



Longmont Astronomical Society
June 2003

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Calendar

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The View From Up Here

Dear members and friends,

Now that warmer weather is here, more of us are getting out and stargazing. We had our largest turnout the year for the 1st quarter public observing at Flanders Park on June 7th. It was great to see such a large group out there taking advantage of this nice site for some springtime observing.

The City of Longmont has leased McIntosh Lake (where Flanders Park is located), and is developing a master plan for turning the area into a regional park. They have held 3 public hearings for input on 3 different alternatives for development, ranging from nature area status to full boating, swimming and fishing access. Those of you who have been club members the longest can remember when we held our public observing at Dawson Park on the south side of the lake, when we had to get the keys to turn off the streetlights in the park! Needless to say, none of us would like to see any more lights at Flanders than there already are.

The LAS has a great relationship with the parks department – in fact they are the ones who suggested that first Dawson and now Flanders would be the best parks for our observing. I talked to Dan Wolford from the parks department last week about the different alternatives and in particular the effects on Flanders, and his remarks were very encouraging. He mentioned that first of all, there are no plans to change Flanders Park. Second, as a regional park, it would be open from ½ hour before dawn to ½ hour after dusk, eliminating the need for additional lighting. Finally, he knows about us (and keeps promising to attend!), and said we are welcome to continue using Flanders for our public nights. All in all, it was a very encouraging conversation. With the continuing growth of the area, it is becoming extremely difficult to find close convenient places to observe; I am very happy to report that Flanders will be able to remain on our schedule for the foreseeable future. For more information on the development alternatives for McIntosh Lake, please go to this website:

http://www.ci.longmont.co.us/openspace/lake_mac_masterplan.htm

Clear Skies,

Bob Spohn
President

Calendar

June

Star Party Flanders 6/07 - LAS meeting 6/19 – Rocky Mountain Star Stare Colorado Springs - 6/26 to 29 –
Star Party Pawnee 6/28 - New moon 6/29

July

Star Party Flanders 7/05 - LAS meeting 7/17 – WUTS Fox Park 7/24-26 - New moon 7/29

August

Star Party Flanders 8/02 - LAS meeting 8/21 – Star Party Fox Park 8/23 - New moon 8/27 –Star Party
Flanders 8/30

September

LAS meeting 9/18- New moon 9/26 – Star Party Pawnee 9/27

October

Star Party Flanders 10/04 - LAS meeting 10/16 - New moon & Star Party Pawnee 10/25

November

Star Party Flanders 11/01 - LAS meeting 11/20 – Star Party Pawnee 11/22 - New moon 11/23 – Star Party
Flanders 11/29

December

LAS meeting 12/18 – Star Party Pawnee 12/20 - New moon 12/23

Calling all Amateur Astronomers!

Take this opportunity to complete the new Astronomical Society of the Pacific (ASP) online survey and have a chance to win a \$100 gift certificate to the ASP Catalog!

You will be assisting ASP in developing training and materials for amateur astronomers to help the public understand concepts of astronomy. In addition, the survey is collecting your experiences with any astronomy misconceptions you have come across in your encounters with the public. Click on this link to access the survey:

<http://fs8.formsite.com/astrosociety/AstroSurvey/index.html>

Or from the ASP web site: <http://www.astrosociety.org/>

As an added bonus, if 15 or more of your club members respond to the survey, you will receive a copy of your club's responses (no names or other identifiers will be included). This could help in planning programs for your club and can serve as a topic of discussion at a club meeting. Just have your members put your club's full name on the form where they enter their name for the drawing.

We're expecting to close the survey by the end of August or September and will distribute club responses within six to eight weeks after that.

To find out more about the survey and to access it, click on this link:

<http://fs8.formsite.com/astrosociety/AstroSurvey/index.html>

Thank you for your participation and your contribution to research in amateur astronomy outreach!

Marni Berendsen
Education Project Coordinator
Astronomical Society of the Pacific
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Fast-track to Mars – Mars Express

The Red Planet has always been a source of intrigue and fascination. It is currently the only planet in the solar system on which there is a strong possibility of finding life - past, or perhaps present. And it is a prime candidate for future manned exploration, and even colonization.

The end of 2003 and early 2004 will see a true scientific invasion of Mars as no fewer than six international spacecraft chart a course to the planet within a short time.

