



NEHEA and *GeoBrain* - An Organization and System for Data Intensive Earth System Science Education and Research at Colleges around the World

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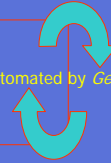
Introduction

- Earth System Science (ESS) studies Earth as an integrated system.
- Satellite remote sensing is one of major data sources for ESS research, especially at continental and global scales.
- Handling a large volume of remote sensing data with computers in scientific models is the essential skill that ESS researchers must master.
- ESS education has to prepare students for handling data-intensive nature of ESS.

Process of Learning and Knowledge Discovery in Data-Intensive ESS

1. Find a real-world problem to solve
2. Develop/modify a hypothesis/model
3. Implement the model/develop analysis procedure at computer systems.
 - Determine the data requirements.
4. Search, find, and order the data from data providers.
5. Preprocess the data into the ready-to-analysis form
 - reprojection, reformatting, subsetting, subsampling, geometric/radiometric correction, etc.
6. Execute the model/analysis procedure to obtain the results.
7. Analyze and validate the results
8. Repeat steps 2-7 until the problem is solved.

These steps are automated by *GeoBrain*

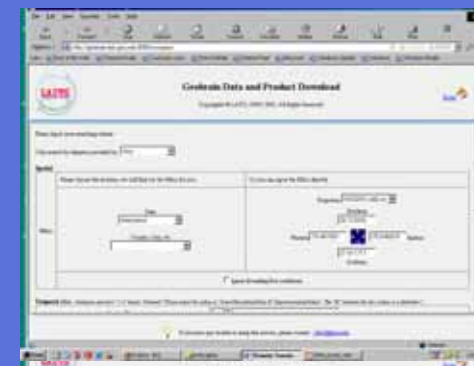
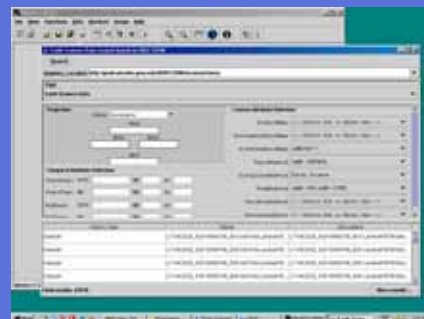


GeoBrain

- An open, standard compliant, interoperable, distributed, web-based, three-tier geospatial information system. It is based on web service technologies and the concepts of Geo-object, Geo-tree, Virtual Geospatial Products, and Geospatial Models.
- The system makes petabytes of NASA EOS data and information easily accessible to any higher-education users around the world.
- The system allows users to dynamically and collaboratively develop interoperable, web-executable geospatial process and analysis modules and models, and run them on-line against any part of the peta-byte archives for getting back the customized information products rather than raw data.
- The system makes a data-enhanced ESS learning and research environment, backed by petabytes of NASA EOS data and large computing powers that are unavailable to students and professors before, available to them at their desktops free of charge.
- The system reduces the current problems of integrating, analyzing, and modeling with large amount of multi-disciplinary, multi-source geospatial data.

NASA EOS Higher Education Alliance (NEHEA)

- In order to integrate this new learning environment into ESS teaching and research and train students on how to effectively use large amount of remote sensing data, we formed NEHEA.
- The core of NEHEA consists of
 - The *GeoBrain* development team led by GMU.
 - Funded education partners- a group of Earth science educators funded from an open RFP process.
- NEHEA welcomes Earth science educators around the world to join NEHEA as non-funded education partners.
- NEHEA members are incorporating the data enhanced learning environment into their teaching and on-going research and will develop new courses for taking advantages of the environment.
- All NEHEA education partners will have access to all NASA data available through *GeoBrain*, all *GeoBrain* software, and technical support for free.
- NEHEA members are incorporating the data-enhanced learning environment into their teaching and on-going research and will develop new courses for taking advantages of the environment.



Acknowledgement

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