

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



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MEETING ANNOUNCEMENT

DATE: Wednesday, September 27, 2006

LOCATION: Orinda Masonic Center, 9 Altarinda Rd., Orinda

TIME: 6:30 p.m. Social; 7:00 p.m. talk (no dinner) Cost: \$5 per regular member; \$1 per student member

RESERVATIONS: Leave your name and phone number at 925-424-3669 or at danday94@pacbell.net before the meeting.

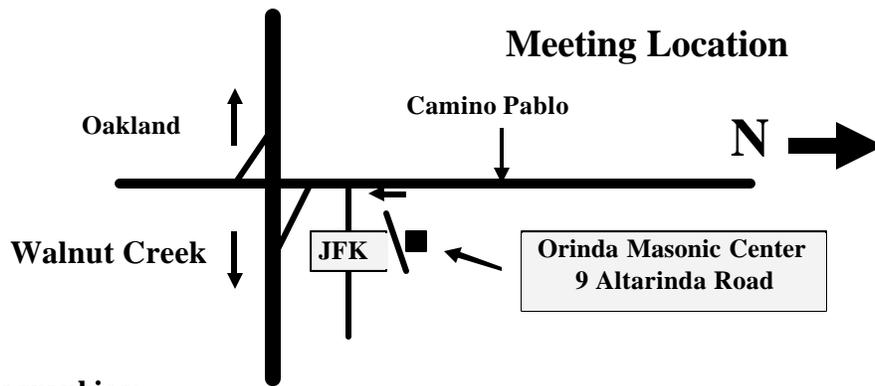
SPEAKERS: *Dr. Doris Sloan, Dept. of Earth and Planetary Science, UC Berkeley, and Dr. John Karachewski, Weiss Associates*

GEOLOGY OF THE SAN FRANCISCO BAY REGION - THE STORY BEHIND THE BOOK

Doris and John will discuss their collaboration on this book, published by UC Press as one of the Natural History Guides. The book is written for the general public, to introduce residents and visitors to the Bay Area's complex geologic mosaic and young landscape. After three introductory chapters, which deal with geologic processes, plate tectonics and rocks, the book discusses Bay Area geology by region, beginning in Marin and proceeding counter-clockwise around the Bay.

Doris and John have explored all nine Bay Area counties over the past five years, seeking locations that best illustrate the local geology and that are accessible to the general public in a wide variety of beautiful federal, state, and local parks. They will highlight the most interesting geological features of each region and share their favorite geological discoveries. Doris will discuss some of the guiding principles behind the book and John will share his experiences in creating the photos.

Copies of the book will be available at the meeting and profits from sales will be donated to NCGS.



Biographies:

Dr. Doris Sloan is an Adjunct Professor in the Dept. of Earth and Planetary Science at UC Berkeley. She has a MS in geology and a PhD in paleontology, both from UC Berkeley. She taught for two decades in the Environmental Sciences program at UCB, taught classes on the geology of California and the Bay Area for UC Extension, and led field seminars at Pt. Reyes, in the Sierra Nevada and White Mountains. After retirement she indulged her love of travel as geologist and host with Cal Alumni Bear Treks and other programs, visiting many corners of the world. In the past five years she has concentrated on the book on Bay Area geology. Her research has focused primarily on the sediments beneath San Francisco Bay and what they can tell us about the Bay’s geologic history.

Dr. John Karachewski has conducted geology and environmental projects throughout the western United States from Colorado to Alaska and Midway Island. He received his Master’s degree from Western Washington University and his doctorate from the Colorado School of Mines. He works for Weiss Associates and supports projects for the Environmental Restoration Division at Lawrence Livermore National Laboratory. In addition, he enjoys teaching at Diablo Valley College and adult education classes for UC Berkeley Extension. He is an avid hiker and enjoys photographing landscapes during the magic light of sunrise and sunset. Examples of his images can be viewed at: www.geoscapesphotography.com

Northern California Geological Society
 c/o Mark Detterman
 3197 Cromwell Place
 Hayward, CA 94542-1209

It’s that time of year! Please Renew - Form Attached!!

Would you like to receive the NCGS newsletter by e-mail? If you are not already doing so, and would like to, please contact **Dan Day** at danday94@pacbell.net to sign up for this service.

