



An Invitation to the SECUREarth Workshop

September 11–13, 2005

Colorado School of Mines, Golden Colorado

You are cordially invited to attend a two-day workshop on the overall science plan for the SECUREarth Initiative. The workshop has a broad initiative that aims to crosscut the physical, chemical, biological, and geological sciences related to the field of geosciences (i.e., the SECUREarth Initiative). You have been identified as one of the leading researchers in a prominent geoscience field, whose scientific input is valuable to the formulation of the scientific foundation of SECUREarth.

Objective:

The primary objectives are to define the science needs of the SECUREarth initiative. This will be accomplished by:

1. Identifying environmental/energy needs (e.g., ground water supply, oil and gas production, clean coal, CO₂ sequestration, nuclear waste disposal etc.) needs over the next two decades
2. Defining the cross-cutting problems
3. Defining science issues that need to be solved
4. Defining the approaches for solving science issues
5. Defining the principal scientific crosscutting thrusts, goals, objectives, and architecture of the SECUREarth Initiative.

Background:

Energy and environmental security are needs central to U.S. prosperity. More importantly, we believe that if we do not meet these needs in a timely fashion, serious societal consequences will result. The geosciences must not only occupy a central role in meeting our energy and environmental needs but our approach must change—to meet these challenges in the time frame needed.

To meet these critical needs, we have formulated a broad initiative, called SECUREarth that aims to crosscut the physical, chemical, biological, and geological sciences within the geosciences. We believe that advances over the last 10 to 15 years in fundamental science, as well as the creation of major research facilities (NSF and DOE supercomputing centers, the Environmental Molecular Science Lab, the Spallation Neutron Source, advanced imaging synchrotron capabilities such as ALS, APS, NSLS, SSRL, DUSEL, etc.) must be utilized and integrated into the geosciences research community. These advances

and new facilities are key to addressing the major road blocks preventing us from making significant advances in characterizing, predicting, and manipulating subsurface properties related to energy and environmental needs.

The objective of SECUREarth is to perform crosscutting fundamental research with interdisciplinary teams of researchers (see attached materials describing SECUREarth's evolution and goals). While SECUREarth will promote research by individual principal investigator-driven research teams, we see a critical need to expand the current mode of most research programs to encourage interdisciplinary research teams –because of the formidable obstacles in achieving fundamental knowledge applicable to crosscutting problems (such as coupled processes, heterogeneity, and scaling in geosciences research). Lastly and most importantly, to maximize the value of future geoscience, scientific results must be tightly coupled to the ultimate users and benefactors of the research. For example, if SECUREarth is to succeed in its objectives, various industrial entities, including representatives of the oil and gas, environmental remediation, nuclear waste disposal, and geothermal industries, must help to set the goals, perform the research, and evaluate the applicability of the results.

At this time, only the concept and purpose of SECUREarth have been developed. It is time to define the scientific goals, structure, and implementation of the initiative. The basic idea and goals were presented to a National Academy of Sciences Workshop in July 2004 (see attached). One of the major outcomes from the workshop was a general acceptance of the SECUREarth concept by attendees from the Department of Energy, the National Science Foundation, the Environmental Protection Agency, the U.S. Geological Survey, and industrial representatives from Shell, Chevron, and Dupont. The workshop also provided the impetus to develop a more detailed plan to submit to the National Academy for review.

Ultimately, SECUREarth is envisioned to be a national initiative with multi-agency support, involving a broad representation and coalition of universities, labs, and the private sector. Congressional staffers from the House Science Committee have been briefed and have advised us to move to the next step of a congressional hearing, on the role of the geosciences in the U.S. energy and environmental future. Therefore, now is the time to develop the overall plan and strategy for the initiative. In June of 2005 the National Academy will begin a study to identify the major challenges and needs for long-term geoscience research. We anticipate that this will be a 15-month study. We believe that the result of that study will drive geoscience research in the U.S. for the next decade or longer. We hope that the coming SECUREarth workshop will supply information for this National Academy study, therefore, SECUREarth must have a solid research plan developed in the near future.

For the upcoming SECUREarth workshop, all interested parties will be included. Although attendance space is limited, input will be solicited from a broad audience. Your selection to receive an invitation was based upon your demonstrated ability to represent the wide range of your discipline, as well as your scientific knowledge, innovativeness, and breadth of experience.

