

**A possibility to teach planetary and space science by increasing enthusiasm: the school year of 2018-2019 covers as 50 years anniversary of the preparations to lunar landing in 1969 July by NASA.**

Sz. Bérczi(1) and I. Ságodi (2). <sup>1</sup>Eötvös University, Faculty of Science, Dept. of Materials Physics, Cosmic Materials Space Res. Group, 1117 Budapest, Pázmány P. s. 1/a. Hungary, ([bercziszani@caesar.elte.hu](mailto:bercziszani@caesar.elte.hu)), <sup>2</sup>Szekszárdi Garay János High School, H-7100 Szekszárd, Szent István tér 7-9. Hungary, ([sagodi62@freemail.hu](mailto:sagodi62@freemail.hu))

**Abstract:** We propose a historical project method in order to help teaching planetary and space science in high school by remembering the main events of Apollo mission preparations for the first lunar landing, 50 years ago.

**Introduction:** During the 1968-1969 school year term (10 months from September to July) final steps were organized and accomplished at NASA for the lunar landing of Apollo-11 in July, 1969. The EPSC conference begins at the starting days of the school year term 50 years later. This gives an occasion to refresh the memory about this historical event. At the same time the comparisons between the today's technologies and those in the past can be examined in the classes. The 50 years anniversary is an excellent occasion to increase the enthusiasm of students in space science and recent years of efforts in planetary science and space travel technologies. Therefore we overview the 5 successful Apollo flights during that period and attach some points of discussion for teachers on the teaching at the specific missions.

The main events in 1968-1969 school term for the Apollo program.

**Apollo 7:** In October 1968 (bw. 11 and 22.). EARTH ORBIT. The first crew (3 astronauts) after Apollo 1 disaster. They used the new (re-planned) Apollo cabin in

Earth orbit. This Earth orbital test flight proved that the new Apollo cabin is ready for the next steps. For teachers it is an occasion to tell and show how the Apollo 1 disaster caused a feedback in the program, but resulted in a less risk cabin atmosphere by application of nitrogen together with oxygen instead of the earlier free oxygen atmosphere.

**Apollo 8.** In December 1968 (bw. 21 and 27.). LUNAR ORBIT. The second 3 astronauts crew carried out a flight first farther than Earth orbit: they went to Lunar orbit and circled the Moon 10 times. The astronauts greeted the Christmas of 1968 from lunar orbit. For teachers it is an occasion to tell about the specific orbit the astronauts used to and back on this lunar mission. (the 8 shaped orbit).

**Apollo 9.** In March 1969 (bw. 3 and 13). EARTH ORBIT. The crew tested the systems of Lunar module, Command and Service modules. It was the first use in flight of the Lunar module. The necessary docking maneuvers and simulations of some lunar landing maneuvers were carried out in a low Earth orbit. The teachers can explain the most important docking steps during the Apollo missions.

**Apollo 10.** In May 1969 (bw. 18 and 26). LUNAR ORBIT. The crew tested all maneuvers and all the systems of Lunar module, Command and Service modules on

lunar orbit. During the maneuver of descending the astronauts approached the lunar surface for 15 kilometers height, but did not land on it. This mission was the final preparation to the historical lunar landing of the next Apollo mission. Teachers have the occasion to tell episodes about the selection of the landing sites, some historical aspects of lunar stratigraphy – compared with that of the Earth.

**Apollo 11.** In July 1969 (bw. 16 and 24). LUNAR ORBIT, LUNAR LANDING. The crew accomplished a historical flight with first manned landing on the Moon. The astronauts settled the first man-transported basis of measuring instruments, collected samples and returned to the Earth for the first time. After almost a 1 year of studies the first Lunar Science Conference had been organized in Houston. Next year the 50th Lunar and Planetary Science Conference will celebrate this historical scientific event, too. For teachers two main scientific topics are comfortable to explain: The role of lunar samples returned, and the garden of instruments settled on the Moon (Apollo Lunar Surface Instrumental Package – ALSEP)

The 4 main rock types were first collected: basalts (high Ti-basalts), anorthosites, breccias, and the lunar soil.

The most important instruments were: seismic (active and passive) thermal, solar wind (low and middle energy range), magnetometer. They can also be compared to those instruments on Surveyor missions.

**Summary:** Teaching through the Apollo historical events is an excellent opportunity for the next school year. The way space technology and science reached this historical goal gives useful aims and

examples to teachers and students in order to increase their enthusiasm in advancing their studies in space science, especially lunar science. In the next years this program can be extended to the subsequent Apollo missions and their results, too. May we offer cooperation to others schools all over the world to join our program.

#### **References:**

[1] Charles Meyer: The Lunar Petrographic Thin Section Set. Curatorial Branch Publication No. 76, NASA Lyndon B. Johnson Space Center, Houston, Texas, USA, 1987

[2] Ságodi I. (2015): A légkörfizika és a csillagászat elemeinek felhasználása a fizika középszintű oktatásában. (Using the elements of the atmospheric physics and astronomy in the high school level teaching of physics). PhD Thesis. Eötvös University, Institute of Physics, Budapest