

Astronomy Education Review

2009, AER, 8, 010201-1, 10.3847/AER2009007

Bill Gates' Great-Great-Granddaughter's Honeymoon: An Astronomy Activity for Several Different Age Groups

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Received: 01/6/09, Accepted: 03/11/09, Published: 04/6/09

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Abstract

When students finish a unit or course on the planets these days, they are often overwhelmed with facts, comparisons, and images. A good culminating activity, to help them organize their thinking (and review), is to have them divide into small groups (travel agencies) and come up with their top ten solar system “tourist sights” for future space vacationers, complete with images. The history of the activity and its variants, and resources to help instructors and students, are reviewed.

1. BACKGROUND

In a recent paper ([Fraknoi 2008](#)), we offered an annotated listing of the best image repositories available for astronomy education these days. However, the number of images in these repositories is so large, students and novice instructors can be forgiven for sometimes feeling completely overwhelmed. (Indeed, this author has been teaching astronomy for over 30 years, and he feels overwhelmed!) This is particularly true in the area of solar system images, where new planetary probes are sometimes adding thousands of images to our repositories in a year. The activity below is an enjoyable way to help students organize some of the images (and information) they come across in an introductory unit or course on the planets.

2. ACTIVITY

The original activity ([Fraknoi 1995](#)) was published in the compilation of astronomy activities and resources called *The Universe at Your Fingertips* (after several years of testing with different classes and teacher groups). Recommended for grades 3–12, the activity involved dividing students into small groups, each of which was to be a travel agency of the future. (This was before the profession of travel agent was largely decimated by the advent of travel websites.) Each group was to use its knowledge of the planets and its writing and art skills to produce a travel brochure, advertising the solar system attractions their tour would visit and explaining why each place was impressive and/or scientifically important.

For younger students, the teacher might have to provide a sample list of places and pictures for them to choose among. Older students would use class, textbook, and library resources to come up with their own lists and images. In addition, everyone was encouraged to be as creative as possible in describing, drawing, and orally presenting their brochure to the class in a way that would entice future tourists to sign up.

2.1. Alternatives to and Expansions of the Activity

1. Producing an informative travel poster, for display in the class or library.
2. Restricting the brochure or poster to one world, such as Mars or Io, for simplicity.
3. Coming up with sports and sporting events that can be done on each world and describing the way visitors might participate.

4. Describing the kind of equipment wise tourists might want to have along on each world, to prevent such annoying events as choking to death on poisonous air, dying from heat or cold, trying to land on liquid rather than solid surfaces, etc.
5. Giving honest reports on the expected weather at each site.

Such a project can also be combined with “Invent an Alien” (Schatz 1984), an activity where students, after studying a planet or satellite, try to come up with a life-form that might survive there. Both activities became a staple of Project ASTRO, the program, sponsored by the Astronomical Society of the Pacific, to link volunteer astronomers and 4th–9th grade teachers in ongoing partnerships in the classroom across the country (Fraknoi, *et al.* 1998; Fraknoi and Lalor 2000).

In 2003, we began using a variant of this activity as a culminating laboratory for the introductory course on the solar system at Foothill College. Students also divide into groups of three to five, and are told that they are each a travel “boutique” in the future, catering to luxury clients. They are approached by Bill Gates’ great-great grand-daughter, for whom money is no object, and asked to plan the honeymoon trip of a lifetime through the solar system. Furthermore, the bride and bridegroom have a strong interest in astronomy, and thus want to see places that are not only beautiful and exciting, but also scientifically significant. Each group must then come up with ten destinations, complete with images, and explain how they meet the traveler’s double criteria.

This is an open-book, open-computer activity. Students are given a list of web resources, with NASA/JPL’s superb *Photojournal* site (<http://photojournal.jpl.nasa.gov>) particularly recommended. This site has the advantage that you are able to search for images not just by planet or moon, but also by feature name. (Its only disadvantage is that, despite the recommendation of its own advisory committee, the site limits itself to NASA images only, thus leaving out any foreign missions without a U.S. instrument.)

After each group comes up with its own list, they make public presentations to a representative of the happy couple (played by the instructor), who can ask probing questions about their selection. Alternatively, they are asked to present an oral paper on their choices to a meeting of the American Astronomical Travel Society, and the other students can act as a skeptical audience. College students also enjoy discussing possible sports activities, weather conditions, environmental dangers, and honeymoon hideaways on the worlds they select, if time is available and you are willing to join them in thinking a little bit outside the normal discussions in textbooks.

To help you get started thinking about potential destinations, the author’s list of favorite destinations (with image URLs) is given below as the Appendix.