NCGS 2006 Calendar

Wednesday September 27, 2006

Dr. Doris Sloan, University of California, Berkeley

Dr. John Karachewski, Weiss Associates

Geology of the San Francisco Bay Region – The Story Behind the Book

For details on the UC Press book go to:

<http://www.ucpress.edu/books/pages/9237.html>

Wednesday October 25, 2006

Dr. Richard Stanley, Dr. Russell Graymer, Dr.

Carl M. Wentworth, U.S. Geological Survey, Menlo Park

Subsurface geology, hydrology, basin evolution, and climatic cyclicality of the Santa Clara Valley area

7:00 pm at Orinda Masonic Center

Upcoming NCGS Field Trips

September 16, 2006 *Field Geological Mapping Using Modern Technology*
Dr. George Brimhall, U.C. Berkeley

For questions regarding these field trips, please contact Rob Nelson at: rlngeology@sbcglobal.net

Earth and Space Science Education in California

Reported by Dan Day

The NCGS was privileged to host **Dr. Eldridge Moores**, Professor Emeritus, Geology Department, University of California, Davis, at its November 16, 2005, evening meeting. Dr. Moores is a renowned expert in Plate Tectonics whose graduate work on the Cyprus Troodos ophiolite helped set the foundation of modern continental drift theory. In addition to numerous contributions to the tectonic evolution of the western United States, Eldridge gained substantial fame as the central figure in writer John McPhee's book "Assembling California." In recent years, Dr. Moores has actively campaigned for the incorporation of Earth Science into California's educational programs. His concerns and observations were emphasized in his presentation *Earth and Space Sciences and California*.

Eldridge opened with three points to ponder: What is the public's notion of science; What must earth and planetary scientists do to get their message to the public and bureaucrats; and How can this be used to effectively modify California college admission requirements. As Eldridge observes, the crisis in California, and nationwide, is that there is very little public knowledge of basic geology. However, most people show a keen interest in geological phenomena when brought to their attention. Volcanism, earthquakes, and landslides are prime examples. In general, our government has little appreciation for the geosciences. It promotes the physical sciences, but is earth science illiterate. In most government circles, the earth and space sciences are considered irrelevant to society, a mere curiosity. Eldridge noted that the earth sciences are important to society. The earth is, after all, our home planet, and merits understanding if for no other reason than for our basic survival. It provides mankind with an evolutionary perspective, a link with other sciences and humanities. It has direct bearing on our safety and welfare, it is of geopolitical significance, and has an aesthetic appeal to the layman.

The earth and planetary sciences have played a key role in the development of the physical sciences. Copernicus, Kepler, Galileo, and other astronomers laid the foundations of physics and modern mathematics by seeking to describe the motion of celestial bodies. Today, education champions the reductionist or hierarchical sciences, described by Dr. Moores as islands of conformity surrounded by interdisciplinary oceans of ignorance. Surveys record that 50% of the polled adults thought that man was created less than 10,000 years ago. Slightly over 50% thought that man evolved from pre-existing species, and only 65% had even a rudimentary understanding of science.

Geology is poised to be a fundamental science in the 21st Century. The world population is growing rapidly. Resource availability and public safety are becoming important issues. Water, energy (fossil fuels), minerals, metals, and tillable soil are serious concerns. Recent natural disasters (hurricane Katrina and the Banda Aceh tidal wave) have underscored man's vulnerability. Many large population centers are located close to natural hazards. The greater Naples metropolitan area is at

major risk from now dormant Mount Vesuvius. Major cities in western Washington State and coastal Japan are earthquake targets. And following the December, 2004, Sumatran tsunami tragedy, the world opened its eyes to the risks of submarine seismicity. Earthquakes, floods, volcanism, coastal erosion, landslides, and severe weather are annual hazards that man must face. Last year's milestone hurricane season, punctuated by hurricane Katrina's blow to New Orleans, focused government attention on nature's devastating power.

