

## ASTRONOMICAL ADVANCES

### ❖ MAVEN and MOM to Mars

Two spacecrafts. Similar launches. Similar arrivals. Similar purposes.

Two countries. Different economies.

Different strategies. Different costs.

Comparing India's Mars Orbiter Mission (MOM, aka. *मंगलयान* Mangalyaan) and NASA's Mars Atmosphere and Volatile Evolution Mission (MAVEN) is a difficult task.

Both MOM and MAVEN were launched in November 2013. They both orbited the Earth before breaking away to partake in the one year journey to Mars and they both arrived at Mars in September of this year. Furthermore, both plan to study the Martian surface, mineralogy, and atmosphere.

So how are the two different? MOM was the first interplanetary mission of India and the Indian Space Research Organization (ISRO) while MAVEN was the sixth "mission to Mars" of NASA. MOM was the only successful first attempt of any nation to arrive at the red planet. Furthermore, the cost to build MOM was \$74 million - nine times less than MAVEN with its \$671 million price tag.

This cost difference between the two missions is the most notable. The media is quick to point out how the future lies in inexpensive missions like MOM that "cost less than the movie, Gravity". Even though MAVEN has more sophisticated expensive instruments to detect atmospheric losses, perhaps the media is still right. With cheaper and more efficient players entering the space race, NASA might be "left in the dust" unless it finds ways to be more competitive in our fast-paced world.

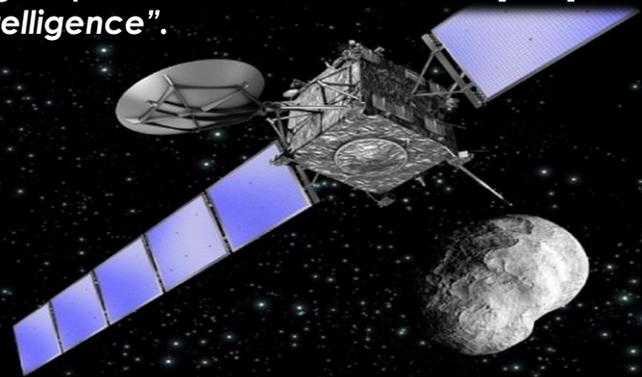
### ❖ Historical Firsts: Rosetta Probe

On Nov. 12<sup>th</sup>, the Rosetta probe Philae successfully landed on Comet Churyumov-Gerasimenko located in the Asteroid belt between Mars and Jupiter. This is the first ever landing on a comet making it a historic touchdown.

The Rosetta probe was launched by the European Space Agency over a decade earlier on March 2, 2004. Its original missions were flybys of seven other comets and Mars. Travelling 6 billion kilometers, the Rosetta approached the comet on Aug. 6<sup>th</sup> and entered into orbit on Sep. 10<sup>th</sup>. On Nov. 12<sup>th</sup>, the Rosetta lander Philae started its final 7-hour descent. During the freefall to the surface, harpoons used to attach the probe to the comet's surface failed to deploy which could cause some future problems.

However, for now, the probe is gathering and sending data from pictures and samples. Scientists will use this information to learn more about the past conditions of our Solar System and to gain unprecedented knowledge about the composition of comets. According to recent reports, scientists may also be able to learn more about life on our planet.

As the Director of the European Space Agency, Jean-Jacques Dordain, says "This is a big step for human civilization... [and] terrestrial intelligence".



## SAN JOSE STARGAZING

### ❖ November 17<sup>th</sup> – Leonids Meteor Shower

What – There will be around 10 to 15 comets per hour at the peak. Although this meteor shower is known to cause meteor storms, none are expected this year.

When – Between midnight and dawn. The peak of the meteor shower is at night on November 17<sup>th</sup>.

Where – Anywhere away from city lights is good. Unfortunately, there are no star parties that we are aware of. So you should just grab a bunch of friends and head into the hills.

### ❖ November mornings – Jupiter

Jupiter is observable in the sky to the South and East during dawn. The waning moon bypassed Jupiter on November 14<sup>th</sup>.

## Quote of the Month:

“Reach for the sun and, should you miss, you will end up amongst the stars.”

## Fun Fact:

If a pinhead sized piece of the Sun was placed on the Earth, you would die from standing within 90 miles of it.

N O O M T E C L I P S E A H A E C  
 F I S S E L O H K C A L B N V U O  
 R R S P T T N E R M U A D R O N R  
 O H E A A A S A N B N R O E N I O  
 E T R C N C T Y E U O T S D R V N  
 T R E E T E E N S M T A H G E E A  
 E A H C R E L S E R T P E I P R M  
 M E P R O L L D H E A O E A U S P  
 I Q S A P I A E L U S L R N S E O  
 L U O F L G T L S O T O O T R I L  
 K I M T A H I B N C R T W S A X A  
 Y N T L N T O B A U O B L S T A R  
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 A X I L T E A H D I O R E T S A S  
 Y Y T I V A R G C O M E T R M G R  
 S T R O N R W H I T E D W A R F A  
 G V E N U S D N I W R A L O S ✨ M

## WordSearch

The remaining letters will spell a secret message...

ANDROMEDAGALAXY	CORONA	LIGHTYEAR	ORBIT	SPACESHUTTLE
ASTEROID	CRATER	MARS	PLANET	STARS
ASTRONOMER	EARTH	METEOR	POLARIS	SUPERNOVA
ATMOSPHERE	ECLIPSE	MILKYWAY	REDGIANTS	TELESCOPE
AURORA	EQUINOX	MOON	SATELLITE	UNIVERSE
BLACKHOLE	GALAXIES	NASA	SOLARSYSTEM	VENUS
COMET	GRAVITY	NEBULA	SOLARWIND	WHITEDWARF
CONSTELLATION	HUBBLE	NEPTUNE	SPACECRAFT	

Look for the answers in the next newsletter!

LOOK IN OUR NEXT NEWSLETTER FOR A SPECIAL ABOUT SKY PHOTOGRAPHY!

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