

NASA EDUCATION FORUM AT SAO ON
THE STRUCTURE AND EVOLUTION OF THE UNIVERSE

Grant NCC5-706

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Annual Report
Period of Performance: 9/15/03 - 9/14/04
The NASA Education Forum at SAO
on the Structure and Evolution of the Universe

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A. Accomplishments for the previous year.

Overview. The past year for the new SEU Forum has been a highly productive one and has moved us forward on three major objectives:

- Involving the public in the major scientific discoveries in our SEU theme this past year, especially the exciting discoveries about dark energy, cosmology, and black holes.
- Implementing the recommendations of the Knappenberger Report in order to strengthen the educational coherence of our collective activities.
- Developing strategic partnerships with underserved communities and other key customers.

Among our activities for the past year are the following:

Serving the Informal Science Education Communities:

Cosmic Questions National Traveling Exhibition. The *Cosmic Questions* exhibition is having an extremely successful tour: One million visitors have enjoyed the exhibit in Boston, Washington, D.C., Michigan, and at its current venue, the Ontario Science Center (which serves schools in the Midwest and upstate NY, as well as Canada, and is the largest interactive science center in North America). The exhibition has been double-booked by every museum on the tour. One measure of its success is that museums have asked permission to replicate various components for their permanent collection. The exhibition is serving as an important venue for public talks about space science given by NASA scientists, and it has also been a catalyst for professional development workshops for teachers. Because the exhibition is periodically updated as it travels, it has kept pace with events in the SEU theme and related events such as the launching of SIRTF. Details of the impact of *Cosmic Questions* can be found in the Summative Evaluation Report, online at:
http://cfa-www.harvard.edu/seuforum/exhibit/resources/CQ_Exec_Sum.pdf

Transit of Venus Activities. The transit of Venus enables astronomers to determine the size of the solar system—the cornerstone for measuring size and scale throughout the universe. To support this important event, the Forum produced a 16-page full-color booklet entitled, "How Big is the Universe?," that takes readers step by step to

Science Teachers' Association. Entitled "Modeling the Universe," the course will also be presented at additional venues by various of the SEU missions and Forum staff. The course is an important step in implementing the Knappenberger recommendations regarding educational coherence.

Professional Development with the Cambridge and Boston Public Schools.

The SEU Forum piloted an important Professional Development Program (not just a single workshop) for middle-school space-science teachers in the Cambridge Public School system. This program was important to the SEU theme because, like most schools, the Cambridge school curriculum focuses on planetary science and not on the universe beyond. The partnership has enabled SEU Forum staff to better address the issues involved in bringing SEU science into the classroom.

Serving Minority and Underserved Communities:

Boston After-School Program and Online Telescopes. The SEU Forum collaborated in a highly productive association with the Boston 2:00-to-6:00 After-School Initiative and the MIT / Chandra After-School Astronomy Project (ASAP) led by Dr. Irene Porro. The Forum provided access to online telescopes, curriculum materials, and Forum staff for training sessions. Youth from the Boston Public Schools attended nine after-school sessions held at two centers: the Hispanic Office of Planning and Evaluation (HOPE), and the Roxbury Multi-Service Center's O'Bryant Youth Community Center. This pilot project is planned to become national in scope (see Section B) and is strengthening our ties with community groups as well as MIT space scientists.

Explorer School participation. Forum staff participated in a NASA training session at one of the NASA Explorer schools, in Fall River, MA. Staff presented a session on size and scale in the universe, and led a question-and-answer session for students.

Chicago Conference and NOBCChE participation. Forum staff served on the planning committee and as breakout session facilitator for the Chicago Conference to broaden participation in space science. The Forum also presented workshops and poster sessions at last year's conference of the National Organization of Black Chemists and Chemical Engineers.

B. Summary of Goals, Plans and Activities for the Year 9/15/04 - 9/14/05.

The SEU Forum's overarching goal for 2005 is:

- To utilize the nationwide celebrations surrounding the Einstein Centennial to promote public interest and involvement in the SEU theme.

Although the flagship missions and probes of NASA's Beyond Einstein program have been delayed, the public's interest in the theme is stronger than ever. The SEU Forum

Underserved Communities Access the Online Telescopes. The Forum will build on its partnerships with the Hispanic Office of Planning and Evaluation (HOPE) and the Roxbury Multi-Service Center's John D. O'Bryant Youth Community Center, with the goal of providing national access to the online telescopes and activities. The Forum is developing and testing a pooled-mode for the telescopes, in which learners who take pictures of the same object receive the same (pooled) image, rather than separate, nearly-identical images. This mode will vastly increase the throughput to the telescopes—allowing access by many more community groups nationwide—without diminishing the educational effectiveness of the on-demand telescope experience. By taking their own images with the telescopes, the students are better able to understand and work with the more abstract images taken by NASA's x-ray, gamma-ray, and infra-red telescopes.

C. Interactions with the Space Science Community.

The SEU Forum now routinely works with space scientists for virtually every project it undertakes. Examples of scientist involvement in the Forum's projects this past year:

WMAP mission webcast. The Forum coordinated a webcast from Adler Planetarium to museums in the East, Midwest, and West, featuring interviews by students of the science PI for the Wilkinson Microwave Anisotropy Probe (WMAP) mission.

Input to Space Science Assessment Project. More than 21 space scientists vetted the >100 questions on the tests for scientific accuracy.

Scientist involvement at *Cosmic Questions* venues. More than a hundred scientists were involved in the production of the exhibition, *Cosmic Questions*, and it continues to serve as a venue for public talks by space scientists as it travels. The Forum also works with the other members of the Support Network to line up regional scientists for these public engagements.

High-Energy Astrophysics Division (HEAD) Conference. During the period covered by this report, the SEU Forum will have worked with scientists at the HEAD section of the AAS in Louisiana, presenting opportunities for scientist involvement in education.

Minority Space Scientists in Professional Development. This year the Forum brokered the participation of minority scientists in professional development workshops for local area teachers. These workshops were developed at the systemic level.

Chicago Conference and Scientist Working Group. Forum staff participated in planning for the Chicago conference on broadening participation in space science research, and also were active members of the Working Group for increasing scientists' participation in education.