In August 2003 Mars will make its closest approach to Earth for 17 years. Around that time, Mars Express will journey to the red planet. It will be launched in June 2003, before the planet's closest approach, and will head for the position in space where Mars will be the following December. By having the closest approach occur while Mars Express is on its journey, the spacecraft will take the shortest possible route.

The distance between Mars and Earth varies mainly because, like all planets, they have elliptical (oval) orbits. Earth's is only slightly elliptical, Mars's is more so. Each planet also takes a different amount of time to travel round its orbit: 687 Earth-days in the case of Mars and 365 days for Earth.

Think of the two planets as athletes on a running track. Earth is travelling faster than Mars on the inside track so will periodically catch it up and overtake it. When Earth is on the point of overtaking, the two planets are lined up with the Sun. This is called an "opposition" because, as seen from Earth, Mars is opposite the Sun in the sky. Mars oppositions occur approximately once every 780 days. They are good times to view the red planet because it is near to its closest approach to Earth and almost all its illuminated side faces us.

If opposition occurs when Mars is at its closest to the Sun (opposition on its elliptical orbit called perihelion) the distance between the two planets will be a minimum - 55 million kilometres. When Mars is at its furthest from the Sun (aphelion) the distance at opposition will be 99 million kilometres.

A spacecraft to Mars can be launched around any opposition that is about once every 26 months. But the journey will be shortest and use the least fuel around a perihelic opposition, which occurs about once every 17 years. That's what will happen in 2003.

Europe has waited a long time for the opportunity to mount its own mission to Mars and that dream is about to become a reality. Mars Express, the name of ESA's Mars mission for 2003, marks the opening of a new era for Europe in planetary exploration.

Mars Express, which will also carry a small lander, will be an important element of the international flotilla of spacecraft destined to explore Mars in the first decade of the new millennium.

The ESA project is also the start of an innovative way of organizing the building blocks that form European space missions. The spacecraft will be built and launched in record time and at a much lower cost than previous, similar missions into outer space.

Mars Express is the first 'flexible' mission of ESA's long-term science exploration program. Launched successfully from Russia by a Soyuz Fregat launcher on June, 2nd 2003. Arrival at Mars is planned for the following December.

Mars Express comprises a number of essential components - the spacecraft and its instruments, the lander, a network of ground and data processing stations, and the launcher itself. These are supported by an experienced team of engineers in ESA and industry and hundreds of international scientists.

The mission's main objective is to search for sub-surface water from orbit and drop a lander on the Martian surface. Seven scientific instruments onboard the orbiting spacecraft will perform a series of remote sensing experiments designed to shed new light on the Martian atmosphere, the planet's structure and geology.

The lander, called Beagle 2 after the ship in which Charles Darwin set sail to explore uncharted areas of the Earth in 1831, is an exciting opportunity for Europe to contribute to the search for life on Mars. After coming to rest on the surface, Beagle 2 will perform exobiology and geochemistry research.

As well as its science objectives, Mars Express will also provide relay communication services between the Earth and landers deployed on the surface by other nations, thus forming a centre piece of the international effort in Mars exploration.

Scientists hope that the instruments onboard Mars Express will detect the presence of water below the surface. This could exist in the form of underground rivers, pools, aquifers or permafrost.

Overall, the main goals of the instruments to be carried by the Mars Express orbiter are:

- Sharp-eyed, 3D photography to discover more about the surface and geology of Mars.
- Looking at the 'invisible' beneath the surface by using radar beams to penetrate below ground.
- Different materials or structures will send back different radar echoes allowing scientists to produce an accurate 3D survey
- Precise determination of atmospheric circulation and composition to build up an accurate picture of Martian meteorology and climate.
- Study of the interaction of the atmosphere with outer space.

Gathering such information on the history and present day circumstances of Mars may also improve our understanding of things that influence our own environment.

For example, if we can determine why Martian water disappeared in the past we may learn more about whether a similar fate is one day awaits the oceans of Earth.

The Mars Express spacecraft and its instruments represent a truly international endeavor - a stereoscopic camera from Germany, a geological mapping device from France and an atmospheric sounder from Italy. The radar instrument, to probe for water at depths of a few kilometers below the surface, is being built jointly between Italy and the Jet Propulsion Laboratory in California. The Beagle 2 landing craft is being designed and built in the UK.

