

Geosciences Activity Group (SIAG) Charter Renewal

This CHARTER RENEWAL applies to the SIAM Activity Group on Geosciences (SIAG/GS). The SIAG/GS was originally formed under the aegis of SIAM in July 1991 by the SIAM Council and the SIAM Board of Trustees with its initial operating period beginning January 1, 1992 and ending December 31, 1994. Its charter has been renewed by the Council and Board seven (7) times thereafter. This SIAG has 462 members, including 156 student members, as of December 31, 2013.

According to its Rules of Procedure, the objective of the SIAM Activity Group on Geosciences is to provide an established forum for interdisciplinary interactions among mathematicians, engineers, chemists, physicists, and other scientists having special interests in flow in porous media and geophysics.

Its purposed functions were:

1. The SIAG will organize activities, including conferences and publications, to promote the interaction of practitioners and researchers and to keep the SIAM membership up to date on trends in geosciences.
2. The SIAG shall not present awards or otherwise recognize scientific achievement, professional service, or the like without prior approval by both the SIAM Major Awards Committee and the SIAM Council of the award criteria, the method of selection of recipient(s), the nature of the award, and all other aspects, if any, of each such award must have the prior approval of the SIAM Board of Trustees.

Other activities may include:

3. Organize minisymposia at the SIAM Annual Meeting in years where there is no SIAG conference.
4. At least once every five years either organize a track of at least six minisymposia at the SIAM Annual Meeting or have an activity group meeting held jointly with the annual meeting. The VP for Programs and the VP at Large will coordinate the scheduling with the SIAG chair.
5. Organize a biennial SIAM Conference on Geosciences. The SIAG will consider dovetailing specialized workshops and conferences with the SIAM Annual meeting or other SIAG conferences. The chair of the conference organizing committee shall be either the program director or the chairperson of the SIAG or their designee. The organizing committee must be approved by the VP for Programs at least 16 months before the conference.
6. With the approval of the SIAM Program Committee, the SIAG may organize special sessions at SIAM meetings, and conduct special one- or two-day meetings immediately before or after a regular SIAM meeting. Other SIAG meetings may be organized only with the approval of the SIAM president and vice president for programs.
7. Award the biennial SIAG/GS Career Prize and the SIAG/GS Junior Scientist Prize.

8. Maintain a wiki site for the activity group http://wiki.siam.org/siags/index.php/Main_Page

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. List all current officers of the activity group (including advisory board, if relevant).

Todd Arbogast (Chair), Iuliu Sorin Pop (Vice-Chair), Knut-Andreas Lie (Program Director), and Beatrice Riviere (Secretary). All were elected for the period January 1, 2013 to December 31, 2014.

2. 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 years?

The field of mathematical and computational geosciences is evolving in a number of areas. First, new challenges arise from the applications, in such areas as modeling of climate change, ocean-atmosphere coupling and in particular including effects of clouds and sea-ice, tsunamis and earthquakes, coastal and shallow water environments, geo-mechanics and in particular fracking and fracture mechanics of geo-materials, carbon sequestration, the dynamics of the Earth's mantle, and geophysical techniques to characterizing the subsurface.

Second, new mathematical and computational techniques are being developed to handle the aforementioned modeling challenges. The models share difficulties associated with multiple space and time scales, multi-physics applications and the poorly understood propagation of errors and stability within such systems, linear and nonlinear system solution, incorporation of inequality constraints especially in multiphase systems, numerical approximation of degenerate and singular systems as well as under-resolved wave action, the importance of data assimilation and uncertainty quantification, analysis of "big data" sets that is becoming available from various observatories and experiments, and preservation of important physical constraints such as maximum principles and conservation in complex interconnected systems.

Finally, there is a real need to develop new techniques and adapt existing ones for use by new computational technologies such as GPUs and hybrid massively parallel high performance computers. Included are new techniques for coupling multi-physics and multi-scale models in an efficient and accurate space-time framework.

Often mathematical and computational techniques developed for problems in geosciences impact other fields of applications, and, conversely, the geosciences benefit from advances in other disciplines.

3. 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 activity group is doing very well and the members are connected well to other SIAM groups (such as CSE). After a dip in conference participation in 2001, it has increased fairly steadily over the past 7 meetings from about 250 to 440. The SIAG/GS membership increased steadily over the past decade from about 250 members to a peak of about 500 members, and had 462 members at the end of last year. Recent reductions from the peak seem to be due mainly to a decline in student participation.

The percentage of women in SIAG/GS (19% female, 6% not indicated) is the higher than for SIAM overall (14% female, 15% not indicated). The percentage of SIAG/GS members from outside the US (34%) is about the same as for SIAM overall (32%). The percentage of SIAG/GS members working in industry (17%) and in government (16%) is more than in SIAM overall (12% and 8%, respectively). The percentage of SIAG/GS members coming from physical science departments (17%) is higher than for SIAM overall (2%).

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

The SIAG/GS organizes the biennial conference on Geosciences. This list of conferences may be found at: <http://www.siam.org/meetings/archives.php#GS>. The 2013 SIAM Conference on Geosciences was held in Padova, Italy, and had 444 attendees. A follow-up survey found that being able to present research results (78.1%) and interactions with other participants (94.4%) are the main reasons for attending the meeting. The meeting is so popular that we are likely to limit minisymposium talks to 20 (i.e., 15+5) minutes to avoid increasing the number of parallel sessions, which was 9, and to increase the opportunity for cross-disciplinary interaction within the geosciences.

5. Please indicate the number of minisymposia directly organized by the activity group at the last two SIAM annual meetings. When did the SIAG last organize a track at an annual meeting or meet jointly with the SIAM Annual Meeting?

2014 SIAM Annual meeting MS 4/17, MS 31/47/62, MS 76, MS 93, MS 109 (5 total in 8 sessions). The SIAG has not met jointly with the SIAM Annual meeting.

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

There is a wiki site used as a repository of information. We send a newsletter (approximately quarterly) with information about upcoming conferences and other items of interest. In addition, timely messages are forwarded at once to members; these average a few a month.

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

SIAM Conference on Geosciences will be held in the summer of 2015 (likely June 29 through July 2) on the campus of Stanford University. The conference format will attempt to improve and increase participation in the poster sessions, as well as reduce the number of parallel sessions.

SIAM Conference on Geosciences will likely be held in the spring or summer of 2017 at a European site, but it is too early to know the details. The 2019 meeting may be organized as a satellite conference of ICIAM, but no decision has yet been made.

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

Continue to support our activities, including especially our conference, minisymposia at SIAM Annual meetings, prizes, and members, in particular students and those outside academia.

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

We reach out broadly beyond the applied mathematics communities into the geosciences, to researchers in industry and scientific disciplines that are not as well represented otherwise in SIAM.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2015.

Signed,

Todd Arbogast, SIAG Geosciences Chair
May 15, 2014

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