NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

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NCGS OFFICERS

COUNSELORS

MEETING ANNOUNCEMENT

DATE: **Wednesday, January 25, 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 student member**

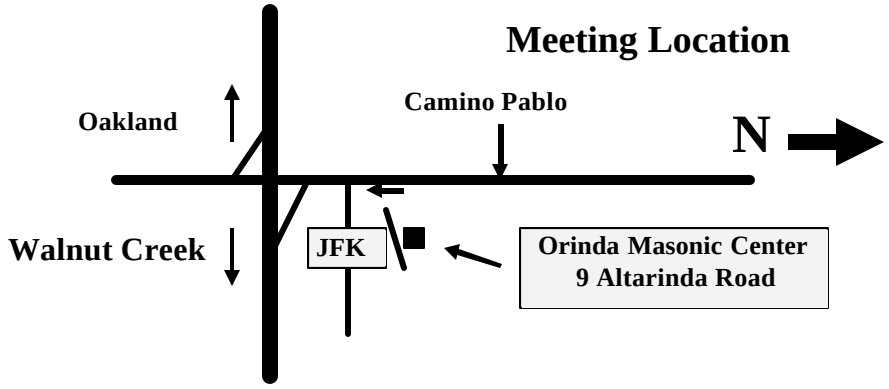
RESERVATIONS: **Leave your name and phone number at 925-424-3669 or at *danday94@pacbell.net* before the meeting.**

SPEAKER: ***Sarah Andrews*, Author of the Em Hansen Forensic Geology Novels**

Art Meets Science on the Cold Continent

Interpreting geology to the lay reader is a collaborative process that has opened some interesting doors for me. In creating the Em Hansen forensic geology mystery series, I have worked with the USGS, FBI, NASA, DOE, DOD, Smithsonian, National Gallery of Art, six state geological surveys, uncounted industry colleagues and university contacts, and now the National science Foundation. This talk shall focus on this process and especially the most recent (NSF) escapade, which took me to the coldest, highest, driest, and least populous continent on Earth: Antarctica. Fraught with red tape, screaming penguins, white-out blizzards, and 24-hour sunlight, this research trip was the closest thing to going into space I expect to experience in this lifetime, but the geology--and the landscapes it forms--was worth every ounce of effort it took to get there and back again.

Biography: Just back from the icy continent of Antarctica, Geologist **Sarah Andrews** is the author of ten mystery novels about geology and geologists. Not surprisingly, here core readership lies among her colleagues. While working for the USGS, the oil business, environmental cleanup, and teaching geology, Sarah developed her **Em Hansen forensic geology series** to help build a bridge between geoscience and the public it serves. Her many awards include a 2005 grant from the National Science Foundation's Antarctic Artists and Writers Program to travel to Antarctica to research the eleventh novel in the series. Her novels cover applications of geology to oil and gas, environmental services, paleontology, mining, seismicity, government research, and forensic



science. She has been interviewed on radio, and in print media, and frequently lectures on science. In addition articles she has written have appeared in Geotimes (*Why Study Geology?*) and the Association of Engineering Geologists (*The mind of the geologist).* She received her M.S. degree in Geology in 1981 from Colorado State University, and is licensed in California as a Professional Geologist. Visit her website at: http://www.sarahandrews.net/index.htm

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

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 2005-2006 Calendar

Wednesday January 25, 2006
Sarah Andrews , Author, Em Hansen Forensic Geology Novels
Art Meets Science on the Cold Continent
7:00 pm at Orinda Masonic Center

Wednesday February 22, 2006
Dr. Richard Buffler, University of Texas at Austin
Geologic Setting of the Abdur Archaeological Site on the Red Sea Coast of Eritrea, Africa
7:00 pm at Orinda Masonic Center

Wednesday March 29, 2006
Dr. Mary Lou Zoback, U.S. Geological Survey, Menlo Park
The 1906 Earthquake – Lessons Learned, Lessons Forgotten, and Looking Forward
7:00 pm at Orinda Masonic Center

