

The Role of Computation in Protecting the **Environment**



Exciting and Fascinating Workshop for Science and Mathematics Educators

EDUCATORS WILL RECEIVE AN HONORARIUM FOR ATTENDING.

- Hotel accommodation will be provided for out of town participants.
- All participants will receive complimentary meals.
- Dinner on June 15th will be served on a Colorado River steam boat.

One and a half day program

Hosted by CSM and BEG at the University of Texas, and funded by the National Science Foundation and the Department of Energy through Cyber-Enabled Discovery and Innovation (CDI) and Center for Frontiers of Subsurface Energy Security (CFSES).

TECHNOLOGY SOLUTIONS THAT PROTECT OUR INTEREST IN THE FUTURE

The workshop will inform and challenge high school educators so they can in turn impact the students under their charge.

We will discuss the emerging interdisciplinary role of mathematics and computational science in the simulation and solution of the world's Grand Challenges, illustrated by the environmentally important carbon storage problem.

There will be discussions on laboratory and field experiments, mathematical modeling and large scale parallel computation. We will train attendees in the use of a sophisticated groundwater simulator as a tool to engage and pique the interest of high school students, perhaps leading some to careers in mathematics and science.



The University of Texas at Austin

Location:
J.J. Pickle Research Campus
10100 Burnet Road, Austin, TX 78758

To ensure availability, interested people should contact the program's senior Administrator Ms. Connie Baxter connie@ices.utexas.edu
Tel 512.475.8625 Fax 512.232.2445 and
Dino Golgoon dino@mail.utexas.edu Tel 512.232.4193

Center for Subsurface Modeling,
Institute for Computational
Engineering & Sciences, Bureau
of Economic Geology and
Institute for Geophysics
The University of Texas at Austin

TARGETING:

- High school teachers of mathematics and science
- Advanced high school students
- Undergraduate students with an interest in high school teaching

PURPOSE:

The workshop will inform and challenge high school teachers so they can in turn impact the students under their charge. We will discuss the emerging interdisciplinary role of mathematics and computational science in the simulation and solution of the world's Grand Challenges, illustrated by the important environmental carbon sequestration problem. Included will be discussion of laboratory and implementation of computational algorithms, and aspects of high performance parallel computing. We will train attendees in the use of a sophisticated groundwater simulator as a tool to engage and pique the interest of high schoolers, perhaps leading some to careers in the mathematics, the science, and interdisciplinary work.

The role of Computation in Protecting the Environment: A workshop on Carbon Sequestration Simulation for High School Mathematics and Science Teachers.

Schedule of Events

June 15-16, 2010

Tuesday, June 15, 2010

Welcome and Opening Remarks

Greenhouse gas emissions

- World energy demand
- CO₂ buildup in the atmosphere and global warming

Geologic Sequestration

- What it is
- Where it can be done
- Where it has been done

9:45 Break

The grand challenge of carbon sequestration

- Overall challenges
 - Injectivity
 - Leakage
 - Monitoring
 - Intervention
 - Risk assessment
- Role of computational simulation

The mathematics of flow in porous media

11:45 Lunch (provided)

Numerical approximations

Reservoir simulators

2:30 Break

Tour of the laboratory facilities

- Institute of Geophysics
- Bureau Of Economic Geology
- Texas Advanced Computing Center

Dinner will be provided on the Colorado River

Wednesday, June 16, 2010

Field experiments

Mathematical modeling of CO₂ processes

9:45 Break

Field –scale CO₂ simulation

Parallel processing

11:45 Lunch (provided)

UTCHEM, a groundwater simulator

Concluding remarks

UT Faculty and Staff

- **Mary Wheeler**
- **Todd Arbogast**
- **Mojdeh Delshad**
- **Ian Duncan**
- **Tim Wildey**



**The University of
Texas at Austin**