

Summary notes from the March 6-7, 2006 meeting of the  
Scientific Earthquake Studies Advisory Committee (SESAC)  
USGS National Center

**Meeting Participants**

**SESAC**

Lloyd Cluff, Chair, Pacific Gas & Electric

Jim Dieterich, University of California at Riverside and Chair, National Earthquake Prediction  
Evaluation Committee

Ron Eguchi, ImageCat Inc.

Tom Jordan, University of Southern California/ Southern California Earthquake Center  
Art Lerner-Lam, Center for Hazards and Risk Research, The Earth Institute, Columbia  
University

Vicki McConnell, Oregon Department of Geology & Mineral Industries

Jonathan Price, Nevada Bureau of Mines and Geology

Robert Smith, University of Utah

Unable to attend: Sharon Wood, University of Texas at Austin

Paul Somerville, URS Corporation

**USGS**

David Applegate, Senior Science Advisor for Earthquake & Geologic Hazards

Michael Blanpied, Associate Coordinator, Earthquake Hazards Program

Rufus Catchings, Chief Scientist, Western Region Earthquake Hazards Team

Jim Devine, Senior Advisor for Science Applications

Lind Gee, Chief, Global Seismographic Network Project

Linda Gundersen, Acting Associate Director for Geology

Pat Leahy, Acting Director

William Leith, Coordinator, Advanced National Seismic System

Elizabeth Lemersal, External Research Support Manager, Earthquake Hazards Program

Jill McCarthy, Chief Scientist, Central Region Geologic Hazards Team

Bill Werkheiser, Chief, Hazards Initiative Design Team

**Invited Guests**

Tina Faecke, Building and Fire Research Laboratory, National Institute for Standards &  
Technology

David Green, Tsunami Program Coordinator, NOAA

Jack Hayes, Director, National Earthquake Hazards Reduction Program

Kaye Shedlock, EarthScope Program Director, National Science Foundation

Shyam Sunder, Deputy Director, Building and Fire Research Laboratory, National Institute for  
Standards & Technology

Greg van der Vink, Director, EarthScope Facility Project

*The meeting agenda is appended to this summary with annotations for file names of Powerpoint presentations that were provided earlier on a separate CD.*

## **March 6, 2006 (Open Session)**

### Call to Order and Introductions

SESAC Chairman Lloyd Cluff began the meeting at 8:30 a.m., and attendees introduced themselves. Cluff welcomed three newly appointed SESAC members: Jim Dieterich from University of California Riverside, Art Lerner-Lam from Columbia University, and Vicki McConnell from the Oregon Department of Geology and Mineral Industries. He also noted that this was the final meeting for departing SESAC members Ron Eguchi and Bob Smith.

### State of the USGS Geologic Discipline

USGS Acting Associate Director for Geology Linda Gundersen provided an overview of the budget for the Geologic Discipline, with focus of discussions from the committee on the state of the Earthquake Hazards Program's (EHP) finances given that 90% of appropriated funds that go to salaries and rent while only 6.6% are available for operating expenses (OE), the smallest percentage of any of the Discipline's programs. Current OE is very tight, as 20% is considered healthy. Monitoring is equipment-intensive, so the focus that EHP has had on upgrading systems through the Advanced National Seismic System (ANSS) has resulted in a further decline in the previously tight OE within the last couple of years. Shifting salary costs from healthier programs within Geology was suggested, but with the staff specialization that exists and is necessary for EHP work, there is little applicability to be gained by shifting staff. Gundersen noted that careful management of funds by the teams and reimbursable-funded efforts have been insufficient to counter the growth in salaries and benefits that takes place each year. Despite strong support for USGS hazards and energy work from the Administration and Congress, the next few years will likely be lean budget years. She also discussed competitive sourcing, i.e., the continuing efforts to evaluate various components of the USGS in order to outsource functions that are not inherently governmental. The science function will be evaluated in 2008, so it is important to carefully identify what inherently governmental means with regard to GS-12 and above research scientists.