Wednesday, April 26, 2006
Kathleen Burnham, Consultant
San Gregorio and Northern San Andreas Faults, Point Lobos to Point Reyes, CA
(This is a lead-in to the May 2006 field trip: ***Point Lobos to Point Reyes: Evidence of ~180 km Offset of the San Gregorio & Northern San Andreas Faults***)
7:00 PM at Orinda Masonic Center

Wednesday May 31, 2006
Dr. George Brimhall, UC Berkeley
A History of Field Geology at UC Berkeley, and Issues Facing Field Geology Training Programs Today
(This is a lead-in to field trip in September 2006: ***Field Geological Mapping Using Modern Technology***)
7:00 PM at Orinda Masonic Center

Wednesday June 28, 2006
Robert Kayen, US Geological Survey
Title TBA
7:00 pm at Orinda Masonic Center

Wednesday September 27, 2006
Dr. Doris Sloan, University of California, Berkeley
Dr. John Karachewski, Weiss Associates
Slide Show Lead-in to Book Publication **(*Geology of the San Francisco Bay Region,* UC Press; (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 cyclicity of the Santa Clara Valley area, CA/Fault and bedrock mapping from Sonoma into northernmost Contra Costa counties, CA (Title TBA)
7:00 pm at Orinda Masonic Center

1906 Earthquake Centennial

Seismological Society of America
100th Anniversary Earthquake Conference
Managing Risk in Earthquake Country
April 18 – 22, 2006
Moscone Center, San Francisco

The anniversary of the 1906 Earthquake is a valuable opportunity for earth scientist, engineers, policy makers, emergency responders and businesses to take stock of how well we are protecting our communities and mitigating the dangers associated with earthquakes. To attend the premier disaster mitigation conference in 2006 visit the conference website (www.1906eqconf.org). Early registration prices end March 17th.

For a full listing of centennial events visit the website of the ***1906 Earthquake Centennial Alliance*** (http://www.06centennial.org/). Events will range from professional meetings, multiple museum exhibits, commissioned music to be played by the Contra Costa Wind Symphony, and much more. NCGS events (below) will be posted to the website shortly.

NCGS Centennial Events

March 2006 — **Field Trip** - ***A Walk Along The Old Bay Margin in Downtown San Francisco - Tracing The Events of The 1906 Earthquake and Fire,*** **Dr. Ray Sullivan,** Emeritus, San Francisco State University

See Attached Field Trip Flyer

NCGS Centennial Events, Continued

March 29, 2006 — **Monthly Meeting** - ***The 1906 Earthquake – Lessons Learned, Lessons Forgotten, and Looking Forward***, **Dr. Mary Lou Zoback**, U.S. Geological Survey, Menlo Park

April 2006 — **Family Field Trip** - ***Tracing the Hayward Fault – A Potential Disaster Area,*** **Dr. Joyce Blueford and Others**, Fremont Math Science Nucleus and California Geological Survey, respectively

See Attached Field Trip Flyer

April 26, 2006, — **Monthly Meeting** - ***San Gregorio and Northern San Andreas Faults, Point Lobos to Point Reyes, CA*** **Kathleen Burnham,** Consultant

May 20 – 21, 2006 — **Field Trip** - ***Point Lobos to Point Reyes: Evidence of ~180 km Offset of the San Gregorio & Northern San Andreas Faults,*** **Kathleen Burnham**, Consultant

See Attached Field Trip Flyer

Other Upcoming NCGS Field Trips

(See Also – NCGS Centennial Events)

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

For questions regarding these field trips, please contact Tridib Guha at: tridibguha@sbcglobal.net

NCGS Scholarship Awards Year 2005 – 2006

The Northern California Geological Society is pleased to announce the availability of three scholarship awards for the 2005-2006 academic year:

Graduate Scholarship Award (MS Degree) of $750
Graduate Scholarship Award (PhD Degree) of $1,000
For candidates working toward the MS or PhD degrees; Funding is provided for projects implemented during the 2006 calendar year. *Application deadline is January 31, 2006 for a February 28, 2006 award date*

