award consists of an engraved crystal cube and certificate.

Dr. Fischbeck began his professional career as a science teacher at Ernie Pyle Junior High in Albuquerque and eventually became the "Television Science Teacher" for the Albuquerque Public Schools with a science show for students on PBS. In 1961 he won the National Education Television Award. Dr

George was an important part of NMAS in the 60s and 70s. He served as President of NMAS in 1965 and in 1970 was honored with an "Outstanding New Mexico Science Teacher Award" by NMAS.

In 1970, Dr. George went on to educate the general public in science as a TV meteorologist first at KOB-TV in Albuquerque and then at KABC-TV in Los Angeles. But his impact on the students of New Mexico has never been forgotten. He was the face of science for hundreds of thousands of New Mexico's children for 25 years; with an influence so widespread, it's estimated that by the early 1970s, 25% of New Mexico's residents learned science from him either through the classroom or television. And though he achieved great fame as a TV weatherman in Southern California, he never forgot his New Mexico roots.

NMAS is proud to honor our Past President, Dr. George Fischbeck! See a copy of the event program above. For more information about this event, visit <http://tinyurl.com/mccea3>.



## Climate Change Comes to the Rio Grande: NMAS Co-sponsors Important Water Talk

Dr. Dagmar Llewellyn, hydrogeologist with the US Bureau of Reclamation, was the invited speaker for a talk sponsored by the Academy in partnership with New Mexicans for Science and Reason, and the NM Museum of Natural History and Science. The talk, given at the Natural History Museum on July 10, was offered free to the general public. An audience of 240 people attended the talk entitled “Impacts of Climate Change on the Upper Rio Grande Basin: Adaptation and Mitigation Strategies.”



*Dr. Llewellyn speaking with Albuquerque Journal science writer John Fleck before the presentation (photo courtesy of Dave Thomas, president NMSR)*

Dr. Llewellyn gave the first public summary of a report that will soon be released by the Bureau of Reclamation, the U.S. Army Corps of Engineers and Sandia Labs. This document, entitled the “Upper Rio Grande Impacts Assessment,” represents a two-year effort by these three agencies to characterize the potential risks and impacts of climate change to water supplies and demands in the Upper Rio Grande. Risks characterized in this study include changes in snowpack, timing and quantity of runoff, groundwater recharge and discharge as well as changes in demand and consumption. Models have been run to assess the impact of changing individual components in the basin system, but the report did not include recommendations for which of these components should be changed. The bottom line in the report is that water supply will decrease and water demand will increase by the year 2100. The next step is to open a dialogue with the

public and all of the many stakeholders in order to begin to decide what should or could be changed.

The lecture concluded with a mini-town hall discussion by members of the audience, many of whom were passionate and articulate in their comments.

This lecture was on a particularly important topic for New Mexicans. By co-sponsoring this lecture, the NMAS has served the public interest well and followed through on its mission to support science and science education in NM. The success of this lecture, and the successful association of the three partners, will help the Chair of the NMAS Speaker Committee, Dr. Marvin Moss, to continue this excellent program of science lectures offered to the public under the auspices of the Academy.

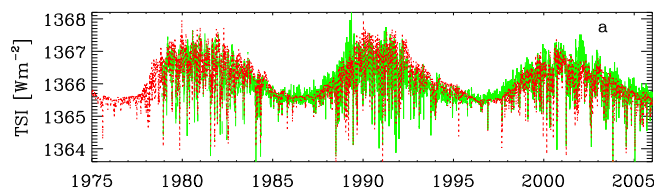
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## It's Probably Not the Sun's Fault

The Sun is the largest *external* contributor to the climate on Earth. A critical question is how important are its effects compared to the *internal* processes influencing Earth's atmosphere like greenhouse gas production, ocean absorption of carbon dioxide, volcanic outgassing, etc. Perhaps one way of indirectly answering this question is to better understand how the Sun *changes* over time, and to quantify if those changes (if there are any at all) have had observable effects on Earth's climate.

The best way to do this is to measure the total solar irradiance (TSI), which can be understood as the incoming total solar energy flux incident at the top of Earth's atmosphere. Fortunately, space-based instruments have been doing just that since about 1978 (ACRIM, SORCE, etc.) What these observations show is that the TSI does indeed vary, over the course of about 11 years - following the solar cycle - but that this variation is rather regular, and small. As can be seen from the figure on the following page, the difference between the maximum and minimum TSI since the 1970s is roughly one in one thousandth, or less than 0.1%.

