“From Earth to the Solar System Traveling Exhibit visits Puerto Rico”

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Summary
Puerto Rico was one of the venues for the traveling exhibit “From Earth to the Solar System” (FETTSS) as part of the NASA Year of the Solar System (YSS) during October 2011.FETTSS is a collection of images that showcase the excitement of planetary exploration—our journey to understand the origin and evolution of the Solar System, and our search for life elsewhere[1].

The images were displayed at the main library of the University of Puerto Rico (UPR) in San Juan. A set of astronomy outreach activities were organized to take place during the month of October 2011 aligned with the FETTSS theme. These activities included the main exhibit, guided tours for school groups, a special one day event denominated “Planet Festival”, talks by astronomers from the UPR and the University of Valencia (Spain), telescope observations of the Sun, and a film cycle (astronomy related).

This paper describes this experience and in particular the work with a group of undergraduate students at the UPR that assisted in the outreach events. Among this group were three blind students. The FETTSS exhibit included a set of tactile and

Braille images for the blind and visually impaired. A special exhibit was prepared with additional adapted materials for the visually impaired or blind. This allowed not only blind visitors to participate but allowed the general public to become more aware of the needs of this population.

Introduction

The International Year of Astronomy 2009 (IYA2009) triggered a wave of interest, excitement and collaboration in astronomy throughout the world (e.g. IYA2009 Final Report Executive Summary[2], 2010).

One of the important achievements for the IYA2009-Puerto Rico affiliated node was to establish a network with outreach specialists at the Smithsonian Astrophysical Observatory (SAO).

From Earth to the Universe (FETTU), was a very successful global project[3] of the IYA2009 developed at SAO (Kowal Arcand and Watzke, 2009). We collaborated with the FETTU project providing the Spanish captions of the exhibit. The IYA2009-Puerto Rico node received on loan the FETTU EPOESS NASA funded traveling exhibit during the month of November 2009, and it was presented at three different cities of Puerto Rico (IYA2009 Final Report[4], 2010).

New initiatives were inspired by the IYA2009 cornerstone projects. One example is the "From Earth to the Solar System" (FETTSS) project, a sister project of FETTU (Arcand and Watzke, 2012). The FETTSS is focused on the themes of planetary exploration, origin and evolution of the Solar System and the search for life. The images may be downloaded for free[5].

This article describes the FETTSS experience in Puerto Rico.

FETTSS Exhibit in Puerto Rico

A traveling version of FETTSS composed of 30 images was created as part of a NASA proposal (10-EPOESS10-0028) issued through the Science Mission Directorate. The exhibit contains English and Spanish captions. It made a stop at the UPR Río Piedras campus in San Juan Puerto Rico during October 2011. The exhibit also included 8 panels with 8 tactile images, large print and Braille text for the visually impaired.

The NASA FETTSS traveling exhibit was presented at the UPR as part of the celebration of the YSS. The YSS is a period of time designated by NASA, corresponding to a Martian year (October 2010 until August 2012) in which several NASA spacecraft missions took place exploring different questions about the Solar System. During this time (23 months) NASA selected several themes for the general public to explore and participate. A special website was created to facilitate the access to the Solar System outreach materials[6].

The FETTSS exhibit consisted of color images printed on both sides of 3'x5' panels that were displayed on aluminum stands (a total of 30 images). The images were displayed at the lobby of the main library of the UPR (José M. Lázaro Library) from October 3 - 28, 2011.

Preparation for the FETTSS

Since 2008 a group of UPR professors and professional astronomers have developed an outreach program together with amateur astronomers, educators and the members of the Puerto Rico-NASA Space Grant Consortium (PRSGC). Since then the group has met to develop and have at least one astronomical outreach event each year. In 2011 CP and ML received a NASA IDEAS-ER award to support two astronomy image exhibits during the YSS celebration. A meeting with members of the PRSGC was coordinated to organize a series of events to celebrate the YSS including the FETTSS exhibit.

The FETTSS exhibit was announced to faculty, students and employees of the UPR. We prepared a press release and announced on TV, radio, printed newspaper, and through electronic media directed at the general public. The students helped with this organization phase. We prepared four printed handouts with astronomy activities related to the FETTSS for the children we expected as audience: one for each school level (elementary, middle and high), and a Braille activity for all levels.