### NEHRP lead agency

Shyam Sunder, Deputy Director of the National Institute of Standards and Technology (NIST) Building and Fire Research Laboratory, described NIST's plans for carrying out its duties as the designated lead agency for the National Earthquake Hazards Reduction Program (NEHRP) in the short term, despite the lack of new funds from Congress. NIST has set up a NEHRP office headed by Jack Hayes, who came to NIST from the U.S. Army Corps of Engineers research lab in Champaign-Urbana, Illinois. NIST is covering the bulk of the cost of the office but is also receiving contributions from the other NEHRP agencies (USGS, NSF and FEMA). Former EHP Coordinator John Filson's participation in NEHRP lead agency activities is fulfilling USGS's in-kind contribution to manage NEHRP. Comments on the existing NEHRP strategic plan are being requested in order to update the plan; the web page for comments will be sent to SESAC members. Sunder asked for the committee's input on the need for NEHRP and was answered that the earthquake hazard requires a special focus or runs the risk of being lost within the current multi-hazard focus. It was suggested that NIST seek input from the regional earthquake consortia regarding federal-state linkages necessary for policy development and implementation.

### U.S. tsunami activities

A series of presentations were made describing how USGS and NOAA have used the supplemental funding that followed the Indian Ocean tsunami as part of the President's tsunami warning initiative. Many developments have taken place in the short time frame required by Congress. Jim Devine, USGS Senior Advisor for Science Applications, summarized the national tsunami implementation plan recently produced by the National Science and Technology Council as well as U.S. participation in international coordination efforts.

Jill McCarthy, Geologic Hazards Team Chief Scientist, described the USGS role in the initiative and updated the committee on progress toward improved operations at the National Earthquake Information Center (NEIC) and the Global Seismographic Network, including deployment of a regional network in the Caribbean. NEIC's response time is down 50% for global earthquakes. The discussion included planned capabilities and possible enhancements to the Prompt Assessment of Global Earthquakes for Response (PAGER) system, including the evaluation of secondary hazard potential, and making alerts more visible, especially to policy makers. Eguchi noted the need for better exposure data.

David Green, NOAA's Tsunami Program Manager, summarized the structure and current activities of the NOAA's tsunami program, which deals with hazard assessment, warning guidance, and mitigation. As outlined in the national tsunami plan, the National Tsunami Hazard Mitigation Program – a federal-state partnership – is to serve as a framework for tsunami-related activities. The top priority for NTHMP is developing a first-ever national tsunami hazard and risk assessment. A major challenge is sustainability of these systems, in particular sustaining international support. Another challenge is the difficulty in supporting low-profile activities like data archiving and management.

The committee recommended that Green be invited to visit the NEIC in Golden. The committee also discussed the importance of integrating geodesy into earthquake warning capabilities, and it was suggested that a working group be established on how to accomplish that.

### EarthScope partnership

Applegate provided an overview of the USGS role in the EarthScope partnership and reviewed the EarthScope opportunities identified by SESAC in its 2005 report.

Kaye Shedlock, NSF EarthScope Program Director, presented an overview of the current state of EarthScope, including research funding, education and outreach, and the recent baseline review process. She indicated that the EarthScope Science and Education Committee, which was a chartered advisory committee similar to SESAC, is being phased out after NSF decided that individual programs (as opposed to divisions or directorates) should not have advisory committees. Shedlock encouraged SESAC to provide input to EarthScope. The committee discussed the need for USGS to plan how to incorporate growing amounts of geodetic and InSAR data into hazard assessments. Price suggested that EarthScope deployment will lead to better understanding of velocity structure and potentially better estimates of detection thresholds.

Greg van der Vink, EarthScope facility director, described the scientific mission of EarthScope, the various elements of the facility, and how the program's performance is monitored using earned value management. Uses of EarthScope data and the future use and maintenance of

instruments were discussed, including interest from regional seismic networks in maintaining some key USArray sites beyond their 18-month deployment.