Energy is a serious national concern. As populous third world nations develop, energy availability has become an issue. Eldridge presented 1987 data on per capita global energy consumption. Then the mean global consumption was 1.6 kilowatt (kW) years per person. North America consumed 7 kW years per person, the former USSR and eastern Europe 4.5 kW years per person, Western Europe 3.2 kW years per person, Japan 3 kW years per person, Latin America about 1 kW year per person, China 0.75 kW year per person, and Africa-Asia-Oceania 0.7 kW year per person. It is now known that the per capita energy consumption of China, India, Indonesia, and Brazil will increase substantially. Currently these nations combined consume half the annual U.S. energy plus power needed for aluminum, copper, and steel products. If these nations increase annual energy consumption to 25% the U.S. per capita rate, they will consume 5 times the U.S. total. By increasing global energy and raw material consumption to 1995 U.S. per capita levels, global minerals consumption would increase 7-fold, metals usage would double, nonfuel wood products would increase 5 fold, and fossil fuel-based synthetics usage would soar 11 times. Under this scenario, the total combined consumption of these materials rises 6 fold. Global oil production was predicted to peak before 2010. U.S. oil production peaked in 1970. The petroleum situation, noting the current Middle Eastern political climate, is of major concern. And oil and gas exploration is, ironically, a geological discipline.

U.S. earthquake losses, based on 1997 figures, are sobering. Eldridge presented liabilities based on the occurrence of predicted major earthquake events in probable geographic locations. A magnitude 7.2 event in Southern California's "Elysian Park" fault system: \$112 billion loss; a magnitude 8.0 event on

the Southern California San Andreas fault: \$63 billion loss; a magnitude 7.5 temblor on the Northern California Hayward fault: \$54 billion loss; a magnitude 8.0 event on the New Madrid Fault (Missouri-Illinois-Kentucky): \$63 billion loss; a magnitude 7.5 event in Utah's Wasatch Mountains: \$14 billion loss; a magnitude 7.5 quake in the Pacific Northwest (Seattle region): \$19 billion loss; and a magnitude 6.0 event in the New York City area: \$100 billion loss. All these areas have experienced events of this magnitude. Atlantic seaboard quakes have struck Boston and New York in the 1700's. Charleston, South Carolina has suffered a magnitude 7 earthquake.

For perspective, Tokyo's 1923 Great Kanto Earthquake killed 140,000. It caused \$52 billion damage, resulted in economic collapse, and led to a military takeover (disaster-induced political instability). Today a major Japanese earthquake would consume disaster funds and fiscal surpluses. It would result in major insurance claims, and have strong repercussions on the global economy. Its effects on the U.S. alone would include bond and stock market crashes, rising interest rates, an economic recession, and severe debtor nation problems. Predictions claim that an international financial crisis would ensue, followed by global economic deterioration. A chilling premonition.

Volcanic disasters are another geologic hazard facing mankind. Most of us have read accounts of major eruptive events such as the 1883 Krakatoa catastrophe. Yet the geologic record provides evidence of even larger magnitude events. Two such "hot spots" being closely watched by volcanologists are California's Long Valley caldera (whose last major eruption 730,000 years ago deposited the Bishop Tuff) and the Yellowstone caldera, which could affect a much larger area. The influence of such mega-eruptions on global climate is not fully understood, but are expected to be significant, based on the impact of the much smaller Krakatoan event. We can see the impact of Mount Vesuvius' A.D. 79 eruption that buried the town of Pompeii. Experts fear an even greater loss of life and property if such an eruption occurred in modern day metropolitan Naples. Seattle is only a short distance from Mount Rainier, another stratovolcano in the Cascade Range with explosive potential equivalent to Mount St. Helens, which self-

destroyed in 1980. If Seattle is spared the eruptive fallout, it may fall prey to devastating mudflow slurries off steep water-soaked slopes.

Landslides are by far the most costly geological hazard. They occur throughout California and cause \$1.5 billion damage in the United States each year. Preventative measures are largely unsuccessful. Landslide risk areas have been identified in many major population areas, but construction zoning by risk exposure has not been satisfactorily implemented. There is no systematic landslide reporting in the U.S. today. A geological hazard of similar social impact is coastal erosion. It impacts not only the Pacific Coast, but the Great Lakes region and parts of the Atlantic seaboard. Preventative action has also had limited success.

Flooding affects all parts of the U.S. It has been controlled by engineered structures in many locations, but has exacerbated the risk in others. California's Sacramento River is an example of the latter, where levee collapse during periods of unusually high rainfall or snow runoff has resulted in substantial property losses.

Tsunamis, submarine earthquake-triggered events, have been brought to the public's attention by the recent Sumatran catastrophe, which claimed over 125,000 lives and affected the entire eastern Indian Ocean coastline. Recently scientists have considered tsunami generation by enormous submarine landslides on the Hawaiian Islands. These two phenomena have not been positively linked, but numerous paleo-landslides discovered off the island chain have inspired this hypothesis.