The format of the workshop (see attached draft agenda) will include an initial presentation to explain the motivation for SECUREarth and the workshop goals. Subsequently, the

attendees will be separated into six main groups—energy, environmental, nuclear waste, CO₂ storage, geothermal, and groundwater—with the respective group leaders as follows:

Energy: Phil Bording, Memorial University of Newfoundland
Environmental: Tullis Onstott, Princeton University
Nuclear Waste: Mark Peters, Argonne National Laboratory
CO₂ Storage: Sally Benson, Lawrence Berkeley National Laboratory
Geothermal: Sabodh Garg, SAIC
Groundwater: Bruce Robinson, Los Alamos National Laboratory.

Each group will be interdisciplinary and inter-institutional, with no more than 15 people per group. If more people register than we anticipate, we will have duplicate groups. Each group will be charged with identifying the broad challenges facing the assigned problem area (e.g., determine the main scientific obstacles preventing us from achieving our goals and how to address these obstacles).

To register for the meeting, log onto the SECUREarth web site (<http://www-esd.lbl.gov/SECUREarth/>) and click on the “Fall 2005 SECUREarth Workshop” button. **The deadline for registration is August 1, 2005.** We are asking for a \$50 registration fee to cover materials, hospitality, and a group dinner the first night (September 12). Also listed on this web site will be other information on logistics of the meeting, (accommodations, travel information, maps, etc.) and other information regarding SECUREarth.

In summary, we hope that you will seriously consider attending this workshop. Your input is critical in defining the proper research plan for an initiative that could have a profound influence on our energy and environmental welfare—far into the future.

Attached are two documents that give more information on the history, need, and status of SECUREarth.

If you have any questions or concerns, please don’t hesitate to contact us. A detailed contact list is attached for your information.

We hope to see you there!

CONTACT INFORMATION

For logistical or administrative questions, contact:

Nina Lucido, (510) 486-7071 or nlucido@lbl.gov

Marie Butson, (510) 486-6455 or mlbutson@lbl.gov

Dixie Termin, (303) 273-3506 or dixie.termin@mines.edu

For specific SECUREarth questions and scientific background, contact either:

Ernie Majer, elmajer@lbl.gov

Rick Colwell, fxc@inel.gov

Additional people in the current working group to contact are:

Bo Bodvarsson, GSBodvarsson@lbl.gov

Pat Brady, pvbrady@sandia.gov

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**FALL 2005 SECUREARTH WORKSHOP
SUNDAY, SEPTEMBER 11–TUESDAY SEPTEMBER 13
COLORADO SCHOOL OF MINES
GOLDEN, CO**

AGENDA

PURPOSE OF THE WORKSHOP: Develop the SECUREarth science plan in the form of a proposal for the science and funding communities, and for consideration by a National Academy of Sciences committee.

GOALS OF THE WORKSHOP:

1. Address the hypothesis that to accelerate the advancement of earth sciences, interdisciplinary, problem-focused research related to subsurface issues is needed to augment the current research base.
2. Determine which common or recurring themes for addressing subsurface problem areas should be addressed using a SECUREarth (SE)- type approach, and establish why this is the case.
3. Assuming progress on Goals 1 and 2, define the scientific appearance (structure or format) of an SE-like program.

Sunday (Evening), September 11, 2005

Ben Parker Student Center

5:00–7:00 Registration & Informal Reception

Monday, September 12, 2005

Ben Parker Student Center Ballroom

7:30 Continental breakfast

8:00 Attendee introductions

8:15: Review of SECUREarth (Bo Bodvarsson)

- SECUREarth concept: Understanding fluid flow in the subsurface, control of fluid flow, and the relationship between fluid flow and subsurface biogeochemical processes.
- Drivers for SECUREarth (i.e., list of applications and problems that require immediate attention. Themes are science, engineering and rate of progress).

- Compare SE to other analogous programs, indicate the progress made regarding SE to this point in time, and indicate why we believe that development of a science plan is a critical step in gaining advocacy.
- Outline how people can stay informed and involved, and how participation in the workshop will benefit them.
- Develop a general vision of how a SE science campaign would function. Define a “SE-like” program (i.e., a loose confederation of researchers or a centrally organized group that has funding and input into the science agenda).
- Discuss how results of this workshop will be used – e.g., where we will go from here.