Individual scholarship announcements with instructions can be requested from and proposals submitted 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

Funding priority will be directed to research programs focused on topics in mapping, structural, stratigraphic, economic, engineering or environmental geology, geophysics, stratigraphic paleontology, or paleoecology, implemented within the State of California or immediately adjacent western states. Funds are intended to support field and laboratory components of research programs. Candidates will be evaluated based on submission of a cover letter requesting the award, a brief (no more than 2 page) summary of the proposed research topic, and a faculty signature confirming departmental approval of the application. Winners will be invited to speak or otherwise present their research at a regular evening NCGS meeting in Orinda, California.

Northern California Geological Society and the American Association of Petroleum Geologists

K-12 Earth Science Teacher of the Year Award

$750 Northern California Geological Society
$500 Pacific Section AAPG
$5,000 National AAPG

Call for Nominations for the Year 2006 NCGS Competition

The Northern California Geological Society (NCGS) is pleased to announce that it will accept applications from candidates in the Northern California region for the Year 2006 competition for the Earth Science Teacher of the Year Award. The $750 NCGS award is intended to recognize pre-college earth science programs already in place, and to encourage their organization in districts where they have not been fully developed. Nominations of qualified K-12 teacher candidates are solicited from teachers, school administrators, teacher outreach programs, and other interested parties.

The NCGS awardee's application will be submitted to a regional competition sponsored by the American Association of Petroleum Geologists (AAPG) Pacific Section. The Pacific Section winner will receive a $500 award at the Pacific Section regional meeting in Anchorage, Alaska in May, 2006, plus up to $250 toward meeting expenses. The regional winner's project will be submitted to AAPG headquarters for the national contest. The national winner will receive an expense-paid trip to Long Beach in 2007 to attend the national meeting and receive the award.

At the national level, the AAPG Foundation presents an annual $5,000 award to a K-12 teacher for *Excellence in the Teaching of Natural Resources in the Earth Sciences.* The award recognizes balanced incorporation of natural resource extraction and environmental sustainability concepts in pre-college Earth science curricula. It includes $2,500 to the teacher's school for the winning teacher's use, and $2,500 for the teacher's personal use. The award will be given at the April 2007 AAPG Annual Meeting in Long Beach, California.
The deadline for application submittal by candidates for the $750 NCGS award is Friday, February 17, 2006.

Interested candidates or nominators can request Application Information and an Entrant Application Form, or submit an application, by contacting:

John Stockwell, Chair, K-12 Geoscience Education Committee
Northern California Geological Society
1807 San Lorenzo Avenue
Berkeley, California 94707-1840
Tel: (510) 526-1646
e-mail: kugeln@msn.com

The Origin, Evolution and Social Impact of Coastal Cliffs

Reported by Dan Day

The June 29, 2005 NCGS meeting delved into a topic familiar to most Californians – the origin and evolution of coastal cliffs, and their economic influence on modern society. The speaker was **Dr. Monty Hampton**, one of the most knowledgeable persons on this subject. His presentation **"Formation and Evolution of Coastal Cliffs (Or the All-Time Shortest Coastal Cliffs Short Course)"** was a comprehensive study of coastal cliff development**,** geomorphology, and impact on manmade structures.

Coastal cliffs provide romantic, often breath-taking views of oceans and lakes. They entice development near steep precipices, risking the possibility of plunging into the surf below as the cliffs erode. Financial losses have prompted experts and government agencies to explore coastal geomorphic processes to assess public risk, mitigate potential problem areas, and guide contractors to stable development sites.

Coastal processes are complex and influenced by several independent factors. Tectonic uplift, eustatic sea level changes, and lithology are the most critical. Before evaluating their effects, it is best to digress and examine coastal cliffs on a broader scale.