We selected a group of twelve undergraduate students and two graduate students of the UPR to assist in the outreach events associated with the FETTSS exhibit during the month of October. These students were from different disciplines: physics, environmental sciences, education, communications, humanities, and social sciences. This group included 2 totally blind students and one legally blind. We met with the students explaining the details about the exhibit and gave them reading materials about the exhibit in order to prepare them as exhibit guides. We also discussed with them an evaluation survey to be administered by the UPR students to the visiting public during the exhibit. The students also helped with the advertisement of the events through social nets, and others.

Events

Four main events were organized during the month of October to complement the main FETTSS exhibit (October 3-28, 2011): guided tours for schools, film cycle (astronomy themes) with a guided discussion after the presentation, conference cycle and a single day science festival (Planet Festival).

Guided tours

We scheduled the hours between 9:00 a.m. and 2:00 p.m. on Tuesdays and Thursdays to give guided tours of the exhibit for school groups that had made reservations. The children and teachers were greeted by University professors and students, who gave some information about themselves. An introduction was presented regarding the exhibit, establishing a dialogue with the children about what they already knew of the Solar System. They visited the exhibit and were given information about the images and allowed questions. There was a tactile and Braille astronomy exhibit that included different resources such as relief maps, a tactile map to track hurricanes, with the path of hurricane Maria (September 2011) as an example[7]. The children were given information about Braille, a copy of a Braille alphabet developed by the National Federation of the Blind[8], a Braille activity to use this alphabet, and one of the blind students printed their names using a Brailler machine. The children were motivated at this moment to ask questions to the blind students about their experiences at the University.

Figure 2: Tactile and Braille exhibit.

The blind students enjoyed greeting the school groups as they arrived and together with the sighted students they gave the first instructions. The blind students took the initiative to carefully study the captions and occasionally accompanied the sighted students with the children in the tour of the visual images.

Film cycle

Four movies were screened and discussed in a event called “Ciclo de Cine Comentado” (Commented astronomy movie cycle). An undergraduate student presented the movie and the film commentator for the evening. The following movies were presented: ”*2001: A Space Odyssey*” (Kubrik, 1968), commented by Dr. Ramón López Alemán (cosmologist), “*Solaris*” (Tarkovskiy, 1972), commented by Dr. Fernando Noriega Crespo (Science Education Researcher), “*Nostalgia de la Luz*” (Nostalgia for the light) (Guzmán, 2010), commented by Dr. Carmen Pantoja and Dr. Mayra Lebrón (Astrophysicists) and “*Koyaanisqatsi*” (Reggio, 1982), commented by Dr. Jorge Rocafort (Architect) and Dr. Daniel Altschuler (Astrophysicist).

Figure 3: Dr. Ramón López Alemán presenteing the conference "Colonization of Mars".

Conference cycle

During the month of October there was a weekly astronomy conference.
The following conferences were presented: ”*Aliens and Alien Life*”, presented by Dr. Daniel Altschuler (UPR), “*Mars Colonization*” presented by Dr. Ramón López Alemán

Figure 4: Observations of sunspots at the Planet Festival at the University of Puerto Rico.

(UPR), "*The New Solar System*" presented by Dr. José L. Alonso (UPR) and "*Water in the Solar System*" presented by Dr. Amelia Ortiz-Gil (Astronomical Observatory, University of Valencia, Spain). One of the undergraduate students welcomed the audience, presented the speaker and directed the question and answer sessions each evening.

One day science festival

"The Planet Festival" was a one day event in which undergraduate students of the UPR developed outreach exhibits and activities focused on the FETTSS themes and displayed them for the visiting public on October 15, 2011. The Puerto Rico Space Grant affiliate from UPR-Mayagüez displayed materials related to space exploration. The amateurs from the "Sociedad de Astronomía de Puerto Rico" and the "Sociedad de Astronomía del Caribe" had telescopes with filters for observation of the Sun available for the visiting public. Local weather was favorable and the visitors could observe sunspots and solar prominences. The tactile image of the Sun included in the FETTSS exhibit gave the opportunity to the blind students to understand the concepts of sunspots and prominences that were viewed during the festival.