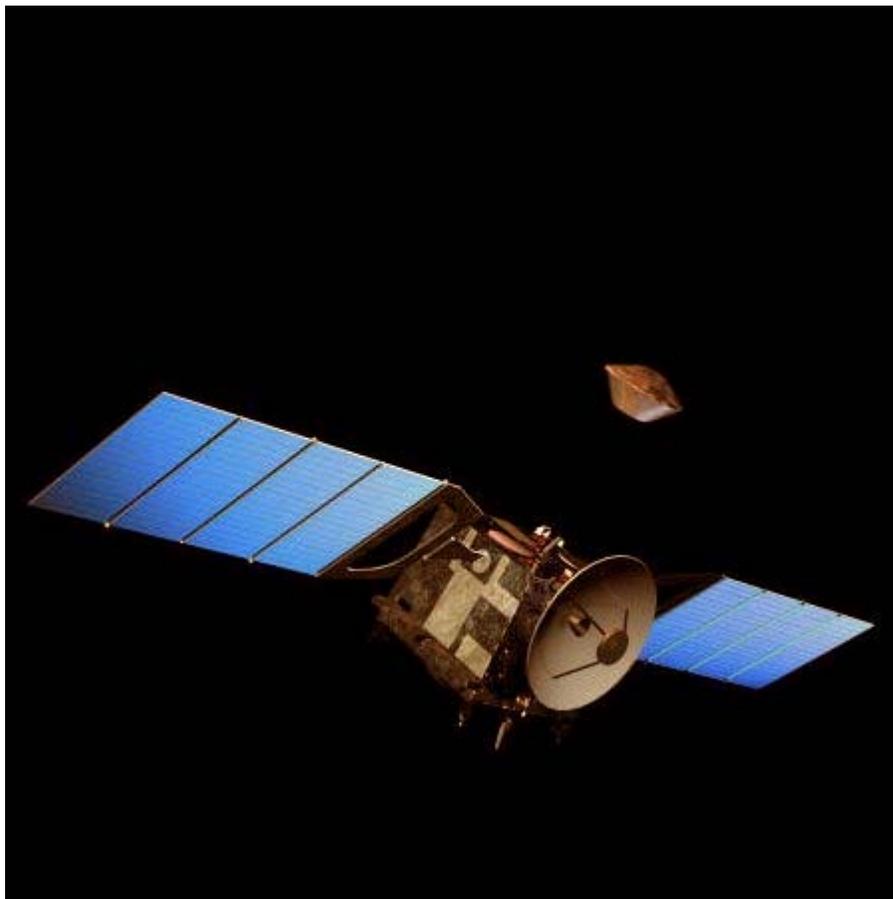
As well as the remote observation payload the orbiter will carry a lander communications package to support international Mars lander missions from 2003 to 2007.

Once on the surface of Mars, the Mars Express Beagle 2 lander will have to survive temperatures down to as low as -100°C . It will carry a variety of scientific experiments powered by solar cells and a rechargeable battery.



Like any self-respecting tourist visiting a new destination for the first time, Beagle 2 will take photographs. Panoramic and wide field cameras will be used for pictures of the landing site to guide further exploration as the mission progresses.

A microscope will look closely at the rocks and soil with a high degree of magnification. Fragments of rocks within reach of Beagle 2's small robotic arm will be analyzed for the existence of organic matter, water and aqueously-deposited minerals.



The busy lander will also deploy a mole capable of crawling short distances across the surface at one cm every six seconds (the relative equivalent of six metres an hour) and burrowing beneath large boulders to collect soil

samples for a gas analysis system. The primary aim of these experiments will be to see if any evidence of past life processes near the landing site remains.

The selection of a Soyuz/Fregat launcher to put Mars Express on course for Mars is linked to the flexible approach adopted by ESA. The launcher will be procured through Starsem, a Russian/European company. As a relatively low-cost launcher it will help keep the overall cost of the Mars Express mission within a total budget of \$150 million.

Europe's own Ariane-4, or Ariane-5, would be more costly, although either would be more than adequate for the task. Ariane-4, the world's most successful commercial launcher, is normally used for putting two spacecraft into orbit at once. But Mars Express needs to be a single passenger because of its special trajectory and launch window constraints. The required dedicated launch vehicle makes the Ariane option too expensive.

For a quicker journey using less fuel, Mars Express will make maximum use of the favourable positioning of Earth with relation to Mars in 2003. Following launch, which will occur within an 11-day launch window opening on 1 June 2003, Mars Express will arrive at Mars on 26 December 2003.