Most individuals envision coastal cliffs as high, steep-faced edifices pounded by surf far below. A closer look, however, shows a range in cliff morphology, from near vertical to gently sloping. Tectonic setting has a strong influence on coastline development, and coastal cliff evolution. Passive continental margins like the Atlantic seaboard reflect stable conditions, low shoreline relief, and broad continental shelves

with depositional landforms such as beaches and dunes, or offshore bars and barrier islands. Tectonically active margins, like the Pacific coast, are dominated by erosional landforms, rugged shorelines, and coastal cliffs. Coastal cliffs are not strictly a marine phenomenon but also occur on large inland bodies of water such as the Great Lakes. Lacustrine cliffs are smaller than ocean cliffs and are often referred to as "bluffs." Although not typical of passive margins, coastal cliffs are not limited to active tectonic margins.

Why are coastal cliffs important? They occupy about 80% of ocean coastlines and are a dominant erosional feature. Coastal cliffs are more prevalent during sea level highs (such as current global conditions), and they are being heavily developed for human habitation. Coastal cliffs form where the ocean shore is elevated, typically under conditions of tectonic uplift, regardless of lithology. Active margins, such as the west coast of North America, provide these conditions, but cliffs can also form along inactive margins where prior tectonic or sedimentary processes have elevated the land. Most of today's coastal cliffs formed after the most recent ice age, the Wisconsin stage of the Pleistocene epoch, or during earlier Pleistocene eustatic transgressions. The end of the Wisconsin glaciation occurred about 21,000 years ago, when sea level was about 120 meters lower than today. As the Wisconsin ice sheets melted, sea level rose eustatically (by increase in water volume) at an estimated rate of nearly 1 cm per year up to 5,000 years ago. From then until the present time, sea level has risen much more slowly, only a few mm per year. The sea level transgression along elevated shorelines eroded the coast and formed an abrupt step or cliff at the water-land interface. Filling of the Great Lakes basin after the Wisconsin Ice Age produced cliffs along uplifted shorelines. Some of the post-glacial uplift, particularly along the Atlantic seaboard, was produced by about 60 meters of glacial rebound post-dating the eustatic sea level rise. In tectonically active regions, like the California coast, periodic coastal uplift has produced a terracing effect as older coastlines are uplifted and a new cliff face forms seaward. Where the coastline is sinking, or the sea level is rising, the cliff face is sharply defined and gradually migrates landward.

Subaerial erosional processes interact with marine or lacustrine processes to control cliff face morphology. Each, by itself, can play an important role in shaping cliff profiles. Steep, unvegetated cliffs with a sharply-defined crest and absence of debris buildup at the base indicate an actively retreating cliff face dominated by marine erosion. A gently sloping convex to sigmoidal cliff profile with a rounded upper crest indicates an inactive or abandoned cliff sculpted by subaerial erosion. Alternating marine and terrestrial erosional processes during glacial-interglacial cycles produce composite cliff profiles. The interaction between marine/lacustrine versus subaerial erosion, and lithology ultimately control cliff morphology. Lithology also includes important mechanical features such as jointing and bedding planes, which have a strong influence on the integrity of the cliff face and how rapidly it deteriorates. Other secondary structural features controlling cliff face development are folds and faults, which can produce differential erosion.

Coastal cliff erosion is a four step process: 1) material is dislodged from the cliff face; 2) dislodged material is transported down the cliff face; 3) debris accumulates at the cliff base; and 4) debris is removal from the cliff base by wave activity. A cyclical model can be devised for coastal cliff formation using this four step model. Basal wave erosion undercuts the cliff face and oversteepens it. The weakened unsupported cliff face collapses. The debris accumulated at the cliff base initially protects the cliff from further wave attack, allowing subaerial erosion to reduce the cliff slope. Eventually the basal talus is removed by wave action and the cycle repeats itself.

Environmental factors that affect coastal cliff evolution can be divided into exposure and susceptibility categories. Exposure refers to the magnitude and frequency of forces acting on the cliff face, and the susceptibility factors are material vulnerability to these forces. The latter is strongly influenced by material properties of the exposed rock units. Sea level/lake level rise and wave action are the fundamental to coastal cliff development. When these functions cease to operate on the cliff face, the cliff deteriorates. Active cliff formation can be affected by several processes, mostly terrestrial, yielding complex results. Each cliff site is unique and requires careful examination to characterize its evolution.

