

# From Earth to the Solar System: A Case Study for Public Science Events

**Kimberly Kowal Arcand**

Chandra X-ray Center/SAO  
kkowal@cfa.harvard.edu

**Megan Watzke**

Chandra X-ray Center/SAO  
mwatzke@cfa.harvard.edu

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## Summary

The term “public science” is proposed to describe science outreach events and activities that are conducted in public spaces. In this article, the photography exhibition “From Earth to the Solar System” (FETTSS) is outlined as a case study to evaluate the impact and the types of audiences reached by public science programmes.

## Public science

Public art is defined on Wikipedia as “works of art in any media that have been planned and executed with the specific intention of being sited or staged in the physical public domain, usually outside and accessible to all”. It is a well-established means through which people can become engaged in art during their everyday activities. Typically, public art pieces have some connection to their location, as well as the potential for community involvement and collaboration.

The same types of easy-access events are already taking place in science outreach. Astronomy, in particular, has had success in engaging the public in everyday situations through city centre star parties, sidewalk astronomy, and outdoor exhibitions. It is therefore suggested that the term “public science” should be adopted for outreach projects that attempt to reach new audiences by being held outdoors or in another type of public or accessible space (Arcand & Watzke, 2011). Public science could help frame such outreach events that attempt to attract incidental or casual visitors (Crettaz von Roten, 2011).

## From Earth to the Solar System

From Earth to the Solar System (FETTSS) was conceived as a response to NASA’s Year of the Solar System (which ran for one Martian year, from October 2010 through August 2012), and arguably provides a solid case study for the newly defined category of public science.



**Figure 1.** The Big Yellow Rabbit is a large (13 metres tall) and evocative piece of temporary public art created by Dutch artist by Florentijn Hofman and displayed in Orebro, Sweden in 2011. Credit: Peterappelros, Wikimedia Commons (CC)

As with its predecessor project, From Earth to the Universe (FETTU), the FETTSS organisational structure follows a grassroots approach (Russo & Christensen, 2010) in which local organisers print their own version of the exhibition for their selected venues. The FETTSS project supplies high-resolution electronic files that have been approved for non-commercial outreach use to be displayed in any way that makes sense for a given venue. However, the printing, installation, and other logistics are the responsibility of the local hosts.

One major implementation of the FETTSS programme, organised by the Chandra X-ray Center/Smithsonian Astrophysical Observatory and NASA Astrobiology Institute, is a traveling FETTSS exhibit and a tactile Braille all-weather poster series for the visually impaired. The NASA-funded exhibit, which consists of 15 all-weather, double-sided image stands (bilingual in English and Spanish), is being loaned free of charge to over a dozen venues that

commit to hosting the project. Each host must also organise an additional event to supplement the exhibit, such as a star



**Figure 2.** A selection of the 95 images that were curated for the FETTSS collection. FETTSS content weaves together themes in multi-wavelength astrophysics, astrobiology and planetary science and includes images from amateur astronomers, field scientists and ground- and space-based missions. Credit: FETTSS

party, scavenger hunt or a question and answer session.

Internationally, the FETTU network was leveraged to advertise the opportunity beyond NASA and US-specific audiences. As of November 2012, about 100 FETTSS venues in 25 countries have either signed up to participate or have already hosted FETTSS events. The following section details a few locations that have hosted the FETTSS exhibition in the United States.

## FETTSS on location

### 1) La Palmera, Corpus Christi, Texas, US

In the US, the first port of call for FETTSS was at a high-traffic shopping mall called La Palmera, located in Corpus Christi, Texas, from 9–31 May 2011. This coincided with a programme of events for NASA's Space Week, coordinated with the Corpus Christi Museum of Science and History and the National Center for Earth and Space Science Education. FETTSS was covered in television news broadcasts, online articles and promoted through the museum.

### 2) National Air & Space Museum (NASM), Washington DC, US

The exhibit was hosted outside NASM from 1 June to 11 July, 2011. FETTSS funds were used to allocate two summer interns to act as docents at the outdoor exhibition. Each weekday, two 15-minute tours were offered in the mornings on the moons in the Solar System and cosmic weather. The materials used to supplement the exhibit included the FETTSS exhibit guide and FETTSS postcards. The FETTSS exhibition also played a part in the National Mall Astronomy Night, which was held on 8 July in Washington DC. At this event, more than 300 visitors visited the astronomy exhibits, theatrical events and star-gazing parties that took place.

