Earth System Initiative

Overview

The Earth System Initiative (ESI) was formed in 2002 to encourage and coordinate multidisciplinary research and education efforts in the earth sciences and engineering at MIT, and to develop strategies to communicate this new knowledge to the citizens, policy makers, and corporate decision makers whose actions determine how Earth's resources are managed. The faculty involved in the initiative are drawn primarily from Civil and Environmental Engineering and Earth, Atmospheric, and Planetary Sciences, but ESI also has representation from Chemistry, Electrical Engineering and Computer Science, Biology, and even Anthropology.

Research

ESI currently has a research portfolio that includes over $22 million in funded projects (an average of approximately $4 million per year), and $30 million in pending proposals. These projects, representing a broad spectrum of Earth system science and engineering research, include efforts such as:

- assimilating remote sensing data into atmospheric/hydrological models
- establishing a graduate traineeship program in environmental sensors design and deployment
- developing, designing, and launching a satellite to monitor the Earth's hydrosphere
- designing empirical computer models that predict the outbreak of malaria
- quantifying interactions between rates of evaporation and land surface temperatures
- developing new technologies for Mars rover systems
- studying the microbial genomics and ecology of marine ecosystems

These projects include collaborations among faculty in the Schools of Engineering and Science at MIT and bridge the gaps between the fields of biology, geology, atmospheric sciences, aeronautics and astronautics, and electrical engineering and computer science.

We are continuing efforts to broaden the scope of ESI's research portfolio.

Education and Outreach

Terrascope

Terrascope, a freshman community focusing on the Earth system as a context for interdisciplinary learning, studied the multiple issues involved with energy extraction from the Arctic. For more details, see Terrascope's Report to the President.

Education and Public Outreach Infrastructure

The Earth System Initiative has developed an Education and Public Outreach (E&PO) infrastructure to assist faculty in developing, implementing, and evaluating E&PO activities as part of their sponsored research projects. Educational activities already in place include a partnership with the Boston Museum of Science to develop educational exhibits based on research projects. Several research proposals utilizing this resource have been funded, and the corresponding E&PO projects will commence this fall.

MIT Visibility and Fundraising

Considerable effort has been expended to inform the broader MIT community, as well as potential corporate and foundation donors, about ESI activities. In addition to our website, we have developed and disseminated a variety of materials that describe ESI research and education activities.

The most recent successes from these efforts include an award of $11 million dollars over 5 years from the Gordon and Betty Moore Foundation to support research in marine microbiology, and $440,000 over 4 years from the Henry Luce Foundation to support freshmen field experiences in Terrascope.

Linden Earth System Fellowship Program

ESI received a donation for the Lawrence and Dana Linden Family Foundation to create the Linden Earth System Fellowship program. These fellowships provide support for outstanding new graduate students who plan to pursue graduate studies in the environmental sciences and engineering. The second class of four fellows has been selected and will arrive on campus in the fall of 2004.

Symposium, Workshops, and Seminar Series

In 2004, ESI hosted a major international symposium on the evolution of the Earth system (Was…Is…Might Be... Perspectives on the Evolution of the Earth System). Over 250 participants registered for the event, which was met with praise and enthusiasm for the wide array of perspectives it presented on the evolution of the Earth system.

A second symposium, planned for January 2005 and tentatively titled “The Pulse of the Planet,” will focus on new technologies that are being applied to studies of the Earth system. ESI will continue its regular seminar series, faculty retreats, and workshops in order to continue to raise its profile within MIT and the broader academic community.

Personnel

ESI has two codirectors, Professor Kip Hodges (EAPS) and Professor Penny Chisholm (Biology and CEE), and a program administrator, Matthew Gardner.

Penny Chisholm, Professor of Civil and Environmental Engineering and Biology
Kip Hodges, Professor of Geology

More information about the Earth System Initiative can be found on the web at http://web.mit.edu/esi/.