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Mars Mania

If you haven't already noticed, this summer and fall Mars is in the news - a lot. If you're wondering what all the fuss is about and whether or not it is something to share with your students, this issue of The Universe in the Classroom has some of the basic facts and some new resources we hope will be useful in your classroom.

Image credit: NASA and the Hubble Heritage Team (STScI/AURA)

1. What's so special about a perihelic opposition? On August 27, 2003 Mars will be closer to Earth than it has been in recorded history. That sounds like a big deal, but really it is just 1% closer than it was in 1971. It is significant that we think we can accurately calculate it's distance from us for times dating back 50,000 years. Neither Mars nor Earth has a perfectly circular orbit and this year when Mars is closest to the Sun happens to be near the time when Earth is farthest from the Sun and both coincide with opposition, when Mars and the Sun are on opposite sides of the Earth. That means they (Earth and Mars) will be closer to each other than usual. A mere 55,758,006 km will separate them.

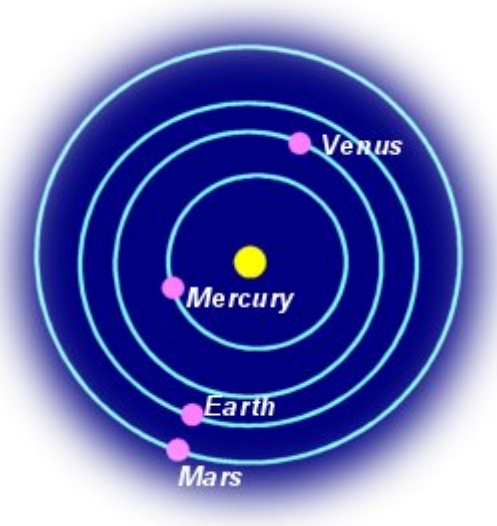


Image credit: Cranbrook Institute of Science

2. How different will it look in the sky? Usually Mars looks like a small orange dot in the sky, this summer and fall it will look like a bigger orange dot in the sky. It will be the brightest thing in the constellation Aquarius. While its actual size remains the same, it will appear larger through a telescope because it is closer. Follow the links below for tips on observing Mars. If you plan on hosting a Mars Watch you might first have your students do the "Remember the Egg" activity (http://www.astrosociety.org/education/publications/tnl/egg.html). This will help them hone their observation skills and give them practice noticing subtle details for it is only subtle details that will be visible on Mars through the blurring effects of our atmosphere.

Image credit: Cranbrook Institute of Science

3. So if it's not such a great sight, even through a telescope, what's the big deal? This kind of approach is less significant to ground based observers than it is to the space missions. When Mars is this close, it is easier to get to. Follow the links below to find out more about the international fleet that is on its way to Mars. Spacecraft from Japan, Europe and two from the United States are all on their way to explore the planet up close and personal. With this close approach it will be that much shorter a journey.

Jane Houston-Jones of the San Francisco Sidewalk Astronomers has put together a great resource page of web links to learn more about Mars during this close encounter of the red kind. Here are some of the most relevant ones for teachers:

- Mars Opposition, An Introduction Includes free Mars Previewer II software download
- Mars 2003: The view from Earth Some cool Mars posters you can download
- Kid's Cosmos Mars Opposition explained for the younger generation
- The Shallow Sky,, resources for amateur astronomers Check out the Mars section
- The Nine Planets Check out the Mars section
- Missions to Mars
    - ESA Mars Express launched Launched June 3, 2003!
    - NASA Mars Exploration Rover Mission Launched June 10, 2003!
    - Mars Global Surveyor images, courtesy of "NASA/JPL/Malin Space Science Systems."

For her complete list, go to: http://www.whiteoaks.com/jane/Mars/

The Planetary Society, also has put together some great information that can be used by teachers to bring this event into the classroom. Background information plus classroom activities can be found at: http://planetary.org/marswatch2003/

Finally, to make the experience of exploring Mars even more real, here is a review of a software package and set of lesson plans from Carnegie Mellon University Studio for Creative Inquiry.