Meteorite and asteroid impacts are a far less probable form of natural disaster. Geologists have used the meteorite impact theory as cause for major extinctions in the geologic record. A Holocene meteorite impact is preserved at Meteor Crater near Winslow, Arizona. The historical Tunguska impact occurred in remote Siberia in the early 1900's. It leveled trees for miles around. The estimated energy released on impact was equivalent to a 100 megaton bomb. Experts analyzed the effects of a major meteorite impact comparable to what might have driven the Cretaceous-Tertiary extinctions. They calculate that 25% of the world population would perish in such an event, and that a global agricultural collapse would ensue.

An issue currently gaining major political momentum is global warming. News media have chronicled glacial retreat in the Alps, diminishment of the Arctic and the Antarctic ice caps, and the associated rise in sea level. These phenomena are clearly earth science topics.

After discussing the impact of various geological processes on our everyday lives, Dr. Moore offered a roadmap to usher the Earth and Space Sciences into the 21st Century. Clearly the principle goal of the Earth Sciences is to foster stewardship of planet earth. Field geology has entered the digital age, melding traditional skills with digital maps and GPS technology. Geological hazard analysis must be promoted. And public awareness should be cultivated through K-12 schooling and adult education programs. The Earth and Space Sciences are, after all, intrinsically historical sciences. They interpret an ongoing experiment not designed by man. The evidence is essentially incomplete or missing, and some is unquantifiable. Solving the puzzle is an empirical, forensic exercise. It is a holistic, integrative problem not solely analytical in nature.

This generation of scientists needs to present the earth and planetary sciences as exciting and inspiring. They are the seedbed of major scientific theories. Plate tectonics, evolution, and astrogeology are current topics of interest. And NASA has set its goals at reaching distant planets within 25 years. Modern technology has provided the means for expanding the horizons of the earth sciences and helping unlock the secrets of space. These tools can also help resolve social issues such as energy shortages, raw material availability, and global climate change.

The earth sciences are intertwined with human culture. Mankind has a need for oneness with the earth. Primitive native societies and Western civilizations fashioned their mythological subject matter from earthly phenomena. Their efforts reflect man's thirst for knowledge. Geology is linked to the basic sciences: physics, chemistry, biology, and mathematics. It integrates disparate facts and compels one to think in a four-dimensional object-time framework. Earth sciences touch on politics, culture, global finance, geography, agriculture, technology, environmental issues, military strategy, and raw material

utilization. These disciplines must interact cooperatively to nurture the responsible stewardship of planet earth.

Geology, meteorology, oceanography, and planetary sciences embrace the political, cultural, environmental, technological, and philosophical issues facing society. These disciplines address natural disasters, resource shortages, hazards, political conflicts, religion, and geopolitics.

There are several reasons why Earth and Space Science should be included as a core educational science. The earth sciences form the foundation and background for biology, chemistry, and physics---the basic physical sciences. Earth sciences are tangible and present in our everyday lives. They draw students to science, and provide an entry point to the basic sciences. They are an affordable curriculum for disadvantaged students. Earth sciences are thrilling examples of dynamic earth processes such as plate tectonics, which are now being observed on other planets. The earth sciences are clearly relevant to California's geohazards and closely tied to important nonrenewable energy resources. Volcanism, tsunamis, earthquakes, hurricanes, and other natural disasters of global proportions are earth processes.

Post K-12 education in California needs an earth science infusion in its curriculum. California currently has three college systems. The University of California is the premier institution, with 10 campuses and 150,000 students. It enrolls the top 12% of state high school graduates. The California State University system operates 20 campuses, has an enrollment of 400,000 and selects the top 50% of secondary school graduates. The largest is the California Community College system. It oversees 109 campuses statewide, and has 2.5 million students. It is the largest college network in the world.

The University of California admissions require a minimum 2 years of laboratory science; 3 years are recommended. These courses must cover the fundamentals of two of the three physical sciences: biology, chemistry, or physics. Earth science is not considered a laboratory science even though it is deeply rooted in, and forms the foundation of, all three basic disciplines (note that evolutionist Charles Darwin's original training was in geology,

which he utilized during his global tour on the HMS Beagle). The task at hand is to modify the U.C. admissions requirements to accept Earth and Space Science as a laboratory science. To accomplish this, earth scientists must lobby the U.C. Academic Senate. Eldridge admits that this is a slow, tedious uphill battle involving numerous conversations with senate members, e-mails, letters, and correspondence. Some progress has been made but much more work needs to be done to revise U.C. admissions requirements.

