Project Moonwalkers

Fig. 1. The Moon

Images by students Javier Casado(Spain) and Vergil Iotov(Bulgaria) from International Astronomical Summer School 2009, 50/70 Schmidtteleskop +CCD, National Astronomical Observatory-Rozhen, Bulgaria

INTRODUCTION

Our intent is to propose to teachers and students to observe the Moon on every clear night to discover changes of the Moon's phases, to discuss the motion of the Moon and the Earth around the Sun as well as the origin of the Moon; it's also our intent that they can become familiar with the many interesting features on the Moon and can learn many active objects on the Moon's surface.

Summary

This project concerns the observation of the Moon.

Students will have to observe the Moon, to be familiar with certain lunar objects, and observe short term lunar events such as white light, the darkening above certain regions and features on the lunar surface. They will prepare reports of their visual, photographic, web and CCD observations of the Moon.

Students will also calculate the size of the many of the Moon's features and send their reports to observational archive of the Project.

Why study the Moon?

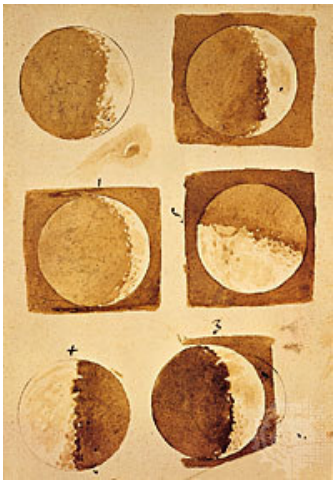
The Moon has been a very important object along Mankind's history.

In antiquity it was one of the seven wanderers that were known to move their position in the sky relative to background stars. It was used to make the first definitions of the length of the months, and it even affects the life of people that live in certain ocean coastlines due to the tides.

It was also very important on the victory of the heliocentric system. Aristotle and Ptolemy defended that the imperfection only existed in the sublunary world and this was a philosophical argument they presented for their geocentric system.

The idea was that the celestial bodies were all crystalline spheres that orbited Earth in motions that could be explained as a composition of movements done obeying to most perfect geometrical figure that they thought was the circle. When 400 years ago Galileo Galilei discovered the Moon's mountains and craters and showed everybody that the Moon wasn't a perfect sphere this was a deep strike on their philosophical arguments.

The Moon is one of most interesting objects for school observations because you can see interesting things even if you observe it in naked eye observations.



Moon phase drawings by Galileo Galilei

The Moon is the only celestial object (except our Sun) that can be seen in the daylight (however there have been comets in the past that were bright and large enough to also be seen in the daylight - and Venus can also be visible if you know exactly where to look). Though allows teachers to prepare telescopic observations of the Moon even in daytime, the features are better seen in night-time observations.

The observation of the Moon, its phases, its motion against stellar background and the analysis of its many features allow even complex studies that can help students to understand the Earth-Sun-Moon system and also planetary motions.

So it's easy to work with and can help to learn a lot!

Pedagogical goals:
To provide knowledge about lunar motion, about the Moon's surface, about lunar research, and about lunar phenomena.
To develop observational skills required in the use of binoculars and small telescopes.
To develop skills required for regular observations of lunar phenomena.

YOUR PROJECT ACTIVITIES

During 2 months you will observe the phases, the Moon's maria (the latin word for "seas"), craters, mountains and peaks. Students are expected to draw, make photos, obtain web and CCD images on many observed objects on the Moon. You will also fill up Observational Sheets and send the reports to the Observational Archive.

Observations:
During the observations you have to fill the Observational Sheet available on the project's webpage. In the Observational Sheet you can fill the time of the observation, you can calculate the high of the Moon above the horizon, draw the phases of the Moon, observe some *maria*, craters and mountains. You can calculate the size of suggested features and the height of mountains. After observations and calculations you can send the Observational Sheet to the Observational Archive. Your Observational Archive will contain the information about your observations: name of participants, country, school and degree, time of observations, size calculation of the observed features.