In fact, reconstructions of solar irradiance have been made dating back over 400 years, to help understand the connection to the climate of Earth at that time, in the pre-satellite era. The findings are



*Total solar irradiance from 1975-2005 measured by Krivova, Vieira, and Solanki (2010). The observations (green) are from spacecraft. The red curve is a theoretical model of the TSI used to extrapolate further back in time (not shown here).*

roughly the same - the TSI has varied at most up to 0.09% since about 1610.

Why is the Sun's energy output changing? The main reason is the variation of magnetic fields (think sunspots) generated in the solar interior that alter the amount of light emitted at the Sun's surface. From centuries of sunspot observations, we know that this 11-year solar cycle is rather steady, if not entirely predictable or fully understood in detail.

Of course, small variations in the TSI are not the only possible consequences of the Sun's periodic magnetic-field changes. Wavelength-dependent irradiance measurements can certainly be important, especially the ultraviolet contributions. In addition, due to the cyclic variations, the heliospheric magnetic field also changes, and cosmic rays from other parts of the galaxy can enter the solar system and impinge on the Earth, causing various atmospheric chemistry processes to occur. Indeed, like all scientific endeavors, the details matter, and this is a very complex and active area of research.

Nonetheless, small but quite *regular* fluctuations in TSI do not explain the steeply rising global surface temperature experience in the 20th and 21st centuries. We may have to look closer to home for the cause.

*Jason Jackiewicz, NMAS VP, is a solar physicist at NMSU in the Department of Astronomy since 2008.*

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## EVENTS CALENDER

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SAWMA presentation - Permitting for  
Oil & Gas

Rick Sprott, Air and Waste Management Association (AWMA) past president and Utah's Department of Environmental Quality former executive director, will present "Protection of Significant Deterioration Permitting for Oil and Gas: Square Peg in a Round Hole?" at AWMA's Tuesday, **Aug. 6**, meeting. He will discuss one of the most difficult issues in oil and gas air quality permitting; deciding if sites are contiguous or adjacent during source determination. Sprott will provide a short history of this bit of regulatory art that has become ground zero the debates between environmental advocates and industry throughout the country. AWMA meetings are open to anyone interested and are held first Tuesdays each month at the Golden Corral Buffet and Grill (NE corner of Central at Eubank). Lunch begins at 11:30 a.m., the presentation is at noon, and the program adjourns at 1 p.m.

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### Museum-sponsored spaceport tour

Join the National Museum of Nuclear Science & History and Follow the Sun Tour Inc. on a tour inside Spaceport America, Saturday, Aug. 17. Guests will witness history in the making at the future home of the personal and commercial spaceflight industry. This unique tour will depart from the museum at 6 a.m. on **Aug. 17**. Only 50 seats are available for this exploration into the latest predictions of game-changing technologies in space, so book today. The cost of the in-depth tour is \$99 per person. For reservations, visit the Spaceport America tour web page, select Aug. 17 on the calendar, choose Nuclear Museum Tour and follow booking instructions, or call 505-897-2886. For more information, visit the museum website (<http://www.nuclearmuseum.org/>).

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### Albuquerque Maker Faire call for makers

Do you like to create, tinker, build, or invent? Then come be a part of the Albuquerque Maker Faire where engineers, artists, and DIY enthusiasts can demonstrate their ideas, show what they are making, and share what (... *continued on page 8*)

# Membership Form

## NEW MEXICO ACADEMY OF SCIENCE

New Membership (2013) ☐    Renewal 2013 ☐    Renewal 2014 ☐    Publications ☐    Donation ☐  
*(check all that apply)*

Date \_\_\_\_\_ Title \_\_\_\_\_ Name \_\_\_\_\_

Employer/Firm/Affiliation \_\_\_\_\_

Primary Interest (geology, astronomy, environment, education, etc.) \_\_\_\_\_

Mailing Address \_\_\_\_\_

Phone \_\_\_\_\_ FAX \_\_\_\_\_ email \_\_\_\_\_

Check if your address is different from that on the mailing label of this newsletter ☐