Appendix

THE FRAKNOI TOURIST AGENCY LIST OF TEN GREAT SOLAR SYSTEM TOURIST SIGHTS

(each with a favorite image)

1. Olympus Mons, the huge volcanic mountain on Mars that is three times the height of Mt. Everest and larger than the state of Arizona at its base:
 - From Viking: <http://photojournal.jpl.nasa.gov/catalog/PIA02982>
 - From Mars Global Surveyor: <http://photojournal.jpl.nasa.gov/catalog/PIA02806>
2. The “Tiger Stripes” region of fractures on Saturn’s moon Enceladus, especially when there is a good water geyser eruption:
 - The region (exaggerated color): <http://photojournal.jpl.nasa.gov/catalog/PIA06254>
 - Eruptions (false-color): <http://photojournal.jpl.nasa.gov/catalog/PIA08386>
3. The red spot of Jupiter, a giant storm that has been observed for centuries and can sometimes grow to be as large as three Earths across:
 - From Galileo: <http://photojournal.jpl.nasa.gov/catalog/PIA00296>
 - From Voyager: <http://antwrp.gsfc.nasa.gov/apod/ap020205.html>
 - From Hubble: <http://photojournal.jpl.nasa.gov/catalog/PIA01593>
4. The F ring of Saturn, especially the regions where it gets “kinky” as the shepherd moons pass by:
 - Cassini image with Prometheus: <http://photojournal.jpl.nasa.gov/catalog/PIA10489>
 - Cassini image with Pandora: <http://photojournal.jpl.nasa.gov/catalog/PIA07579>

5. The Verona Cliffs, on Uranus' moon Miranda, perhaps the most impressive lover's leap in the solar system:
Voyager closeup: <http://photojournal.jpl.nasa.gov/catalog/PIA01354>
6. The giant Caloris Basin on Mercury, one of the great "hot spots" in the solar system (it is located at one of the longitudes where the Sun is overhead when the planet is closest to the Sun):
Composite from Mariner and Messenger: <http://photojournal.jpl.nasa.gov/catalog/PIA10383>
False-color from Messenger: <http://photojournal.jpl.nasa.gov/catalog/PIA10359>
7. The "Lake District" on Saturn's moon Titan, where large lakes of hydrocarbon liquid can be seen (provided you can see through the smog):
False-color Cassini radar image: <http://photojournal.jpl.nasa.gov/catalog/PIA09102>
8. Valles Marineris, the grand canyon system on Mars, which is as long as the United States is wide:
Global view (Viking): <http://antwrp.gsfc.nasa.gov/apod/ap060730.html>
A section with dramatic landslides: <http://photojournal.jpl.nasa.gov/catalog/PIA00005>
9. The erupting plume of a volcano on Jupiter's moon Io (seen from a safe distance):
From New Horizons: <http://antwrp.gsfc.nasa.gov/apod/ap070404.html>
From Galileo: <http://antwrp.gsfc.nasa.gov/apod/ap070211.html>
From Voyager 1: <http://photojournal.jpl.nasa.gov/catalog/PIA00323>
10. The first human footprints on the Moon (Apollo 11 landing site):
Scene with no people: <http://antwrp.gsfc.nasa.gov/apod/ap020720.html>
With astronaut: http://spaceflight1.nasa.gov/gallery/images/apollo/apollo11/html/as11_40_5903.html
A single boot print: <http://grin.hq.nasa.gov/ABSTRACTS/GPN-2001-000014.html>

In addition, some runner-up destinations:

11. Haumea, the egg-shaped dwarf planet that is the fastest spinning world we know:
There is no image yet, but here is a conception of it: <http://web.gps.caltech.edu/~mbrown/2003EL61/>
12. The Herschel impact crater on Saturn's moon Mimas, which resembles the Death Star in the *Star Wars* movies:
From Voyager 1: <http://photojournal.jpl.nasa.gov/catalog/PIA01968>
From Cassini: <http://photojournal.jpl.nasa.gov/catalog/PIA06258> or <http://photojournal.jpl.nasa.gov/catalog/PIA06582>
13. Galle, the "smiley face" crater in Mars' Argyre Basin:
From Mars Global Surveyor: <http://photojournal.jpl.nasa.gov/catalog/PIA04520>
From Viking: <http://photojournal.jpl.nasa.gov/catalog/PIA00186>

Resources

Since we first proposed this activity, at least two popular-level books by astronomers have come out that can be useful resources for teachers and instructors:

1. Hodge, P. 2001, *Higher than Everest: An Adventurer's Guide to the Solar System*, Cambridge, UK: Cambridge University Press. Includes detailed descriptions of what it would be like to climb Olympus Mons, descend into the clouds of Jupiter, or land on Io, among others.
2. Hartmann, W. 2003, *A Traveler's Guide to Mars: The Mysterious Landscapes of the Red Planet*, New York: Workman. Is set up just like any travel guide you would buy for a city or country on Earth, even to the point of including fold-out maps.

In addition, a somewhat humorous book by a German pastor and amateur astronomer treats the Moon from a tourist's perspective: Kustenmacher, W. 1999, *Frommer's The Moon: A Guide for First-time Visitors*, New York: Macmillan. Moreover, an odd little British volume, called *The Traveler's Guide to the Solar System* by Giles Sparrow, 2006, New York: HarperCollins has now been issued in the United States. Its subtitle talks about "an intergalactic getaway" (strange for a book about the solar system), but it has good information and some humorous vignettes as well.

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