Every clear night you have to observe:
1. The phases of the Moon
2. The lunar *maria*
3. The lunar craters
4.The lunar mountains and peaks
5. Transient Lunar Phenomena

We propose that you observe some of the objects from the lists and that you calculate their sizes.

The list of the *maria*:

Latin Name	English Name
Mare Anguis	Serpent Sea
Mare Australe	Southern Sea
Mare Cognitum	Sea That Has Become Known *or* Known Sea
Mare Crisium	Sea of Crises
Mare Fecunditatis	Sea of Fertility
Mare Frigoris	Sea of Cold
Mare Humboldtianum	Sea of Alexander von Humboldt
Mare Humorum	Sea of Moisture
Mare Imbrium	Sea of Showers or Sea of Rains
Mare Ingenii	Sea of Ingenuity
Mare Insularum	Sea of Islands
Mare Marginis	Sea of the Edge
Mare Moscoviense	Sea of Muscovy
Mare Nectaris	Sea of Nectar
Mare Nubium	Sea of Clouds
Mare Orientale	Eastern Sea
Mare Serenitatis	Sea of Serenity
Mare Smythii	Sea of William Henry Smyth
Mare Spumans	Foaming Sea
Mare Tranquillitatis	Sea of Tranquility
Mare Undarum	Sea of Waves
Mare Vaporum	Sea of Vapors
Oceanus Procellarum	Ocean of Storms

The list of the craters:

Lagrenius, Petavius, Furnerius, Cleomedes, Geminus, Endymion, Hercules, Macrobius, Aristoteles, Eudoxus, Manilius, Albategnius, Ptolemaeus, Alphonus, Arzachel, Theophilus, Cyrrilus, Abulfeda, Apianus, La Caille, Werner, Aliacensis, Tycho, Copernicus, Eratostenes, Archimedes, Aristillus, Mersenius, Vieta, Cassini, Helicon, Euler, Lambert

The list of the lunar mountains and peaks: Montes Pyrenaeus, Montes Caucasus, Montes Apenninus, Montes Alpes, Montes Carpatus, Montes Teneriffe, Pico,

The list of features with reported TLP Associations:

Agrippa (crater)
Alphonsus (crater)
Archimedes (crater)
Lambert (crater)
Linné (crater)
Manilius (crater)

Aristarchus (crater)
Aristoteles (crater)
Atlas (crater)
Alphonsus (crater)
Bullialdus (crater)
Calippus (crater)
Cassini (crater)
Censorinus (crater)
Clavius (crater)
Cleomedes (crater)
Copernicus (crater)
Eratosthenes (crater)
Fracastorius (crater)
Gassendi (crater)
Grimaldi (crater)
Herodotus (crater)
Sinus Iridum
Kepler (crater)
Mare Crisium
Menelaus (crater)
Mons Piton
Mons Pico
Picard (crater)
Plato (crater)
Posidonius (crater)
Proclus (crater)
Promontorium Laplace
Riccioli (crater)
Schickard (crater)
Taruntius (crater)
Theophilus (crater)
Timocharis (crater)
Tycho (crater)
Zagut (crater)

Preparation for observations:

Moon motion

Moon, phases and eclipses - http://eaae-astronomy.org/WG3-SS/WorkShops/Moon.html

NASA: On the Moon Educator Guide - http://www.nasa.gov/pdf/308966main_On_the_Moon.pdf

Studying the lunar map with the help of the Virtual moon atlas:

http://www.ap-i.net/avl/en/start

Studying the lunar surface: assemble a mosaic of the Moon:

http://www.schoolsobservatory.org.uk/obs/ulab/moonsaic/
http://www.schoolsobservatory.org.uk/obs/ulab/moonsaic2/
http://www.schoolsobservatory.org.uk/obs/ulab/moonsaic3/
http://www.schoolsobservatory.org.uk/obs/ulab/moonsaic4/
http://www.astrosurf.com/cidadao/moon_obs.htm

Studying the lunar phenomenon

http://en.wikipedia.org/wiki/Transient_lunar_phenomenon
http://www.astro.columbia.edu/~arlin/TLP/
http://www.daviddarling.info/encyclopedia/T/TLP.html