Planetary Wonderings

March Focus: Astronomy Resources for the Visually Impaired

By Mary-Frances Bartels, NASA Solar System Ambassador

Two months ago I mentioned some notable astronomy-related anniversaries that occur this year — from the 400th anniversary of Galileo's use of a telescope to the 40th anniversary of the moon landing. I recently learned of another significant anniversary, one not usually associated with the study of the universe. This year marks the 200th anniversary of the birth of Louis Braille. As a teen, Mr. Braille changed the world of the visually impaired by inventing a system of reading and writing employing raised dots. Two years afterwards, he adapted his system to musical notation, and later, mathematics. Through a tactile system Braille helped blind persons more fully participate in society. While not an astronomer, how has Braille's legacy opened up the world of astronomy to the blind?

Over the past decade NASA has been involved in the creation of a number of resources for use by blind persons. Sometimes these materials are adapted from those developed for sighted persons. Other times resources are developed "from scratch." Let us explore some NASA projects that use tactile methods to teach about outer space to a group not usually associated with this topic.

Touch the Stars — First published in 1999, this combination Braille and large print astronomy text by Noreen Grice includes tactile line drawings. It covers a variety of general astronomy topics including constellations, planets, moon phases, eclipses and galaxies.

Touch the Universe: A NASA Braille Book of Astronomy — This is another Braille and large print book by Grice, and includes images of raised patterns to translate colors, shapes and other intricate details of the cosmic objects, thus allowing the reader to feel what he cannot see. A number of Hubble photographs were embossed for this project which was made available in 2001.

The Evolving Universe — In 2004 the Mid-continent Research for Education and Learning (McREL) and the Colorado School for the Deaf and Blind (CSDB) worked with NASA's Jet Propulsion Laboratory to create materials which focus on the origins of the universe. This resource, part of the Adaptive Curriculum Enhancement (ACE) program, is based on the module, "Genesis Cosmic Chemistry: Cosmogony." Students act as scientists as they study tactile models of specific features of the universe. While studying the Standard Cosmological Model students learn of the difficulties of conducting science on very large time and distance scales by indirect observation and inference. More information on ACE may be found at: http://www.ace-education.org/

Touch the Sun: A NASA Braille Book — Like her previous works Noreen Grice combines Braille and print for a book that can be appreciated by both visually impaired as well as sighted individuals. Published in 2005, the tactile images in the book were created using a process called "thermoforming." Images include those from the Solar and Heliospheric Observatory (SOHO) and the Transition Region and Coronal Explorer (TRACE) spacecraft.

Feel the Impact — Another project from the ACE program, and released in 2007, includes experiments and data analysis of natural phenomenon related to the Deep Impact mission.

Touch the Invisible Sky: A Multi-Wavelength Braille Book Featuring Tactile NASA Images — Published in 2008 this Braille and large print book introduces the concept of non-visible wavelengths, and includes images from the Chandra X-ray Observatory, the Spitzer Infrared Telescope, Hubble, and ground-based telescopes. The color pictures make this book able to be appreciated by seeing people as well. It was authored by Noreen Grice, Simon Steel, and Doris Daou.

The above is only a sampling of the efforts NASA has made to make astronomy accessible to the visually impaired. Other resources are "out there" and being developed.

Resource of the Month: Google Mars http://www.google.com/mars/ consists of maps showing elevation, visible, and infrared. Users can even check on the status of Mars landers.

Activity of the Month: All of the above resources use various methods to make images understandable to visually handicapped persons. Some methods to make tactile images include thermoform, swell paper, and silk screen. These all require special equipment. Think of some objects and concepts in astronomy, such as comets, galaxies, orbits, eclipses, etc. How might you make tactile representations of these using household objects? Would you use string, fabric, hot glue, paper, or what? Make a tactile image and give it only as much detail as needed to convey the general concept you want to illustrate. "Test" its effectiveness by having a blindfolded friend touch it. Better yet, if you know someone who is blind, let him "see" it himself. Make any needed changes to improve your "image." These are some of the same steps professionals used to produce the materials discussed in this article.

Suggestions, questions, corrections, and comments about "Planetary Wonderings" are welcomed and may be directed to stargazer @ keeplookingup.net (remove spaces). Past columns may be found at www.KeepLookingUp.net (click on "Planetary Wonderings" on the right side of opening screen) and at http://www.freelists.org/archives/astronomyed/ (columns from Jan. 2007 to the present).

Remember to *keep looking up!*

Sources (not already mentioned in article): http://www.nasa.gov/audience/foreducators/k-4/features/F_NASA_Dedicated_Students_Disabilities.html
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