Sea level change is a principal factor in coastal cliff development. Low relief coastlines show deeper transgression with small increases in sea level than higher relief coastlines. The post-Wisconsin eustatic

rise in sea level resulted in over 100 km. of local coastal retreat (ocean transgression) on the Atlantic seaboard. Global warming could augment eustatic sea level rise. Tidal records over the last century indicate an average of 3 mm/year sea level rise on the Atlantic coast due to the combined effects of eustacy and land subsidence. On the Alaskan-Canadian Pacific coast, decreases in relative sea level can be linked to terrestrial rebound as alpine glaciers rapidly retreat.

Tidal cycles, particularly high tide elevation, contribute to coastal cliff erosion. Maximum erosion occurs at high tide. The higher the tide, the more opportunity for cliff face erosion. Tidal levels can be predicted from astronomical calculations involving the positions of the sun, moon, and earth. However, climatological factors can enhance tidal surges, particularly in El Niño years. This effect was painfully evident during the 1982-1983 California rainy season, when unusually high tides coincided with seven El Niño-driven storm events. These resulted in significant coastal cliff erosion and the destruction of numerous shoreline structures. The Great Lakes coastlines are also affected by rainfall. Years of high rainfall raise the water levels and consequently prolong wave action on shores. Other influences include annual climate effects involving evaporation rates and mean annual temperatures.

A secondary effect confined to tectonically active coastlines is earthquake activity that can trigger major landslide events. Landslide activity is a major factor on the island of Molokai, Hawaii, where enormous submarine block sliding is manifested by 1000 meter-high vertical scarps along its northern coastline.

Groundwater activity can impact coastal cliff evolution. Seepage along the cliff face and weakening of the rock units renders them more susceptible to wave action. Agricultural and commercial irrigation on cliff terraces can result in localized erosion where runoff occurs or landsliding as the underlying strata become water-saturated.

Dr. Hampton's presentation featured numerous slides illustrating coastal cliff activity along the California to Washington State coastline, and key locations on the eastern seaboard and the Great Lakes. Many depicted manmade effects and tragic property losses from ill-placed structures. As remediation and damage costs have soared, the public, corporations, and government agencies have turned to earth scientists to devise means of mitigating future losses.

The solutions are difficult to find and are not always what developers and home owners want to hear. Stabilization of actively retreating, cliff faces is very expensive and does not always work. Devil's Slide near Pacifica and California's Big Sur Highway 1 recurring landslides are costly examples of questionable remediative action. Analytical models of landslide slope stability are functional in two dimensions (vertical slices normal to the slip direction) and are reasonably accurate models of actual situations, but admittedly neglect lateral forces acting on landslide blocks. Although computer modeling has made major strides in recent years, they cannot replace careful field analysis and monitoring. Landslide stabilization techniques are perhaps the most successful methods of minimizing a specific kind of coastal cliff failure.

Coastline development relies heavily on accurate risk assessment and successfully presenting the analytical results to real estate development agencies. Strip maps defining shoreline environments, aerial photographs, and Army Corps of Engineers maps taken over the years are used to track episodic cliff retreat rates. Probabilistic methods applied to coastal cliff data show promise as a tool for predicting future cliff face erosion. Landslide hazard evaluation can also be used to determine risks to urban, residential, and commercial development. However, Monty noted that there are no consistent criteria that local government planning agencies use to determine setback distances for coastal cliff development. Noting the recurrence of structural losses during cliff failure/retreat events, it appears that some of these criteria need to be re-evaluated. Collaboration between the public and government sectors with coastal cliff researchers needs to be cultivated to establish a successful code for coastal cliff development. Dr. Hampton and other experts are working on this relationship.

The NCGS and its members give their sincerest thanks to Dr. Monty Hampton for a thoroughly entertaining presentation of coastal cliff evolution and its influence on shoreline development. His insight into coastal geomorphic processes is greatly appreciated.