### NMAS Publications

<b>New Mexico Journal of Science</b>	\$10 _____
Set of all available pre-1992 back issues	
<b>From Sundaggers to Space Exploration</b>	\$4 _____
NMAS Sigma Xi, 1986	
<b>Dinosaurs of New Mexico</b>	\$10 _____
NMAS Journal vol. 32, 1994	
<b>The Importance of Agricultural Science in New Mexico's Economy</b>	\$10 _____
NMAS Journal vol. 34, 1994	
<b>Astronomy in New Mexico: Past, Present and Future</b>	\$10 _____
NMAS Journal vol. 35, 1995	
<b>New Mexico's Natural Heritage: Biological Diversity in the Land of Enchantment</b>	\$10 _____
NMAS Journal vol. 36, 1996	
<b>Environmental Management: Current and Future Needs</b>	\$10 _____
NMAS Journal vol. 37, 1997	
<b>Water Resource Issues in New Mexico</b>	\$10 _____
NMAS Journal vol. 38, 1998	
<b>Ensuring Sustainable Development of Arid Lands Through Time</b>	\$10 _____
NMAS Journal vol. 39, 1999	
<b>NMAS Journal vol. 40, 2000</b>	\$10 _____
<b>NMAS Journal vol. 41, 2001</b>	\$10 _____
<b>NMAS Journal vol. 42, 2002</b> ( <i>Centennial CD</i> )	\$10 _____
<b>NMAS Journal vol. 43, 2003</b>	\$10 _____
<b>Science on the Border</b> (vol. 44, 2006)	\$10 _____
<b>Energy in the Southwest</b> (vol. 45, 2008)	\$10 _____
<b>New Mexico's Water Resources</b> (vol. 46, 2012)	\$10 _____

Subtotal: \$ \_\_\_\_\_

+ Handling: \$ 2.00

TOTAL: \$ \_\_\_\_\_

### Membership Class (check one)

<input type="checkbox"/> Member	\$25/year
<input type="checkbox"/> Student	\$15/year
<input type="checkbox"/> Life	\$400
<i>(3/4 of amount goes to NMAS Endowment)</i>	
<input type="checkbox"/> Subscription	\$30/year
<i>(Libraries only)</i>	
<input type="checkbox"/> Contribution to NMAS Endowment	\$ _____
<input type="checkbox"/> Contribution to NMAS General Fund	\$ _____

Membership subtotal: \$ \_\_\_\_\_

Donation subtotal: \$ \_\_\_\_\_

Publication subtotal: \$ \_\_\_\_\_

**Total: \$ \_\_\_\_\_**

Membership includes newsletters and occasional special Journal of Science volumes (sent to life members and members who have paid their annual dues during the volume's year of publication).

Send checks, payable to NMAS, to:

New Mexico Academy of Science  
 1801 Mountain Rd. NW  
 Albuquerque, NM 87104

(...continued from page 6) they are learning with other people in the community. The Maker Faire is at the Albuquerque Balloon Museum on Saturday and Sunday, **Aug. 24-25**. It is a family-friendly festival to showcase resourcefulness, creativity, invention, and the do-it-yourself maker spirit. There are no booth fees and entries can be submitted from individuals as well as from groups. Log on to <http://www.makerfaireabq.com/> for more information or to apply to participate in this year's event.

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### Second Annual Sandia Research & Technology Showcase

Engage with members from the local and regional industry and academic communities as we showcase some of the cutting-edge research and technology development taking place at Sandia and provide information on doing business with Sandia through licensing, partnerships, procurement, and economic

development programs. The showcase will be **Tuesday, Sept. 10**, from 8:30 a.m.-4 p.m. at the Embassy Suites, 1000 Woodward Place NE, in Albuquerque, with registration and check-in beginning at 8 a.m. The event will focus on four themes: bioscience, computing & information science, energy & climate, and nanodevices & microsystems. Sponsors include Sandia, New Mexico Manufacturing Extension Partnership, Sandia Laboratory Federal Credit Union, City of Albuquerque, Bernalillo County, Technology Ventures Corporation, and the Sandia Science & Technology Park. The event is free and open to the public, but online registration is required. Registration fills up quickly, so reserve your spot today at <http://www.sstp.org/about-sstp>.

**Time to pay membership dues.** The last year for which you paid is listed on your mailing label. If you have already paid your dues for 2013, THANK YOU. If you have not yet paid your dues, please fill out the form on page 7 and send the required information to NMAS.



New Mexico  
Academy  
of Science

Newsletter

1801 Mountain Rd NW  
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