There was a committee question on how many USGS external grants use EarthScope data. There was also a discussion of the relation between EarthScope and NSF's contributions to NEHRP. Shedlock will send Applegate a copy of what the Earth Science Division considers as contributions to NEHRP.

#### USGS update from Acting Director Leahy

USGS Acting Director Pat Leahy provided the committee with a summary of the USGS fiscal year 2007 budget request, which is \$944 million, down from the FY 2006 appropriation of \$970 million. The request includes \$2.1 million for a Multi-Hazard Demonstration Project in Southern California, the first part of the Survey's hazards initiative, which Leahy described as a good start that he hoped to grow over time as happened with the National Water Quality Assessment Program and DOI's Water 2025 initiative. Leahy is pleased to see the re-chartering of the National Earthquake Prediction Evaluation Council (NEPEC). He discussed recent visits to earthquake offices in Golden and Menlo Park and is impressed with NEIC renovations and Menlo Park's work with partners. The NRC report *Improved Seismic Monitoring Improved Decision-Making* was discussed (SESAC members have received this report.) Leahy mentioned that a briefing to DOI by Chris Poland on the report could be useful. Committee discussion included the need to expand current efforts to boost monitoring to include science and interpretation. Jordan proposed complex natural systems as a way to frame the issue with the assertion that the USGS seismic hazard analysis represents one of the most complex models that the US government puts out.

At the end of the discussion, Leahy presented departing SESAC members Eguchi and Smith with USGS benchmark plaques and thanked them for their service to USGS and the cause of earthquake loss reduction.

#### Earthquake Hazards Program update

Applegate provided an overview of recent EHP activities, including a discussion of program performance measures and steps being taken to carry out the program's OMB Program Assessment Rating Tool (PART) Improvement Plan. Recent extreme events coupled with the 1906 centennial commemoration activities in the Bay Area have resulted in an increased awareness of earthquake issues nationwide. Price encouraged EHP to assure that media tools go out to partners related to the 1906 event activities.

#### ANSS Steering Committee report

Bill Leith summarized ANSS progress and outlined the committee and reporting structure and how it is evolving as ANSS is built. ANSS benefits have been determined to be three times the operational costs. It was noted that, at the current \$8.1 million funding level, by 2008 all ANSS funds will be dedicated to O&M, and none to installation and acquisition of new stations. Future milestones for expanding the system were described.

#### Status of Geologic Hazards Team and Earthquake Hazards Team

Jill McCarthy presented a fiscal overview and reported on scientific activities in the Central Region Geologic Hazards Team. The fiscal situation is not good, as previously discussed by Linda Gunderson, because the salary burden continues to rise against flat budgets. Western

Region Earthquake Hazards Team chief Rufus Catchings presented an overview of projects and the team's overall situation. The team faced serious salary shortfalls in FY 2006, which were closed largely through an increase in reimbursable funding. Despite some scientists taking an early-out offer, significant financial problems are anticipated to continue given continued flat funding from EHP.

### **March 7, 2006 (Open Session)**

#### Opening remarks

Applegate summarized the first day discussion and the agenda topics for the second day. He noted that the focus so far had been on providing a picture of the current health of the program, particular the challenges the teams face in obtaining adequate support and that ANSS faces in continuing to expand rather than simply maintaining current systems. The funding associated with the tsunami initiative and the early-out/buyout kept the wolf from the door temporarily, but additional program growth is necessary to avoid a major reduction in EHP's ability to carry out its mission. With that in mind, the second morning focuses on plans for the future, in particular the hazards initiative. Cluff commended the presentation provided by Pat Leahy, which should serve the committee well in its deliberations.

#### Hazards Initiative

Bill Werkheiser, Hazards Initiative Design Team Chief, provided the background, purpose, and goals for the integrated multi-hazards demonstration project and the development of success measures. The demonstration project covers earthquakes, floods, coastal hazards, and the wildfire-debris flow cycle. It is expected to have an initial five-year lifespan in order to demonstrate results that can be achieved from a broader hazards initiative of which it is the initial piece.