Another obstacle is the refusal of secondary education (high schools) to recognize the Earth Sciences as a laboratory science. California's K-12 system does not view geology, geophysics, meteorology, or planetary science as core sciences. Many academics believe there are no basic scientific laws in these disciplines---grossly untrue! Dr. Moores thinks the K-12 system has other agendas than recognizing the importance of earth sciences. The governing organizations clearly lack knowledge of these disciplines. However, Eldridge notes that there has not been a consistent message from Earth and Space Science proponents, which weakens their position.

Dr. Moores suggests the following action plan. Concerned professionals should contact faculty associates in the University of California system and have them lobby Division Chairs, local educational policy chairs, and the U.C. admission committees. The goal is to have the Earth and Space Sciences added to the University of California "d" requirement. Examples of successful, quality high school earth science classes should be provided, such as those recently recognized by the NCGS Geoscience Teaching Award. Organizations and individuals should contact the U.C. Regents and local school boards. These steps are admittedly tedious, but persistence is the only way to institute change at these levels. Ironically, with the United Nations designating 2008 the International Year of Planet Earth, the establishment of Earth Day in America, and Global Warming capturing newspaper headlines, it seems odd that the Earth and Space Sciences have not been advocated in our educational systems.

The Northern California Geological Society sincerely thanks **Dr. Eldridge Moores** of U.C. Davis for sharing his thoughts on society's

perception of the Earth and Space Sciences today. His untiring promotion of the Earth Sciences has kept hope alive that these disciplines will eventually achieve their proper place in California's K-12 and college curricula.

“Be a Citizen Scientist!”

Earth Science Week October 8-14, 2006

What does it mean to be a citizen scientist? It means getting involved! Real people collecting data, observing, and testing. You don't have to have a Ph.D. or even formal education in Earth science to be a citizen scientist, only an interest and desire to learn. A citizen scientist is YOU involved in real science and research!

Find more ideas about how you and others can become scientifically literate citizens and get involved in Earth Science Week 2006 by visiting on these websites!

<http://www.earthsciweek.org/index.html> and

<http://www.aapg.org/k12resources/earthscienceweek.cfm>

Earth Science Week Toolkits Are Available Now

The Earth Science Week 2006 Toolkit includes:

- A 12-month school-year activity calendar, suitable for hanging
- The new Earth Science Week poster, including an activity
- Up-to-date factsheets and other materials from the USGS
- A park-views DVD from the National Park Service
- A detailed climate-change booklet from NOAA
- An Earth science education brochure and more from NASA
- Posters from Scholastic, IRIS, and EarthScope

- A GeoCaching pamphlet from Geological Society of America
- An Earth-science CD from ESRI
- And more materials for classroom and home use

In addition, copies of the careers-oriented 2005 Toolkit ("Geoscientists Explore the Earth") and the natural hazards-focused 2004 Toolkit ("Living on a Restless Earth") are available for order.

Library Rate shipping and handling in the U.S. is included. Expect delivery 2-3 weeks after payment is received. Faster shipping services are available at additional cost (phone 703-379-2480 for details). Orders outside of the United States will incur additional shipping charges. For special shipping, bulk orders, and more information, visit <http://www.earthsciweek.org/materials/index.html>

Earth Science Week Contests 2006

American Geological Institute (AGI) is sponsoring three national contests as part of Earth Science Week 2006. The photography, visual arts, and essay contests offer opportunities for both students and the general public to participate in the celebration, learn about the Earth sciences, and compete for prizes.

The photography contest, open to all ages, focuses on "Using and Studying Earth's Resources." Participants are encouraged to think creatively and submit pictures of geoscientists studying or working with the Earth's natural resources or people using these resources.

The visual arts contest is titled "Earth Science in Your Home Town." Students in grades K-5 are encouraged to draw, paint, or create a poster on any aspect of Earth science that affects their local community. Artwork entries should be no larger than 24-by-36 inches.

Finally, students in grades 5-9 are eligible to enter the essay contest: "Be a Citizen Scientist!" Essays must be no longer than 500 words and should highlight the ways every person can contribute to a better understanding of our planet.

