

FAST Education and Public Outreach Highlights of Evaluation Findings FY06 and FY07

The **F**ast **A**uroral **S**napshot Explorer (FAST) satellite was launched on August 21, 1996 as the second mission in NASA's Small Explorer Satellite program (SMEX). FAST is a satellite designed to investigate Earth's aurora. Its primary objective is to study the microphysics of space plasma and the accelerated particles that cause auroras, the spectacular light shows that we know as the Northern Lights. The mission provides ample opportunities to educate the public and students about the physics of auroras.

The Education and Public Outreach (E/PO) effort associated with the FAST mission encompasses four distinct components...

- Creating the FAST E/PO Web page
- Providing Northern Lights kits to planetariums nationwide
- Providing teacher professional development at workshops
- Visiting students underrepresented in science and engineering, mostly African-American, in elementary and community college classrooms

Among the major thrusts of the E/PO effort is reaching underserved, underrepresented populations in science education. These populations are defined as females and non-White, non-Asian males and are reached through the professional development of teachers responsible for delivering science education to these populations.

This summary report focuses on Fiscal Year 2006 (FY06) from October 1, 2005 through September 30, 2006 and Fiscal Year 2007 (FY07) from October 1, 2006 through September 30, 2007. It features outcomes from two components of the E/PO effort—findings from teacher workshops conducted within this time frame and relevant statistics from both fiscal years for the mission's E/PO Web site.

TEACHER WORKSHOP FINDINGS

The FAST E/PO team conducted nine professional development workshops for teachers from August 2006 through July 2007, offering topics related to the mission. The majority of these workshops served as a partnership between FAST and three other NASA missions—THEMIS, STEREO and RHESSI—as well as the Sun-Earth Connection Education Forum at Berkeley. A total of 152 of the teachers attending these workshops completed questionnaires regarding their experience. These respondents told us a little about themselves and the environments in which they teach...

- **Experience**—*N*=141. Teachers average 11.6 years experience ranging from 1 to 40 years.
- **Grade Levels***—*N*=144. Half teach elementary grades, nearly one-third (29%) middle school and one-sixth (16%) high school.
- **Setting**—*N*=138. More than half (55%) teach in suburban schools, more than one-third (34%) in urban schools and a little more than one-tenth (11%) in rural schools.
- **Student Population**—On average, over two-fifths (41%) are teaching in Title I schools—*N*=94; 48% of their students receive free or reduced lunches—*N*=96. Teachers said that more than two-thirds (67%) of their students represented underserved populations in science education, that is, included an average of 45% female and 22% non-White, non-Asian males—*N*=102.

*Where percentages do not sum to 100%, the 'other' category has been dropped from the discussion.

Most (58%) of the teachers told us that they learned about the opportunity from e-mails that piqued their interest in the workshop topics. The nine workshops presented a total of 36 sessions related to the FAST Mission.

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Teachers rated their *understanding of the topics* presented in these sessions as being 'clear'. This is evidenced by a mean rating for all participants for all sessions of 3.5 on a 4-point scale ranging from '1-not clear at all' to '4-very clear'. This is in stark contrast to their prior knowledge of the topics. They told us that before attending the workshops, their knowledge of the topics was between 'just a little' and 'moderate'—the translation of our finding of a 2.4 mean rating on a 4-point scale ranging from '1-almost no knowledge' to '4-quite a bit of knowledge'.

Teachers reported that they were 'very likely' to use the materials and ideas in their classrooms offering a mean rating of 4.0 on a 5-point scale ranging from '1-will not present' to '5-certain to present'. A full 60% of the teachers anticipated they would be using the information gleaned from these workshops primarily as integral parts of basic science courses and 48% envisioned using these materials as resources or supplements to basic science courses. This is dramatically different than their use of these topics prior to the workshops. Before FAST, an average of 30% said that they never taught the topics presented, 32% had used the topics as resources or supplements to basic science courses, and 32% had used the topics as integral parts of their courses.

Despite the high percentage of teachers eager to implement FAST materials and ideas, some expressed concern that their ability to use the materials would be constrained by a lack of financial support to purchase materials, scarce resources and a deficiency in classroom technology. They were also concerned about time constraints.