Before a sequence of manoeuvres places the main spacecraft in Martian orbit, the Beagle 2 lander will separate and descend on its own trajectory to the surface.

For the orbiting spacecraft, a specially devised polar orbit will provide periods of daytime observation for optical instruments, specifically for the high-resolution stereoscopic camera, as well as periods of night time observation (at roughly six month intervals) for the radar instrument.

Mars Express will orbit Mars every 6.7 hours, coming to within 250 km of the surface from a high point of 11 583 km, which will be lowered to 10 243 km after 440 days.

Contact with ground stations on the Earth will not be continuous and, because of the communications delay of eight minutes between Mars and Earth, there will be no real-time command operations from base. It will, however, be possible to modify activities by uploading pre-defined sequences of software commands for automatic execution at specific times.

Data collected by both the orbiting spacecraft and lander will be stored onboard Mars Express and 'dumped' back to Earth at specific times.

Europe's Mars Express will be the cheapest ever mission to Mars and is seen as a pilot project for new methods of funding and working. The experience gained on Mars Express will provide a good basis to further lower the costs of future ESA missions.

After a 12-month competitive study, proposal and evaluation phase, concluding at the end of 1998, ESA's Industrial Policy Committee recommended Matra Marconi Space (MMS), of Toulouse, France, as Prime Contractor for the Mars Express spacecraft. A 60 million contract for the design and development of this first European spacecraft to visit the planet Mars was signed formally on 30 March 1999.

The relatively low cost of the mission is achieved through new and innovative approaches in the working relationship between ESA, industry, national agencies and the scientific community, and through the intensive re-use of equipment developed for the Russian Mars 96 mission and Rosetta.

NASA's 'Spirit' Rises On Its Way To Mars

A NASA robotic geologist named Spirit began its seven-month journey to Mars at 1:58:47 p.m. Eastern Daylight Time (10:58:47 a.m. Pacific Daylight Time) today when its Delta II launch vehicle thundered aloft from Cape Canaveral Air Force Station, Fla.

The spacecraft, first of a twin pair in NASA's Mars Exploration Rover project, separated successfully from the Delta's third stage about 36 minutes after launch, while over the Indian Ocean. Flight controllers at NASA's

Jet Propulsion Laboratory, Pasadena, Calif., received a signal from the spacecraft at 2:48 p.m. Eastern Daylight Time (11:48 a.m. Pacific Daylight Time) via the Canberra, Australia, antenna complex of NASA's Deep Space Network. All systems are operating as expected.

Spirit will roam a landing area on Mars that bears evidence of a wet history. The rover will examine rocks and soil for clues to whether the site may have been a hospitable place for life. Spirit's twin, Opportunity, which is being prepared for launch as early as 12:38 a.m. Eastern Daylight Time June 25 (9:38 p.m. Pacific Daylight Time on June 24) , will be targeted to a separate site with different signs of a watery past.

"We have plenty of challenges ahead, but this launch went so well, we're delighted," said JPL's Pete Theisinger, project manager for the Mars Exploration Rover missions.

The spacecraft's cruise-phase schedule before arriving at Mars next Jan. 4, Universal Time (Jan. 3 in Eastern and Pacific time zones), includes a series of tests and calibrations, plus six opportunities for maneuvers to adjust its trajectory. JPL, a division of the California Institute of Technology, Pasadena, manages the Mars Exploration Rover project for the NASA Office of Space Science, Washington, D.C.

Information about the rovers and the scientific instruments they carry is available online from JPL at <http://mars.jpl.nasa.gov/mer> and from Cornell University, Ithaca, N.Y., at <http://athena.cornell.edu> .

Veronica McGregor (818) 354-9452
Jet Propulsion Laboratory, Pasadena, Calif.

