Facilitating Geosciences Education in Higher-Education Institutes Worldwide With GeoBrain –An Online Learning and Research Environment for Classroom Innovations

Center for Spatial Information Science and Systems (CSISS), George Mason University

Why — Why GeoBrain is useful to you?

The classroom innovations, which encourage and support student investigations and research activities, are recognized as key motivation mechanisms that help to reach the goals of higher education in geosciences, e.g., to prepare students with modern geoscience knowledge and skills to meet the increased demand on trained professionals for working on the big challenges faced by geoscience disciplines.

GeoBrain is a powerful education tool for classroom innovations by facilitating undergraduate and graduate teaching and motivating student research in geosciences. It makes used-to-be very difficult or even impossible teaching/learning or research tasks much easier and practical.

How — How does GeoBrain function?

The GeoBrain system has adopted and implemented the latest Web services and knowledge management technologies for providing innovative methods in publishing, accessing, visualizing, and analyzing geospatial data and in building/sharing geoscience knowledge.

GeoBrain serves the higher education community through its four major capabilities:
1) Personalized, on-demand data access and services to Petabytes of NASA EOS data;
2) Online data analyses;
3) Geospatial-processing modeling;
4) Geospatial knowledge sharing.

Multiple Protocol Geospatial Client of GeoBrain for an interoperable way of accessing, integrating and analyzing distributed heterogeneous Earth science data

GeoBrain's easy-to-use Web interface for personalized data product downloading

GeoBrain's Abstract Model Designer and Services Chaining Engine for geospatial processing modeling and knowledge sharing

Teaching Improvement through GeoBrain at Old Dominion University
Dr. Guoqing Zhou(gzhou@odu.edu)

ODU delivers GIS and advanced GIS courses for graduate students and undergraduate students to 15 states, 50 higher education centers, and 4 oversee navy bases via both the regular classroom and ODU TTN (Tele-Tech-Net) system. Usually, these courses are mainly focused on introducing students with basic concepts due to the difficulties of distance education and shortage of computing resources. However, with introduction of GeoBrain in the semester of Spring 2006, significant progresses have been made in teaching those courses:
•Designing new chapters. The GeoBrain system is employed as example to explain the new concepts, technology advances, and implementations.
•Enhancing the distance laboratory materials. GeoBrain provides the great resources and useful tools for distance teaching.
•Designing more appropriate homework. Through working on the newly-designed assignments based on GeoBrain, students get deeper understanding of concepts, better skills of handling large volume of satellite imagery data, and broader scope of knowledge.
•Assessing the teaching effectiveness through the two methods: statistical assessment in accordance with the final exam and the question survey. The two survey results demonstrated that the GeoBrain system can significantly improve teaching effectiveness, students' learning effectiveness, and enhance students' knowledge in the geospatial field.

What — What is GeoBrain?

GeoBrain is an open, standard compliant, interoperable, distributed, web-based, three-tier data an information system. It is also a knowledge building system. It provides a data-rich online learning and research environment enabled by interoperable Web services, and wealthy data and information available at NASA Earth Observing System (EOS) Data and Information System (EOSDIS).

How — How can GeoBrain work for you? Some hands-on experiences from GeoBrain education partners

The GeoBrain project homepage

Problem-based Learning Supported by GeoBrain at Loma Linda University
Dr. Robert Ford(rford@llu.edu)

• Existing courses improved and new courses developed in remote sensing by using GeoBrain as the primary data source.
• New program development for a new undergraduate curriculum in Environmental and Earth System Science including GeoBrain.
• Problem-based learning enabled by using GeoBrain data and tools.

### Teaching and Studying Urban GIS applications with GeoBrain at Hunter College of CUNY
Dr. Hongmian Gong(gong@hunter.cuny.edu)

Since spring 2006, Dr. Hongmian Gong's Urban GIS applications class at Hunter College of CUNY has been relieved from struggling hard to teach students techniques and models for analyzing complex urban phenomena. Equipped with GeoBrain, it is much easier to prepare appropriate data and do the analysis. For most students without prior knowledge on data types and sources, GeoBrain immediately piques their interests. It serves as a great introduction to the various types of remotely-sensed data that could be applied to the analysis of urban phenomena and enriches the students' potential for understanding urban dynamics.

Using GeoBrain in Educator Professional Development at Middle Tennessee State University
Dr. Mark Abolins(mabolins@mtsu.edu)

MTSU Geosciences faculty and students are using the GeoBrain system to obtain remotely-sensed data for K-12 educator professional development and undergraduate instruction and research, and to obtain images for illustrations of Costa Rican tectonics. These images would likely have been prohibitively difficult and time-consuming to obtain in any other way.
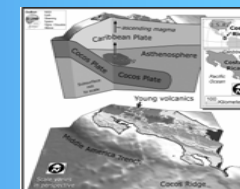
Where — Where can I access GeoBrain data and services? Where can I get technical support? Where can I get education activities support?

You can access GeoBrain data and services anywhere in the world with an Internet connected PC at http://geobrain.laits.gmu.edu. All data and services in GeoBrain are provided for free. Technical support is provided by the GeoBrain development team. Support to education activities is provided by NASA EOS Higher Education Alliance (NEHEA), a free open organization led by NEHEA core members. To join NEHEA, please fill a form available at the GeoBrain. For any technical or education related inquiries, please email pzhao@gmu.edu or mdeng@gmu.edu.

Please contact Meixia Deng(mdeng@gmu.edu) or Liping Di(ldi@gmu.edu) for more information or go to the Web site : http://geobrain.laits.gmu.edu and http://csiss.gmu.edu

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