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS FIELD TRIP IN COMMEMORATION OF 1906 EARTHQUAKE CENTENNIAL

A WALK ALONG THE OLD BAY MARGIN IN DOWNTOWN SAN FRANCISCO – TRACING THE EVENTS OF THE 1906 EARTHQUAKE & FIRE

Sunday March 19, 2006
Leader: Dr. Raymond Sullivan, Professor Emeritus, SFSU

The field trip follows the events that happened on the first day of the April 18, 1906 earthquake and fire. The walk will begin at the Civic Center located at the edge of the old Mission Bay marshland. Stops will be made along Sixth Street and the subsidence area in the South of Market. This part of the City was "ground zero" at dawn on that fateful day since this was the area of greatest damage, and many of the fires originated here. The walk follows the path of the fire as it moves onto Market Street. Stops will be made at some of the pre-1906 buildings along Market, as well as Lotta's Fountain, and the old shoreline marker of Yerba Buena Cove at Mechanics Monument. The walk continues along Montgomery Street following the path of the fire as it spread into the Financial District. A lunch is planned in a restaurant in Chinatown. After lunch, we will visit Portsmouth and Jackson squares ending up at the foot of Russian Hill. The field trip is planned as a fun trip. It would be of interest to families although it does involve quite a bit of walking.

THIS FIELD TRIP WILL BE LIMITED TO 30 PEOPLE.

********** **Field Trip Logistics** **********

Time & Departure: March 19, 2006, 9:00 am (sharp), outside Civic Center BART station at Market & Hyde Street.

Cost: $30/person

**********REGISTRATION FORM (San Francisco Walk Field Trip)**********

Name:_____ E-mail:_____

Address:_____ Phone (day):_____ Phone (evening):_____

Lunch: Regular:_____ Vegetarian: _____ (Please check one) Check Amount: _____

Please mail a check made out to **NCGS** to: **Tridib Guha**
5016 Gloucester Lane,
Martinez, CA 94553

Questions: e-mail: tridibguha@sbcglobal.net Phone: (925) 370-0685 (evening - PREFERRED) (925) 363-1999 (day – emergency)

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS FIELD TRIP IN COMMEMORATION OF 1906 EARTHQUAKE CENTENNIAL

TRACING THE HAYWARD FAULT – A POTENTAIL DISASTER AREA

Saturday April 15, 2006
Leaders: Dr. Joyce Blueford, Math Science Nucleus, Fremont
Dr. Mitchell Craig, CSU East Bay, Hayward

The Hayward fault is a major branch of the San Andreas Fault system in northern California. Many geomorphic features that are indicative of active movement on the Hayward fault have been destroyed by urbanization. This field trip will center on two segments of the Hayward Fault where surface features can still be observed. The first part will center on the Fremont area near Tule Ponds and the second part will look at the Hayward area.

Tule Ponds at Tyson Lagoon has been a site of fresh water for at least the last 3700 years. This sag pond outlines the trace of the Hayward fault zone in this area. Observations of brittle deformation and liquefaction features in trenches just north of this area indicate there may have been 6-8 large earthquakes during the last 2000 years (Lienkaemper et al., 2002). Participants will be able to see a peel of one of the trenches to observe stratigraphic features. After walking along the two traces of the Hayward Fault, we will walk south of Tule Ponds to observe evidence of movement along Walnut Ave. The walk will continue toward Lake Elizabeth to observe other geomorphic and structural features.

We will leave Fremont and drive north along Mission Blvd. to Hayward. For most of this stretch, the active trace of the fault runs parallel to Mission Blvd. and is seldom more than a quarter mile away from the road. Abundant geomorphic evidence of the fault can be seen from the road, including linear ridges that block stream drainages. At Palisade St., creep of the fault has caused offset of sidewalk and curbing. At Spring Dr., the fault acts as a groundwater barrier and has created a natural spring. At Hayward Memorial Park, a stone wall built in the 1930s has been offset by fault creep. In downtown Hayward we will follow the active trace of the fault on foot and observe evidence of fault creep in offset sidewalk curbs, offset walls of buildings, and en-echelon cracks of asphalt pavement. The wall of one brick building is being pulled apart at its base but is still connected at its top. The old Hayward City Hall sits astride the active trace and has been damaged by fault creep. San Lorenzo Creek, which crosses the Hayward fault in downtown Hayward, has evidently been offset approximately one mile by accumulated slip and creep along the fault.