The first-place prize for each contest is \$300. To learn more about these contests, including how to enter, visit <http://www.earthsciweek.org/contests>

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



2007 UNDERGRADUATE SCHOLARSHIP ANNOUNCEMENT

The Northern California Geological Society is pleased to announce the availability of a scholarship to help support undergraduate-level student research in geology during the year 2007.

- **\$500 will be awarded to students working toward completion of a senior thesis.**

These scholarships will be awarded competitively, based upon our review of submitted summaries of proposed research. Funds are intended to support field and laboratory components of research programs. The research must be scheduled for completion during the 2007 calendar year. Winners will be invited to speak about or otherwise present their research at a regular evening NCGS meeting in Orinda, California.

Application Procedure

Candidates may apply by forwarding a signed cover letter on department letterhead requesting the award, accompanied by a brief (no more than 2 page) summary of the proposed research topic. The letter must include candidate contact information (both departmental and home mailing address, telephone, and e-mail).

The bottom of the candidate letter must bear the note:

“Degree Program _____, Approved by _____, (Print) _____, Title _____,
Telephone _____, E-mail _____, Date _____.”

with the signature and printed name/title/telephone/e-mail of a department chairperson or thesis advisor, to show that the recipient has departmental approval to receive the award. An application form is not required.

Please submit the letter and proposal to:

Phillip Garbutt

Chair, NCGS Scholarship Committee

6372 Boone Drive

Castro Valley, CA 94552-5077

Voice: (510) 885-3440 or (510) 581-9098

Fax: (510) 885-2526

e-mail: phillip.garbutt@csueastbay.edu or plgarbutt@comcast.net

no later than November 11, 2006. Awards will be made by December 1, 2006.

Issue date: September 11, 2006

For further information: <http://www.ncgeolsoc.org>

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



2007 GRADUATE SCHOLARSHIP ANNOUNCEMENT – MS & PhD DEGREES

The Northern California Geological Society is pleased to announce the availability of a scholarship to help support graduate-level student research in geology during the year 2007.

- **\$750 will be awarded to students working toward the MS degree**
- **\$1,000 will be awarded to students working toward the PhD degree**

These scholarships will be awarded competitively, based upon our review of submitted summaries of proposed research. Funds are intended to support field and laboratory components of research programs. The research must be scheduled for completion during the 2007 calendar year. Winners will be invited to speak about or otherwise present their research at a regular evening NCGS meeting in Orinda, California.

Application Procedure

Candidates may apply by forwarding a signed cover letter on department letterhead requesting the award, accompanied by a brief (no more than 2 page) summary of the proposed research topic. The letter must include candidate contact information (both departmental and home mailing address, telephone, and e-mail).

The bottom of the candidate letter must bear the note:

“Degree Program _____, Approved by _____, (Print) _____, Title _____,
Telephone _____, E-mail _____. Date _____.”

with the signature and printed name/title/telephone/e-mail of a department chairperson or thesis advisor, to show that the recipient has departmental approval to receive the award. An application form is not required.

Please submit the letter and proposal to:

Phillip Garbutt

Chair, NCGS Scholarship Committee

6372 Boone Drive

Castro Valley, CA 94552-5077

Voice: (510) 885-3440 or (510) 581-9098 (evening)

Fax: (510) 885-2526

e-mail: phillip.garbutt@csueastbay.edu or plgarbutt@comcast.net

no later than January 31, 2007. Awards will be made by February 28, 2007.

Issue date: September 11, 2006

For further information: <http://www.ncgeol.org>

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



2006-2007 Renewal Form

Please fill out this form and attach your check made out to NCGS.

Mail to:

Phil Reed
NCGS Treasurer
488 Chaucer Circle
San Ramon, CA 94583-2542

Dues	Regular (\$15)	\$ _____
	Student (\$ 5)	\$ _____
Contribution	Scholarship	\$ _____
	Teacher Award	\$ _____
Total		\$ _____

Please provide the following information:

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I would like to receive the monthly newsletter via: E-mail _____ Regular mail _____

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K-12 Programs _____ Scholarships _____ AAPG Delegate _____ Membership _____

Please complete the following *only* if there are changes since last year:

Address _____

City, State, Zip _____

Phone: Home (____) _____ Work (____) _____ Fax (____) _____

Employer _____ Job Title _____