Space Odyssey exhibit and Gates Planetarium at the Denver Museum of Nature and Science

My family and I attended a special viewing of the new Space Odyssey exhibit and Gates Planetarium at the Denver Museum of Nature and Science last night. It is definitely a must see. The planetarium show was a tour of the solar system. The heavenly spheres seemed so 3-dimensional and realistic as they filled the dome. I thought I could just reach my hand out and grab a hold of Saturn's rings or feel the warmth as Io's volcanoes spewed into space. The majority of Space Odyssey is dedicated to Mars and the upcoming landers to reach the red planet this winter. They even have an astronaut on a Martian landscape conducting field work who explains what she's doing and answers questions the viewers have. You can drive a Martian rover, create a dust devil over 8 feet tall, and experiment with water flow over the Martian surface. A spectroscopy demonstration allows you to see different sources of light and emission lines through diffraction grating glasses, infrared cameras and sensors let you view objects in a way your eyes can't observe, a turntable with concentric rings and varying speeds reveal Kepler's laws of planetary motion, computers take you through the evolutionary process of a star of your choice, and there is so much more. I sat in on a short program called "Space Today" which told of the latest space stories in a T.V. news format. Not only is Space Odyssey informative and enjoyable for adults (and adolescents like myself), but there are many fun activities for small children. Kids can dress up in spacesuits and astronaut gear in the astronaut training center, or hear a Dr. Seuss story about the cosmos on an interactive big screen.

I hope this sparks your interest and that you venture out to the museum after the exhibit officially opens this Friday June 13th. Clear skies.

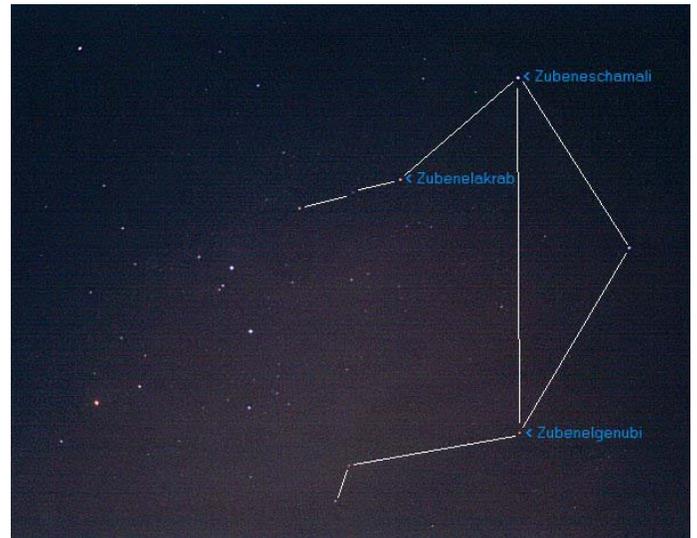
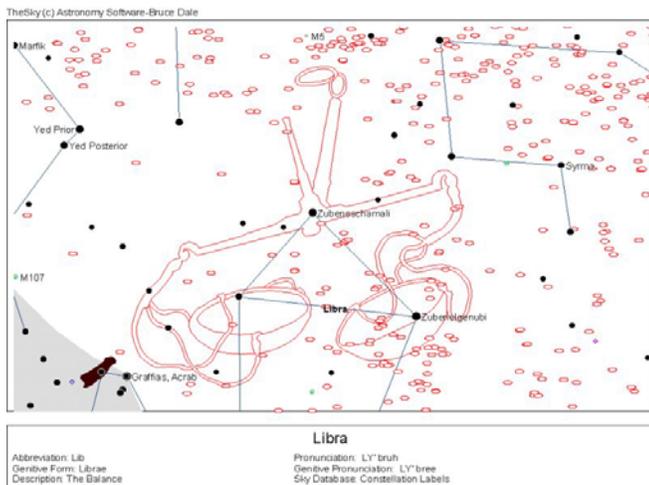
Max Moe

For more information visit the DMNS web site at: <http://www.dmns.org/>

Constellation of the month

Libra: The Scales, The Balance

Looking like a high-flying kite, Libra is easy to find by extending a line westward from Antares and its two bright neighbors in Scorpius. The line reaches a point between Alpha and Beta Librae. Libra is one of the constellations of the zodiac and was associated with Themis, the Greek goddess of justice, whose attribute was a pair of scales. Originally these stars were thought of as part of Scorpius: The alpha and beta stars both carry Arabic names, the former being Zuebn El Genubi,



“southern claw” and the latter Eschamali, “northern claw” Our understanding is that Libra became a separate constellation at the time of the ancient Romans.

Delta Librae: Similar to Algol, this eclipsing variable star fades by about a magnitude every 2.3 days, from 4.9 to 5.9. The entire cycle is visible to the naked eye.

S Librae: A Mira star, S Librae varies from an 8.4 maximum to a 12.0 minimum over a period of a little more than 6 months.