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Mathematicians tackle global issues

Berkeley, California – More than 100 academic institutions and scholarly societies, including the Mathematical Sciences Research Institute ([MSRI](http://msri.org)) based in Berkeley, have joined in a major world-wide initiative: Mathematics of Planet Earth (MPE) 2013. This year-long effort will highlight the contributions made by mathematics in tackling global problems, including natural disasters such as hurricanes, earthquakes, and tsunamis; climate change; sustainability; and pandemics. MPE2013 partners will sponsor workshops, research conferences, public lectures, outreach events, and educational opportunities for all ages. Each country from a partner institution will host a special launch to the year: in the United States, the launch will take place on January 9, 2013, in San Diego at the [Joint Mathematics Meetings](#). As part of the global initiative in the Bay Area, MSRI will present a public lecture by Emily Shuckburgh, one of the world's foremost climate scientists, titled "[Climate Disruption: What Math and Science Have to Say](#)" on March 4, 2013, in San Francisco. The public lecture is funded by the Simons Foundation.

MPE2013 enjoys the patronage of UNESCO, the United Nations Educational, Scientific, and Cultural Organization. The Director-General of UNESCO, Irena Bokova, said, "UNESCO strongly supports this extraordinary collaboration of mathematicians around the world to advance research on fundamental questions about planet Earth, to nurture a better understanding of global issues, to help inform the public, and to enrich the school curriculum about the essential role of mathematics in the challenges facing our planet."

MPE2013 will bring public awareness of the interdisciplinary nature of scientific research and the unique role played by mathematics in facing global challenges. This broad initiative will involve top researchers in fields as diverse as medicine, engineering, and finance, as well as mathematics, to solve some of the world's most challenging problems. Mathematics will also play a role in the solution to long-term issues including security for e-finance, more accurate predictions of natural disasters, the adaptation of interacting ecosystems to change, and the spread of diseases.

"My dream is now shared by so many scientists around the world that MPE2013 is developing on its own. This unprecedented collaboration will last beyond 2013," noted Christiane Rousseau, initiator of MPE2013 and Professor of Mathematics at the University of Montreal. "This broad initiative seeks to involve some of the world's finest minds to solve some of the world's toughest problems," said Brian Conrey, leader of MPE2013 in the United States and Director of the American Institute of Mathematics.

Examples of recent applications of mathematics to MPE problems include:

- improved strategies for recharging underground aquifers;
- a better model for how government and industry can work together to decrease pollution;
- successful modeling of the transmission of epidemic diseases allowing the design of strategies to control or eradicate them; and
- developing a greater theoretical understanding of viruses and the drugs necessary to tackle them.

Long-term problems in which mathematics will play a role include:

- quantifying uncertainty in climate change;
- more accurate predictions of natural disasters including earthquakes, volcanoes, and tsunamis;
- the adaptation of ecosystems to climate change;
- sustainable economic models; and
- the preservation of biodiversity.

According to Mary Lou Zeeman, co-director of the Mathematics and Climate Research Network, “Mathematical modeling has given us a better understanding of how to combat infectious diseases. We can evaluate the percentage of the population that must be vaccinated to eradicate a disease and we can measure the impact of education and other interventions on the spread of a disease.”

“Achieving sustainability requires understanding the complex interactions between a vast number of systems including climate, economics, technological progress, geology, ecology, space science, population control, security, global politics, and mass psychology,” says Dooyne Farmer, Director of the Oxford Martin Programme on Complexity at the University of Oxford. “Sustainability forces us to think clearly about our vision of the future, putting philosophy into direct contact with science. As scientists our job is to try to understand causes and effects, both by making predictions and by quantifying the vast uncertainties in these predictions as best we can. But we need mathematicians to work with physicists, ecologists, economists, etc., to ensure that we are using the right model.”

MPE2013 can impact health care through a better understanding of how to control pandemics, and it can contribute to the green economy by aiding in the design of high-performance materials for batteries and solar cells.

Mathematics is becoming an increasingly popular career path for people who want to be part of the solution to the problems of our planet. High school and college students can share in the excitement of MPE2013 through new educational materials being developed for core mathematics courses. Activities, readings, and seminar lesson plans will be freely available to any teacher who wants to engage students in discovering how the mathematical sciences can have a global impact.

More about MPE2013

Mathematics of Planet Earth 2013 (mpe2013.org) is an initiative of over 100 scientific societies, research institutes, universities, and organizations all over the world. The mission of the project is to encourage research in identifying and solving fundamental questions about planet Earth, encourage educators at all levels to communicate the issues related to planet Earth, inform the public about the essential role of the mathematical sciences in facing the challenges to our planet, and encourage young people interested in sustainability and global issues to consider mathematics as an exciting career choice. MPE2013 enjoys the patronage of UNESCO, the United Nations Educational, Scientific, and Cultural Organization.

About MSRI: The **Mathematical Sciences Research Institute (MSRI, <http://www.msri.org>)**, in Berkeley, California, is one of the world’s preeminent centers for research in the mathematical sciences and has been advancing mathematical research through workshops and conferences since its founding as an independent institute in 1982. Approximately 2,000 mathematicians visit the MSRI each year, and the Institute hosts about 85 leading researchers at any given time for stays of up to one academic year. The Institute has been funded primarily by the National Science Foundation with additional support from other government agencies, private foundations, corporations, individual donors, and more than 90 academic institutions. The MSRI is involved in K-12 math education through its annual Critical Issues in Mathematics Education conferences for educators, math circles, Julia Robinson Math Festivals, the National Association for Math Circles and its website (NAMC, www.mathcircles.org), and Olympiad math competitions; in undergraduate education through its MSRI-UP program; and in public education through its “Conversations” series and a variety of public events.

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For more information, please see <http://www.mpe2013.org/newsroom> or contact:

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