The project is being headed by Lucy Jones, EHP Southern California Coordinator and Scientist-in-Charge of the USGS Pasadena Office, who gave a presentation on recent stakeholder sessions she held to receive up-front input to a strategic plan for the project. The message back from emergency managers (including the City of Los Angeles, U.S. Forest Service, National Park Service, Warner Brothers, and several counties) was that they wanted tools for scenario planning, and an initial effort of the project will be to put together existing research to generate scenarios of coupled hazards, for example a summertime earthquake that triggers wildfires and winter storms that cause coastal erosion and inland debris flows in wildfire-burned areas.

The scenario development process will also provide a guide for research needed to fill community needs, identifying where the gaps are and use that as a prioritization of future research. The FY 2007 budget request includes \$1.5 million that is to be accompanied by \$3.7 million in internally redirected spending. New funds will be directed toward, among other activities, a study of the southern San Andreas fault, additional streamgages, and a prototype debris-flow early warning system. The project is being overseen internally by a steering committee of scientists from each hazard plus those dealing with social and ecological consequences. The intention is to understand how existing science can be used, not just focusing on new science.

Committee discussion included the need to identify specific decisions that could be better informed by this project, the makeup of the stakeholder workshops, and the need to engage infrastructure owners.

#### Re-chartering of National Earthquake Prediction Evaluation Council (NEPEC)

NEPEC Chair Jim Dieterich reported that the council has been approved and is in the process of launching. Committee membership includes both experienced NEPEC veterans as well as new faces who bring a wide range of expertise related to predictability issues. The committee's first meeting, scheduled for May in Menlo Park CA, will focus on defining the committee's role and scope of activities (e.g. how proactive vs. reactive, whether to undertake regional reviews) as well as ground rules. Committee discussion included the active role that NASA is playing in supporting prediction research, and Dieterich noted that the first meeting would include a presentation by NASA. The relation of NEPEC to the existing California Earthquake Prediction Evaluation Council (CEPEC), which provides guidance to the state's Office of Emergency Services, was also raised; Price suggested establishing a formal MOU or similar process in place for CEPEC-NEPEC interaction. CEPEC leadership will be at the initial NEPEC meeting in order to address that issue upfront. Jordan encouraged NEPEC to play a strong role in reviewing the Working Group on California Earthquake Probabilities. Cluff suggested that all NEPEC members should read Richard S. Olson et al.'s book *The Politics of Earthquake Prediction* and the account it provides of NEPEC deliberations in 1980 following the Brady-Spence prediction of a major subduction-zone earthquake off the coast of Peru. Other points of discussion included whether the council would address earthquakes in volcanic systems, early warning (Dieterich viewed as marginal to NEPEC charter, would take up only if USGS asks), ShakeMap and prediction of earthquake effects including ShakeMap, the National Seismic Hazard Maps (Dieterich suggested a focus on time-dependent maps or earthquake potential), and whether to limit scope only to scientifically credible predictions.

#### Collaboratory for the Study of Earthquake Prediction

Tom Jordan followed up the NEPEC discussion with a presentation on the Southern California Earthquake Center's (SCEC) proposal to establish a Collaboratory for the Study of Earthquake Predictability (CSEP), which has received initial funding of \$1.2 million from the Keck Foundation. Jordan noted the challenge NEPEC faces of convening in a room to evaluate predictions without the necessary testing infrastructure. CSEP is intended to provide the infrastructure for rigorous, comparative testing. Jordan provided examples of a number of recent prediction experiments that received broad media attention, including John Rundle's pattern informatics approach, and the medium-term predictions of Vladimir Keilis-Borok and colleagues. Jordan identified three major questions to address: How should earthquake predictions be tested? What is the inherent predictability of the earthquake rupture process? and Can knowledge of large-earthquake predictability be deployed as useful predictions? CSEP focuses on the first two. He sees a role for NEPEC in endorsing consensus testing standards and protocols developed for CSEP, and NEPEC would then have the ability to ask whether predictions had been subjected to community standards.