Evaluation

The exhibit was evaluated using two instruments developed by the FETTSS outreach specialists. Blind and sighted undergraduate students did evaluations to adult visitors to the FETTSS exhibit. The evaluation questions were printed in ink and Braille. A video was posted on "YouTube" as an example of the interaction of the volunteer students with the visitors[9].

One of the evaluation instruments was a twelve questions survey in which the students gathered the opinions about the astronomy exhibits for a sample of visitors[10]. The second instrument was a general observation sheet regarding the observed behavior of visitors to the exhibit on different days and times[11]. The observations considered group composition, overheard comments, group interactions and general observations of visitors. The results for these evaluations have been posted online as a pdf document[12]. Most of the surveyed persons liked the exhibit (39/48=81%), considered they learned a lot from it (34/47= 72%) and was fascinating (36/47=77%). The evaluation indicated that the exhibit increased the interest in astronomy (37/48=77%), in attending another science event (42/48=88%) and in reading about science online (32/47=68%). In terms of the observed behavior of the visitors it was found (total of 20 cases observed) that the average visit time was 21 minutes.

We also had a sign up comment book available during the entire exhibit duration for voluntary comments from the public. The comments left by the visitors were very favorable and mostly asking for more of this type of exhibits.

Conclusion

The Puerto Rico Space Grant Consortium (PRSGC) has served as a facilitator for this project not only through an award but also through its organization structure in terms of PRSGC affiliates. We have taken advantage of this structure to contact and involve those persons interested in NASA related outreach and to include them in the events. The affiliates participated by organizing activities with students to visit the FETTSS exhibit (or the other special events), by allowing the public to observe the Sun through telescopes, by organizing Space exploration exhibits or advertising the exhibit to the general public.

More than 1000 persons participated of the FETTSS activities in Puerto Rico. The comments left by the visitors were very favorable and mostly asking for more of this type of exhibits. The FETTSS allowed a month dedicated to new discoveries and research of the Solar System.

The school children and public had the opportunity to learn how a blind person can learn about topics such as visual astronomy and also had the opportunity to learn about the Braille writing system. Many school children wanted to have their name printed in Braille with the Brailler machine. At this moment they had the opportunity to ask questions to the blind students about their experiences at the University.

The work with the UPR students was very rewarding. The interaction of the students from different disciplines allowed the UPR students to develop different skills not ordinarily explored in a classroom setting. These skills included presentation of guided tours to students and general audiences, as well as the process involved in the evaluation of an exhibit. The UPR students had different backgrounds and they all incorporated their talents into this project. In particular we had three students with visual impairments. It was the first time they had the opportunity to be leaders in presenting science outreach to a general audience. These students were an inspiration for all of us. They put extra effort in order to participate of all aspects of organized events. They memorized the captions of the visual displays and they interacted with the school children and public not only at the Braille and tactile displays. They also participated of the entire tour including the visual part, by means of dialogue with the visitors. The FETTSS was an opportunity for them to learn about astronomy and to strengthen the development of independent living skills. The sighted students learned about accessible materials for the blind, and became more sensitive to the needs of this population. One of the unexpected results of the FETTSS exhibit was this inclusive participation of college level students of diverse backgrounds in science outreach.

The approach in which a network is established with outreach specialists from NASA's Chandra X-ray Observatory at the Smithsonian Astrophysical Observatory has been very successful in Puerto Rico. Receiving on loan a well designed outreach tool (the FETTSS exhibit) has allowed us to: 1) focus on collaborating with other science communicators in Puerto Rico, 2) invite astronomers from Puerto Rico and from the University of Valencia to give astronomy talks 3) prepare our students with different education backgrounds to work in science outreach, 4) develop science related education material for the blind and visually impaired and 5) allow students with

disabilities to participate as facilitators in science outreach activities 6) present a science exhibit in our community. Puerto Rico does not have a science museum. The Arecibo Observatory has a small Visitor Center and it is far from the metropolitan area.

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Notes

[1] http://fettss.arc.nasa.gov (retrieved on 6/3/2012)
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