8:45: Tasks for Attendees

- Develop the science plan for SECUREarth (What are the critical science roadblocks that we face and what science is needed? How will it be carried out?)
- Form interdisciplinary breakout groups and problem areas to be addressed (carbon sequestration, environmental remediation, water quality and supply, nuclear waste isolation, energy extraction, geothermal)

Note: Group leaders were selected early in the development of the workshop and have helped to guide the selection of attendees and the formation of the groups. In addition to the leader, each group needs a scribe. The groups must be interdisciplinary if they are to succeed in developing the science plan for SECUREarth. Selected participants will not be affiliated with any specific groups but rather will roam from group to group, trying to encourage the cross-linking of ideas as they develop in the respective groups.

- Identify products of the workshop
 - An overall science plan consisting of a set of interdisciplinary problem-focused research plans
 - Potential architectures for SE organization and possible facilities (existing or new)
 - Criteria needed to attract good scientists to apply, and for funding agencies to see SE as a major enhancement to currently funded research (i.e., not in competition with currently funded research).
- Example SE science campaigns—Primers for the breakout sessions
 - Identify the problem(s) and the science used to address these problems. What attributes define a problem as a SE target for research?
 - Explain how interdisciplinary science will be organized around a stated problem.
 - Discuss example campaigns without need for resolution to prepare breakout groups.

9:30-12:00: Breakout Groups Work Independently with Their Leaders (break at leader's discretion):

Focus on roadblocks *that require SE for solutions* to accomplish key breakthroughs in problem areas. Confine discussion to the problem area, with stress on the need for interdisciplinary research having sufficient organization to result in relatively rapid progress towards solutions. Aim is to identify the science that stems from the integration, or how progress will be significantly accelerated relative to the urgency of the problem. Group leaders should have a sense of what the future holds for society if problems are not solved by target dates (years).

12:00 Lunch

1:00–3:30: Continue Breakout Group Activity

3:30–4:00: Break

4:00: Breakout Groups Return to General Assembly

- Breakout Groups will report their findings regarding major roadblocks need for SE, thoughts on how the roadblocks can be overcome, estimated rates of progress, and new science that may account for solutions.
- One person reports per group; include an outline of the expected deliverables from the first breakout sessions (What new science? Is SE essential? How will progress be accelerated? Will it be cost effective?)

5:00: Group Leaders Meet

- Determine if there are crosscutting themes that occur in all of the problem areas.
- Identify themes that can ONLY be addressed by SE
- Create teams for Day 2 and define their responsibilities. New teams will be charged with:
 - Converting the breakout session discussions into science plans
 - Outlining how the science campaigns would be run

6:30: Banquet and After-Dinner Presentation (cash bar)

TBD

(Speaker should inspire attendees to consider new science that can be achieved with new approaches)

Tuesday, September 13, 2005

Ben Parker Student Center Ballroom

7:30: Continental Breakfast

8:00: Welcome Back

- Briefly, review overall goals for the workshop.
- State results of the group leaders' meeting in the evening, any changes that are needed.
- Identify specific goals for the day – which includes a discussion on how SE would function

9:00: Breakout Groups Work Independently with Their Leaders to Identify:

The science campaign that would overcome each group's respective problem. Include:

- Evidence that SE is justified to tackle the problem (and cost effective)
- Common themes among problems (the "cross-cutting" themes that require SE)
- Possible organization of SE, including facility needs
- Incentives for collaborating scientists (facilities, administrative support, professional credit for contributions)
- Write outline for science campaign

12:00: Lunch

1:00–2:00: Continue Breakout Group Activity

2:00–3:30: Break out Groups Return to General Assembly

Breakout Groups will report on their Findings regarding the science campaigns they have developed.

- Discussions attempt to consolidate candidate science plans and candidate programmatic structures.
- One person reports per group

3:30–4:00: Break

4:00: Wrap Up

Explain, again, how and when the results for the workshop will be used (NAS).
Summarize next steps

- Determine unresolved or weak aspects to SE
- Determine the types of advocacy required for SE