Discussion focused on the challenge of building credibility and sustainability. Jordan emphasized the need for USGS engagement in order to move beyond the initial start-up, including grant support for the science program setting up natural laboratories. Dieterich noted that it would be helpful for NEPEC to have such infrastructure to lean on. It was suggested that SESAC should make a recommendation to USGS enhanced collaboration with SCEC on CSEP.

Wrap up

Proposed dates for the next two SESAC meetings were established: July 6-7 or 13-14 in Golden CO, and October 26-27 or 30-31 in Albuquerque NM. The Golden meeting will focus on the hazard to risk handoff, interprogram coordination with the Volcano and Landslide Hazards Programs, update on the demonstration project and on NEPEC.

Cluff once again thanked departing SESAC members Eguchi and Smith for their many contributions and adjourned the meeting.

Agenda  
**Scientific Earthquake Studies Advisory Committee (SESAC)**  
 March 6-7, 2006  
 USGS National Center Room 1B215  
 Reston, Virginia

**Monday, March 6th (Open Session all day)**

<i>Time</i>	<i>Topic</i>	<i>Presenter/Participants</i>
8:30	Introductions and agenda revisions	Lloyd Cluff, Chairman
8:45	State of the USGS Geologic Discipline (PP: Gundersen)	Linda Gundersen
9:30	Plans for NEHRP lead agency role (PP: Sunder_NEHRP)	Jack Hayes and Shyam Sunder, NIST
10:15	<i>Break</i>	
10:30	Update on US tsunami activities: A year after Sumatra	
	<ul style="list-style-type: none"> <li>• National tsunami risk reduction plan (PP: Devine_Tsunami_Plan)</li> <li>• Status of USGS activities in President's initiative (PP: McCarthy_TsunamiUpdate)</li> <li>• National Tsunami Hazard Mitigation Program (PP: Green_NOAAtsunami)</li> </ul>	Jim Devine  Applegate & McCarthy  David Green, NOAA
12:00	<i>Lunch (USGS Cafeteria)</i>	
1:30	The EarthScope partnership	
	<ul style="list-style-type: none"> <li>• USGS role in the partnership (see 4 EarthScope slides in PP: Applegate_EHPoverview)</li> <li>• NSF perspective on EarthScope's future (PP: Shedlock_Earthscope)</li> <li>• Update on the EarthScope facility (PP: vandervink_Earthscope)</li> </ul>	Applegate  Kaye Shedlock, NSF  Greg van der Vink, EarthScope
3:15	<i>Break</i>	
3:30	Update on USGS (no PP)	Pat Leahy



- 3:45 Update on Earthquake Hazards Program activities Applegate  
(PP: Applegate\_EHPoverview)
- 4:00 ANSS Steering Committee report Bill Leith  
(PP: Leith\_ANSS)
- 4:30 Status of teams supported by Earthquake Hazards Program
- Central Region Geologic Hazards Team Jill McCarthy  
(PP: mccarthy\_GHTupdate)
  - Western Region Earthquake Hazards Team Rufus Catching  
(PP: catchings\_EHZupdate)
- 5:30 Adjourn for the day

**Tuesday, March 7 (Open Session until 11 a.m.)**

<i>Time</i>	<i>Topic</i>	<i>Presenter/Participants</i>
8:30	USGS Hazards Initiative (PP: Werkheiser_hazardinitiative)	Bill Werkheiser
9:00	Hazards Initiative: Southern Cal. Demonstration Project (PP: Jones_DemonstrationProject)	Lucy Jones
9:45	<i>Break</i>	
10:00	Plans for re-chartered NEPEC (PP: Dieterich-NEPEC)	Jim Dieterich, UC Riverside
10:30	Collaboratory for the Study of Earthquake Predictability (PP: Jordon_CSEP 030706)	Tom Jordan, SCEC
11:00	Executive Session	SESAC Members
12:00	Adjourn	