### 3) Science City, Kansas City, US

FETTSS travelled to host organisers at the Science City science centre at the historic train station, Union Station, in Kansas City, Missouri, from 6 March–8 May, 2012. The landmark is a tourist destination not only for its historic architecture, but also its indoor mall that hosts unique shops and restaurants. The FETTSS exhibit opening was part of the train station's Science City 2.0 kick-off



*Figure 3. FETTSS visited Washington, DC from 1 June to 11 July 2011, with hundreds of visitors attending the National Mall Astronomy Night held on 8 July in Washington DC. Credit: NASA/CXC/SAO/J. DePasquale*

event to celebrate a new nature centre, planetarium show and the reopening of the public mall space in front of the "Engineerium", where students perform experiments in a simulated engineering environment. The organisers scheduled numerous school field trips and also inserted FETTSS into their Astronomy Week festivities (1–8 May 2012).

### 4) University of Central Florida (CFU), Orlando, US

FETTSS travelled to the John C. Hitt Library at the University of Central Florida in Orlando, Florida, for display from 11–29 May, 2012. The university's Planetary Sciences Group within the College of Sciences organised the exhibit's stop in Orlando to help "give community members a chance to see what inspires scientists every day to continue research into the formation of the Solar System and the possibility of life beyond Earth".

## Evaluating the impact and audience reached by FETTSS

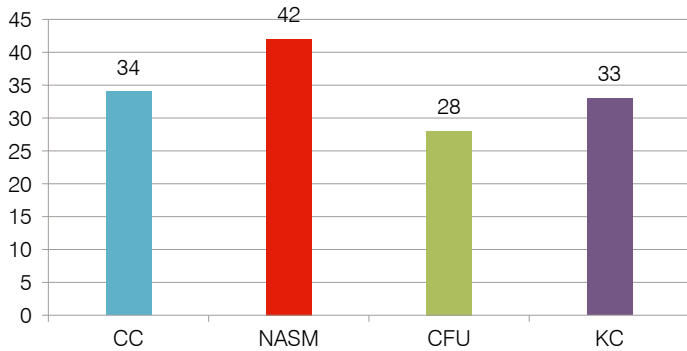
The FETTSS research questions follow on from previous public science project results (Arcand & Watzke, 2010), as well as results from the ongoing Aesthetics & Astronomy research project (Smith et al., 2010). These questions include: Who are we attracting with science displays in these everyday situations? Are there more

incidental visitors than intentional visitors with public science events? Do any participants follow up with their local science centre or library or other resources? FETTSS data may help shed light on whether public science events can be effective ways of reaching new audiences.

Tables 1–5 show preliminary self-reported results from 5 out of 11 questions from surveys distributed to population samples of one in three adults at the FETTSS sites described above. The graphs were prepared by external evaluator Jan Crocker LLC associates and edited by the first author. In the tables, La Palmera, Corpus Christi = CC; National Air and Space Museum = NASM; Central Florida University = CFU, and Union Station, Kansas City = KC.

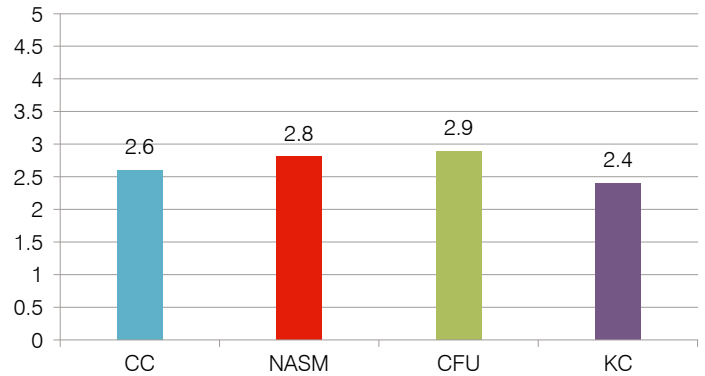
A noted difference between the data is that the population surveyed at NASM came from across the US, as well as from other countries, whereas those surveyed at the other sites came from relatively nearby locations. This is not a surprising find, since NASM is a significant tourist destination. Another noticeable difference is the average age of the audience, with a younger crowd at CFU (average age 28 years) compared to those attending NASM (average age 42.1 years). This is likely because more multi-generational family units visit NASM, and many college students live near to CFU.