Bringing 3-D Mars to Earth

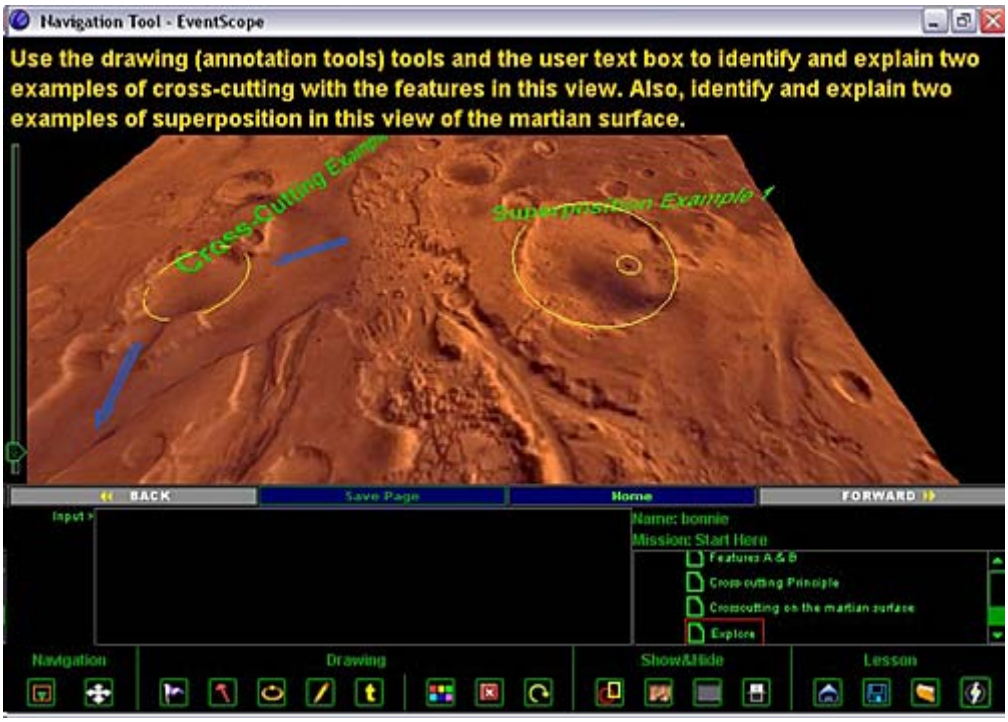
EventScope software reviewed by Bonnie Schulkin. *Despite her current foray into software that has nothing to do with astronomy or education, Bonnie will always be an astronomy educator at heart.*

Have you seen those 3-D representations of Mars's surface featured in NASA videos? There's something about zooming along Valles Marineris in simulated flight that feels real in a way a flat photograph never could. Now

this excitingly tangible 3-D Mars surface can be studied from school computers, thanks to the Carnegie Mellon University Studio for Creative Inquiry.

The EventScope software includes thirteen lessons about craters and erosion on Mars, emphasizing evidence of water in Mars's past. The lessons culminate in two "missions" that simulate a planetary scientist's interaction with landing site data. Though there is no official target grade level, the pre-packaged curriculum is appropriate for students in grades 7-10. With some teacher effort, the software can be effective at nearly any grade level.

For the first few lessons, EventScope is little more than an illustrated text lecture. But what illustrations! Using the navigational tools, students can study the surface before them from any angle they wish, at any height above the surface. The navigation involves clicking and dragging the mouse, so each change of view creates a mini-animation. The lessons present the information well, and use the illustrations to great effect – particularly in Lesson 2 where students examine Earth from space in the same way they will shortly examine Mars. Still, the teacher will need to intervene to keep students on task and feeling accountable for the text they read.



The lessons gain more interactivity by Lesson 4, asking students to apply vocabulary they've learned by selecting which highlighted feature represents the new term in question – though there are no real consequences for getting the answer wrong at this stage. By Lesson 11, EventScope's full potential has been realized. Students use the navigation and marking tools to identify and label features within the given landscape. This engaging, satisfying lesson challenges students to apply what they've learned, as they use the nifty technology to produce professional looking annotations (see example below). Students can save their creations to disk for grading or future reference.

EventScope is available for Windows machines only; there is no Macintosh version. The software is fairly easy to download, though vague comments about the differences between the two versions (one is for "newer" computers) make it difficult to choose – and for a lengthy 43 MB download, you want to get it right on the first time! Teachers learn how to use the software from brief tutorial. The students' introduction would best be done verbally by the teacher, or – depending on your students' technological savvy – they may be able to jump right in and figure out the interface on their own. The software performed well on the whole, with occasional quirks (adding two identical lines of text after only one click, for example).

The download comes with resources, including a student worksheet that has minimal text and questions ranging from rote: "When did we first start to use machines to explore Mars?" to fairly open-ended: "Why would scientists want to know which came first – the channel or the crater? How can they tell which came first?" The download also includes quizzes (plus answers) and lesson objectives. www.eventscope.org features

a discussion forum for teachers who use the software, additional sets of data to download from recent NASA missions, and e-mail access to technical support.