

## **SIAM Activity Group Mathematics of Planet Earth** **Charter Renewal Application**

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Mathematics of Planet Earth (hereafter referred to as SIAG/MPE or SIAG).

The SIAG/MPE to which this renewal application applies was formed under the aegis of SIAM and approved by the SIAM Council and SIAM Board of Trustees on December 19, 2014 for an initial operating period beginning on January 1, 2015 and ending on December 31, 2016. This is the first application for renewal of the SIAG charter.

The SIAG/MPE had 126 members, including 91 student members, as of December 31, 2015.

The purpose of the SIAG is to provide a forum for mathematicians and computational scientists to study Planet Earth, its life-supporting capacity, and the impact of human activities. By opening up a new area of applications, the SIAG shall stimulate interesting research in the mathematical sciences. The SIAG shall conduct its activities within the framework of SIAM.

To implement its purpose, the SIAG/MPE shall organize the following activities:

- A biennial SIAM Conference on Mathematics of Planet Earth, to be held in even-numbered years;
- One or more mini-symposia at the SIAM Annual Meeting in years when there is no SIAG conference and/or at the SIAM Conference on Geosciences;
- At least once every seven years, a track of at least six mini-symposia at the SIAM Annual Meeting or an Activity Group meeting in conjunction with the Annual Meeting.

In addition, the SIAG/MPE may engage in specialized workshops or meetings, special sessions at SIAM meetings, and special one- or two-day meetings immediately before or after a regular SIAM meeting.

**SIAG/MPE Officers:**

Chair: Hans G. Kaper  
Vice-chair: Mary Lou Zeeman  
Secretary: Antonios Zagaris  
Program Director: Hans Engler

**SIAG/MPE Advisory Board:**

J. Marty Anderies  
Peter Ashwin  
Luc Doyen  
Gregory M. Forest  
Darryl D. Holm  
Suzanne Lenhart  
Simon A. Levin  
Catherine A. Roberts  
Fred Roberts  
Christiane Rousseau  
David B. Shmoys  
Abdul-Aziz Yakubu

The SIAG has complemented SIAM's activities and supported its proposed functions. The answers to the questions below indicate how this was accomplished and what the officers propose as the future directions for the SIAG.

1. How is the field covered by the activity group doing? Is it growing, is the focus shifting? What have been the significant advances over the last [two/three] years?

MPE is a new area of research in applied mathematics. In 2013, the community of mathematicians and educators focused its collective attention on the mathematics of planet Earth. In the course of the year, a grass-roots organization grew into an international partnership of more than 150 scientific societies, universities, research institutes, and professional organizations. The project, known as “Mathematics

of Planet Earth 2013” (MPE2013) received the patronage of UNESCO in December, 2013. MPE2013 brought the challenges facing our planet to the attention of the mathematics research community in numerous lectures, seminars, workshops, and special sessions at conferences of the professional societies. MPE2013 sponsored the development of curriculum material for all educational levels; it organized many outreach activities, including an international juried exhibit of virtual and physical displays for use in museums and schools; and it presented a series of public lectures by scientists to inform the public how mathematics contributes to our understanding of planet Earth, the nature of the challenges the planet is facing, and how mathematicians help solve them. The founding of the SIAM Activity Group on Mathematics of Planet Earth (SIAG/MPE) was the direct result of SIAM’s involvement in the MPE2013. Its charter reflects the purpose and activities of MPE2013.

From the beginning, “Mathematics of Planet Earth” was interpreted in the broadest possible terms. In addition to climate and sustainability, it included geophysics, ecology, epidemiology, biodiversity, as well as global organization of the planet by humans. The SIAG/MPE follows the same principles. The different topics of interest to MPE can be grouped under the following four themes: (1) A planet to discover (climate dynamics, oceans, atmosphere, cryosphere, earth and space); (2) A planet supporting life (mathematical ecology, the carbon cycle, food systems, natural resources, sustainability); (3) A planet organized by humans (land use, energy, communication, transportation, socio-economics); and (4) A planet at risk (global change, biodiversity, water, food security, epidemics, extreme events).

2. How is the activity group doing? Is it remaining vibrant? Is the size of the SIAG stable or increasing? How is the SIAG keeping up with the changes in the field? How are the broader interests of SIAM reflected in the activities of the SIAG?

The SIAG/MPE was chartered to start its activities on January 1, 2015. At the end of its first year (December 31, 2015) it had 126 members, including 91 student members.

3. Please list conferences/workshops the activity group has sponsored or co-sponsored over the past two years, and give a brief (one sentence or phrase) indication of the success or problems with each.

- SIAM Conference on Mathematics of Planet Earth (MPE16), Philadelphia, Pennsylvania, September 30-October 2, 2016. This will be the inaugural meeting of the SIAG/MPE. The MPE16 submission deadlines have passed. There are currently 24 mini-symposia and 48 contributed submissions on file (15 posters and 33 lectures).

4. Please indicate the number of mini-symposia directly organized by the activity group at the two SIAM Annual Meetings. When did the SIAG last organize a track of mini-symposia at an annual meeting?

The SIAG organized two mini-symposia at the SIAM Conference on Mathematical and Computational Issues in the Geosciences (GS15) at Stanford, June 29-July 2, 2015:

- (MS41) “Planet Earth: Cryosphere Climate, and the Environment”
- (MS47) “Planet Earth: Oceans, climate, and the environment”

5. Please indicate other activities sponsored by the activity group, to include newsletters, prizes and web sites. Have each of these been active and successful?

Book publication:

- Hans Kaper & Christiane Rousseau, “Mathematics of Planet Earth—Mathematicians Reflect on How to Discover, Organize, and Protect Our Planet,” OT140, SIAM (April 2015)

6. What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.

- Mini-symposium “Mathematics of Planet Earth,” AAAS Annual Meeting, Boston, February 2017 (proposal submitted).
- SIAM Conference on Mathematics of Planet Earth, 2018.

7. How can SIAM help the activity group achieve its goals?

Make MPE16 a success.

8. How can the activity group help SIAM in its general role of promoting applied mathematics and computational science?

By opening up a new and highly topical area of research, the SIAG will attract a new group of applied mathematicians to join SIAM.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2017.

Signed

Hans Kaper, SIAG Chair  
(date here)