### Average Age



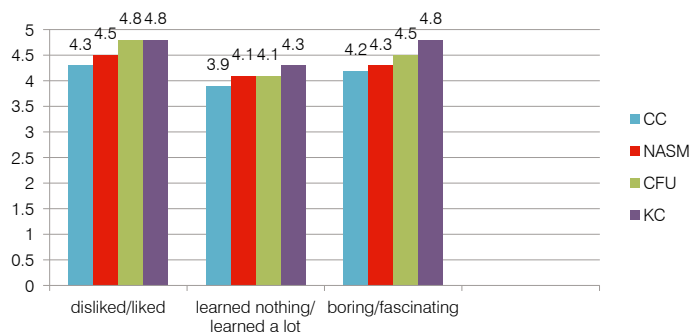
**Table 1.** Question 4 on participant age: The somewhat older age for NASM reflects the family audience that typically visits the museum.

### Average Rating of Knowledge of Astronomy On a scale of 1–5



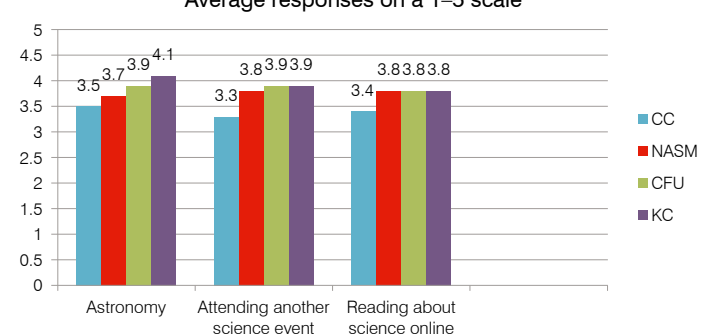
**Table 2.** Participants were questioned about their existing knowledge of astronomy on a scale of least (1) to greatest (5). The similarity in self-reported knowledge across the venues is, perhaps, surprising and requires further analysis with the remaining data from the survey.

### How Do You Feel About FETTSS? Average responses on a 1–5 scale



**Table 3.** Respondents were asked to indicate a score between 1 and 5, where 1 represents disliked/learned nothing/boring and 5 represents liked/learned a lot/fascinating. The results indicate that the biggest impact may be that of an aesthetic experience, based on the higher ratings in the “like/dislike” and the “boring/fascinating” categories.

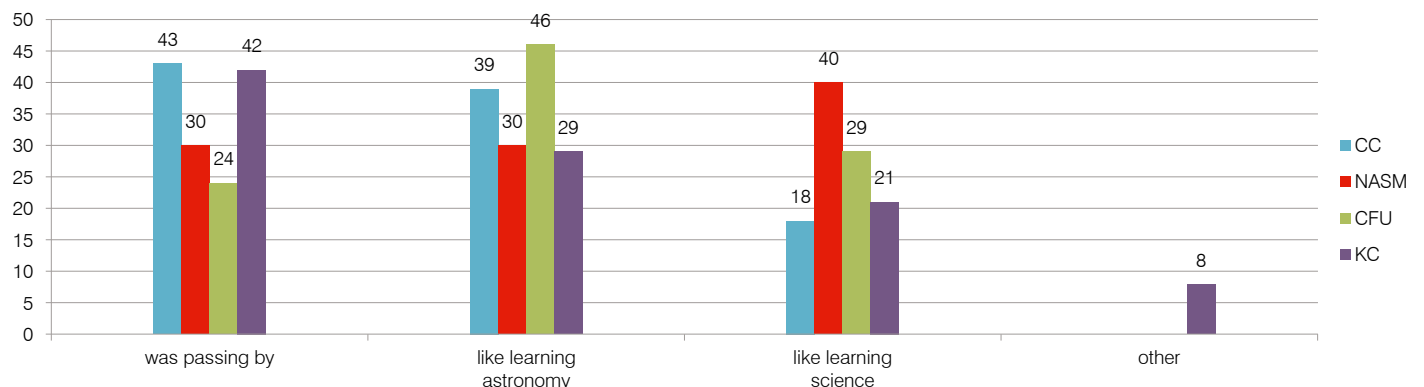
### How Do FETTSS Increase/Decrease Interest in the Following Average responses on a 1–5 scale



