

NEXT GENERATION LUNAR SCIENTISTS AND ENGINEERS: DEVELOPING THE FUTURE WORK FORCE FOR A SUSTAINABLE LUNAR SCIENCE AND EXPLORATION PROGRAM. L. V. Bleacher¹, N. Petro², J. E. Bleacher², D. Santiago³, S. Noble² ¹Lunar and Planetary Institute/USRA/NASA GSFC (Lora.V.Bleacher@nasa.gov), ²NASA GSFC, ³Lockheed Martin/NASA Ames.

Introduction: The Next Generation Lunar Scientists and Engineers (NGLSE) is a grass-roots effort aimed at fostering the growing community of early career lunar scientists and engineers [1]. Recent lunar missions, along with an increase in funding opportunities for lunar science, have resulted in a substantial increase in the number of early career lunar scientists and engineers in recent years. With plans for future US and international orbital and landed spacecraft, the Moon will continue to be a place of intense scientific study. The lunar community is fortunate to be in a position to develop the next generation of lunar researchers and engineers with the support of the first generation of lunar scientists and engineers, ensuring continuity of lunar knowledge and expertise. We report on the progress of the NGLSE group, the needs and interests of this community as identified through our efforts, and our future plans to meet those needs.

Background: The need to foster the next generation of lunar scientists is recognized within NASA and the international community (e.g., International Lunar Exploration Working Group, Lunar Explorers Society, and the Canadian Lunar Research Network). For example, the NASA Lunar Science Institute has established a goal to support "...the development of the lunar science community and training the next generation of lunar science researchers." In addressing these goals, the NGLSE aims to bring early career scientists and engineers together in order to create and support a network of next generation lunar scientists and engineers who will be able to work effectively together.

Established informally in 2008 by early career scientists and education and public outreach (E/PO) professionals, the NGLSE group has since grown tremendously. With over 190 current members from academia, industry, and NASA, the NGLSE is building a representative cross-section of the lunar science and engineering communities. The group's founders have since applied for, and received, NASA funding from the EPOESS program to formally design, encourage, promote, and fund experience-building and networking activities for, and between, group members, such as professional development workshops and other community-building events.

Goals: The professional development opportunities provided to the NGLSE group enable the members to become better equipped to contribute to the success of the lunar program, now and in the future if called upon by NASA, academia, industry, or international part-

ners. The group has responded to the needs of the lunar community for input or service, in the form of reviewing proposals and serving on advisory committees, and will continue to become engaged in other opportunities for service as they present themselves. The NGLSE group will also participate in E/PO activities for students and the general public in order to continually recruit the next generation of lunar scientists and engineers. Therefore, NGLSE will provide NASA with a future workforce that is focused on and experienced with the integration of science and engineering as it pertains to lunar exploration.

Workshops: The NGLSE has received NASA funding, as well as support from the NLSI, to host workshops for its members, including providing small travel stipends for student participants, in association with major lunar conferences, such as the NASA Lunar Science Forum and the Lunar and Planetary Science Conference (LPSC). The goals of these workshops are to provide attendees with professional development, to familiarize them with E/PO best practices and opportunities, to provide an opportunity for them to network with each other – now and in the future, and to provide opportunities for them to meet, collaborate with, and receive training from established members of the lunar science and engineering community.

2010 Workshop. The first official NGLSE workshop took place prior to the 2010 NASA Lunar Science Forum. In the morning session of the workshop, participants worked with science educators from George Mason University (GMU) on how to effectively craft presentations for students and how to communicate our exciting science and engineering. The morning was designed based on the results of a pre-workshop survey intended to gauge participants' experience and comfort level with communicating with various audiences. The survey indicated that just over half of the participants (54.6%) frequently to very frequently give presentations to students in an educational capacity. The majority (63.6%) of these interactions are via the participant serving as a guest speaker for a lecture or demonstration. The most challenging aspect of presenting to students was determined to be anticipating the level of background knowledge of the audience (76.2%). Among other questions, the survey also asked participants about the various techniques they use to gauge and maintain student interest during their presentations. The presenters from GMU used this information to model best practices and to provide realistic tips and

suggestions for effectively communicating science and engineering with students (Fig. 1).



Fig. 1 Workshop participants brainstorm how to design an effective presentation for students.



Fig. 2 Workshop participants learn about dust mitigation technique research during the poster session.

The workshop also provided opportunities for participants to network and communicate their science and engineering with each other via oral and poster presentations (Fig. 2). Participants interacted with NASA leaders (Dr. Michael Wargo) and established members of the lunar science and engineering communities over lunch and afternoon Q&A sessions. Additionally, participants received a presentation on lunar education and public outreach resources and opportunities.

A post-workshop survey was used to gauge participants' attitudes toward the workshop and desires for future workshops. Participants agreed to strongly agreed (91%) that the workshop structure was effective in allowing exchange of information and in encouraging discussion among participants, facilitators, and presenters. Of note is that 95% of attendees reported that they anticipate networking/connecting with other workshop participants, facilitators, and/or presenters in the future in a professional capacity. The majority (90%) also reported anticipating making use of the lunar education resources and activities that were pre-

sented in their future EPO endeavors. For future NGLSE workshops, participants commented that they would like to learn more about proposal writing, effective conference presentations, and career development.

2011 Workshops. Based on the results of the 2010 workshop and the needs of the NGLSE as indicated by the post-workshop survey, we are planning our 2011 workshops accordingly. We have worked with NASA Headquarters to schedule and advertise to the NGLSE group a half-day proposal writing workshop prior to the 42nd LPSC. This workshop, which will be led by personnel from Headquarters, will provide participants with an overview of available funding avenues, tips for writing winning proposals, and experience in reviewing successful and unsuccessful proposals. We have also begun organizing a networking event to take place during LPSC. The event will include a presentation and Q&A session with an established member of the lunar science or engineering community. We are in the early stages of planning the next full-day NGLSE workshop, which will take place prior to the 2011 Lunar Science Forum (July 18, 2011). The content of the workshop will be based not only on feedback received from our 2010 workshop but also from a survey that is currently being conducted with NGLSE members to gauge their use of the information presented in 2010 and their needs and desires for 2011.

Community Building Events: In addition to workshops, we have organized a number of smaller, informal networking events since 2008. Events have ranged from formal presentations to small group discussions over coffee to social hours and meals. Each event has brought together established, respected members of the lunar science and engineering communities with the NGLSE group so as to allow for networking and discussion in an inviting, friendly environment. These events have been well attended and received by both the NGLSE participants and the community leaders who have graciously participated.

Conclusions: The NGLSE group seeks to provide experience-building and networking opportunities between and among its members and the established lunar science and engineering communities. We have begun a series of workshops and community-building events to accomplish these goals. Participants have responded positively to these efforts and have provided feedback on the tools and professional development experiences they need to become active, successful leaders in their disciplines and to build a sustainable, long-lived, and publicly supported lunar science and exploration program.

References: [1] Petro N. and Bleacher L. V. (2009) *Lunar Sci. Forum II*, (abstr.).