These findings suggest that the workshops have presented complex materials to teachers in a clear manner that gives them the confidence to present the materials to their students. Additionally, they are now more likely to include the materials and ideas as integral parts of or resources to supplement their basic science courses.

WEB SITE STATISTICS

The FAST E/PO Web site has been up and running since March 2000. Our focus for this section is on Web site statistics for FY06 and FY07.

Visitor Profile—In each of the fiscal years, the domain names for visitors to the Web site were catalogued. This offers an avenue for identifying visitors' countries of origin. We found that during the two years, nearly two-thirds of the site's visitors can be identified as residents of the United States. Specifically our findings are...

- **FY06**—We found 63% of the visitors were from domain names located in the United States, and 4% were from countries other than the US—with The Netherlands, Canada, Romania and Switzerland leading the list. An additional 32% were from numerical addresses that could not be identified
- **FY07**—We found 61% of the visitors were from domain names located in the United States, and 4% were from countries other than the US—with The Netherlands, Canada and Norway leading the list. An additional 35% were from numerical addresses that could not be identified

We found that visitors to the site enjoyed a 96% and 97% 'hit' rate in FY06 and FY07, respectively. This is the percentage of times (requests) a visitor was successful in accessing the specific files of which a Web page is composed and did so without an error message.

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A single Web page can be made up of any number of unique files (hundreds even). Since there may be multiple files making up a Web page—resulting in hundreds of ‘hits’—counting those requests may not be the most accurate reflection of Web traffic. Consequently, for the remainder of this discussion, we will refer to the Web site’s activity levels in terms of requests for a page—a page that has been viewed by a visitor rather than all of the files that make up the Web page.

Activity Levels—A general summary below indicates activity levels as reflected in successful requests for pages. For the number counts and averages for FY06 and FY07, we will discuss specific patterns of activity by month, day-of-the-week and hour. We note that with the tenth anniversary year of the mission, FY06 activity levels—as reflected in a count of successful requests for pages—were 24% higher than in the following year FY07.

<u>Requests</u>	<u>FY06</u>	<u>FY07</u>
Total # Successful Requests for Pages	44,179	35,591
Average Successful Requests for Pages per Month	3,682	2,965
Average Successful Requests for Pages per Day	121	97
# of Page Requests in Peak Month for Entire Year—March	5,291	3,502
# of Page Requests on Peak Day for Entire Year—Tuesday	6,802	5,632
# of Page Requests in Peak Hour for Entire Year—3pmET/6pmET	2,332	1,749

- **Monthly**—In FY06, above average activity of more than 5,000 pages requested per month was noted in March, April and May, with the peak month of March bringing in 5,291 requests. We surmise that this increased activity is due to a March 29 solar eclipse that was featured on the NASA Web site as well as the sites of all heliophysics missions. In addition, the teacher professional development workshops were being held around this time. It is possible that teachers were taking FAST information back to their classes, causing a burgeoning of interest in the site among their students. Activity in FY07 peaked in the months of March, May and June 2007 with more than 3,200 pages being requested each month. The peak month of March brought in 3,502 requests.
- **Daily**—For FY06 and FY07, the number of average successful requests per day was 121 and 97, respectively. In FY06, successful requests on weekdays ran higher than average, while requests on weekends fell below. In FY07, the pattern was similar with requests falling above average on Tuesday through Saturday and below on Sunday and Monday. For both years, Tuesdays were the peak request days (6,802 requests for all Tuesdays in FY06 and 5,632 for FY07) and Sundays were the lowest request days (5,606 for FY06 and 4,481 for FY07).
- **Hourly**—For both FY06 and FY07, the peak hours for successful requests ran from approximately 10am to 6pm ET—we take the liberty to use Eastern Time as our point of reference since the majority of site users were from the US. The peak hour for FY06 was 3pm with 2,332 requests for the year, while that for FY07 was 6pm with 1,749 requests over the year.

The daily- and hourly-use statistics indicate high traffic during the work/school week and during work/school hours and into the afternoon—10am to 6pm ET. It is also being used predominantly in the Spring months—March through May. This pattern tends to support the premise that the FAST E/PO Web site, in contrast to its image as primarily an informal public outreach tool, is being relied upon as part of the formal educational process.

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