**Table 4.** Question about the participants’ interest in astronomy as a result of seeing the FETTSS exhibition, and the likelihood that they will attend other science events or read about science online. The range of responses across sites was similar, with slightly lower numbers from the mall site in Corpus Christi.

### Was Drawn to the Exhibit because:

Numbers in percents based on number of responses



**Table 5.** Participants were asked why they had been drawn to the exhibit with numbers in percentages, based on the number of responses. CFU had the highest percentage of people who visited the exhibit because they were interested in astronomy, which is perhaps not surprising as the hosts mentioned in an email that they would encourage staff and students to attend the exhibit. CFU and NASM had the two lowest ratings in the “was passing by” category. In the case of NASM, where the exhibit was set up outside, near the entrance, it is suggested that most participants were intentionally visiting the museum and may have viewed FETTSS as part of its collection, hence the low number of reported passers-by.

It is also of interest to note some similarities between the responses from participants at different venues. For example, one might think that viewers at a shopping mall setting would have a lower level of astronomy knowledge than those at a science museum. Yet, the responses to the survey were relatively consistent. Further analysis with data from other sites should help to clarify this finding. It is worth noting, however, that this mall is near to a large academic community (Texas A&M University Corpus Christi), but the results could also indicate that public science events attract participants with an existing interest in the field, even when held in non-traditional venues.

In general, there was much consistency of responses for the questions about the attendees' overall impressions of FETTSS (Table 3) and how it had altered their interest in astronomy and their likelihood of attending another science event (Table 4). It is suggested that the slightly lower rated responses to "learned nothing/learned a lot" in Table 3 reflect the responses of people who commented that they were already knowledgeable about astronomy. Additionally, it may be that the biggest impact may be that of an aesthetic experience, based on the higher ratings in the "like/disliked" and the "boring/fascinating" categories.

Perhaps the most encouraging result of all of these questions from an astronomy communication perspective is that the responses were decidedly positive, no matter what the venue.

## Conclusion

As with the FETTU project (Arcand & Watzke, 2010), the preliminary FETTSS evaluation data suggest that public science projects can have a positive impact on viewers' perception and their relationship with science events (see tables 3 and 4). Deeper and longitudinal studies of public science events will help to shed more light on these early observations. Furthermore, projects similar to FETTSS from other scientific fields would help to further demonstrate any impact that public science may have on society.

In future studies we will consider increasing the scale used in the survey from 5

to 10 points, as used in the Aesthetics & Astronomy studies (Smith et al., 2010). Additionally, future studies might attempt to align survey language and indicators in order compare data with potential benchmarks from current research, such as the Longitudinal Study of American Youth (LSAY) (Miller, 2012) and other existing US-wide data samples.

Meanwhile, in the current study, we are continuing to analyse the data that has been returned as the NASA-funded FETTSS exhibit travels to other locations in the US. We are gathering additional information on the perspective and experiences of FETTSS hosts from the US and worldwide organisers, as well as gathering information about the online interest in FETTSS through website and social media statistics.

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## Notes

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<http://chandra.si.edu/fettss>

## Biographies

**Kimberly Kowal Arcand** is the Visualisation & Media Production Coordinator for NASA's Chandra X-ray Observatory. She is principal investigator of the From Earth to the Solar System (FETTSS) project and co-author of the FETTU- and FETTSS-based book *Your Ticket to the Universe* with Megan Watzke.

**Megan Watzke** has worked in astronomy communication for the past 12 years. As the Press Officer for NASA's Chandra X-ray Observatory since 2000, she has worked toward infusing science in the public's consciousness, trying to remove the stigma that science holds for so many, especially girls, women, minorities and other under-represented groups.