THIS FIELD TRIP WILL BE LIMITED TO 30 PEOPLE.

********** **Field Trip Logistics** **********

Time & Departure: April 15, 2006, 8:30 am (sharp), at MSN, Fremont..
Cost: $35/person

**********REGISTRATION FORM (Hayward Fault Field Trip)**********

Name:_____ E-mail:_____

Address:_____ Phone (day):____ _____ Phone (evening):_____

Lunch: Regular:_____ Vegetarian: _____ (Please check one) Check Amount: _____

Please mail a check made out to **NCGS** to: **Tridib Guha**
5016 Gloucester Lane,
Martinez, CA 94553

Carpool and vanpool is a must for this fieldtrip. Please let us know if you can drive and NCGS can reimburse your gasoline expenses.

Questions: e-mail: tridibguha@sbcglobal.net Phone: (925) 370-0685 (evening - PREFERRED) (925) 363-1999 (day – emergency)

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS FIELD TRIP IN COMMEMORATION OF 1906 EARTHQUAKE CENTENNIAL

Pt. LOBOS TO Pt. REYES: EVIDENCE OF ~ 180 Km OFFSET OF THE SAN GREGORIO & NORTHERN SAN ANDREAS FAULT

Saturday - Sunday May 20-21, 2006
Leader: Kathleen Burnham

NCGS member Kathleen Burnham will lead a two-day field trip in the spring of 2006, as part of NCGS' contribution to the 1906 Earthquake Centennial. The field trip is entitled, "Point Lobos and Point Reyes: evidence of ~180 km offset of the San Gregorio-Northern San Andreas Fault." Participants will examine granitic rocks, conglomerate, and trace fossils at Point Lobos State Park, near Monterey, and then drive ~180 km along the San Gregorio and northern San Andreas faults to Olema, north of San Francisco. On day two, we will examine correlative rocks at Point Reyes National Seashore, as well as a 16 ft. (5m) offset of the 1906 San Francisco earthquake. This will be an interactive, rather than lecture-style field trip. This trip will be substantially different from Clark and Brabb's 1996 field trip. Tentative dates are Saturday and Sunday, April 29-30, 2006, and will probably include optional camping at Pfeiffer-Big Sur State Park on the preceding Friday night.

Roughly 50 million years ago, the granitic rocks and conglomeratic turbidites of Point Lobos and Point Reyes were parts of a single deep submarine canyon system. During the past 27 million years, they've been separated approximately 180 km by dextral slip of the San Gregorio and northern San Andreas faults. Similarity of these rocks has been noted as far back as 1899, but Kathleen's research establishes details which nail down the correlation. Her paleogeographic reconstruction has proved predictive: since its first introduction, other geologists have proposed four geologic and geophysical correlations which fit her model. Point Reyes and Point Lobos are stunningly beautiful, and may be the only pair of localities on earth in which evidence of a large lateral offset is preserved in public parks at both ends.

THIS FIELD TRIP WILL BE LIMITED TO 27 PEOPLE.

********** **Field Trip Logistics** **********

Time & Departure: TBA **Cost**: $125/person

**********REGISTRATION FORM (San Francisco Walk Field Trip)**********

Name:_____ E-mail:_____

Address:_____ Phone (day):_____ Phone (evening):_____

Lunch: Regular:_____ Vegetarian: _____ (Please check one) Check Amount: _____

Please mail a check made out to **NCGS** to: **Tridib Guha**
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Questions: e-mail: tridibguha@sbcglobal.net Phone: (925) 370-0685 (evening - PREFERRED) (925) 363-1999 (day – emergency)