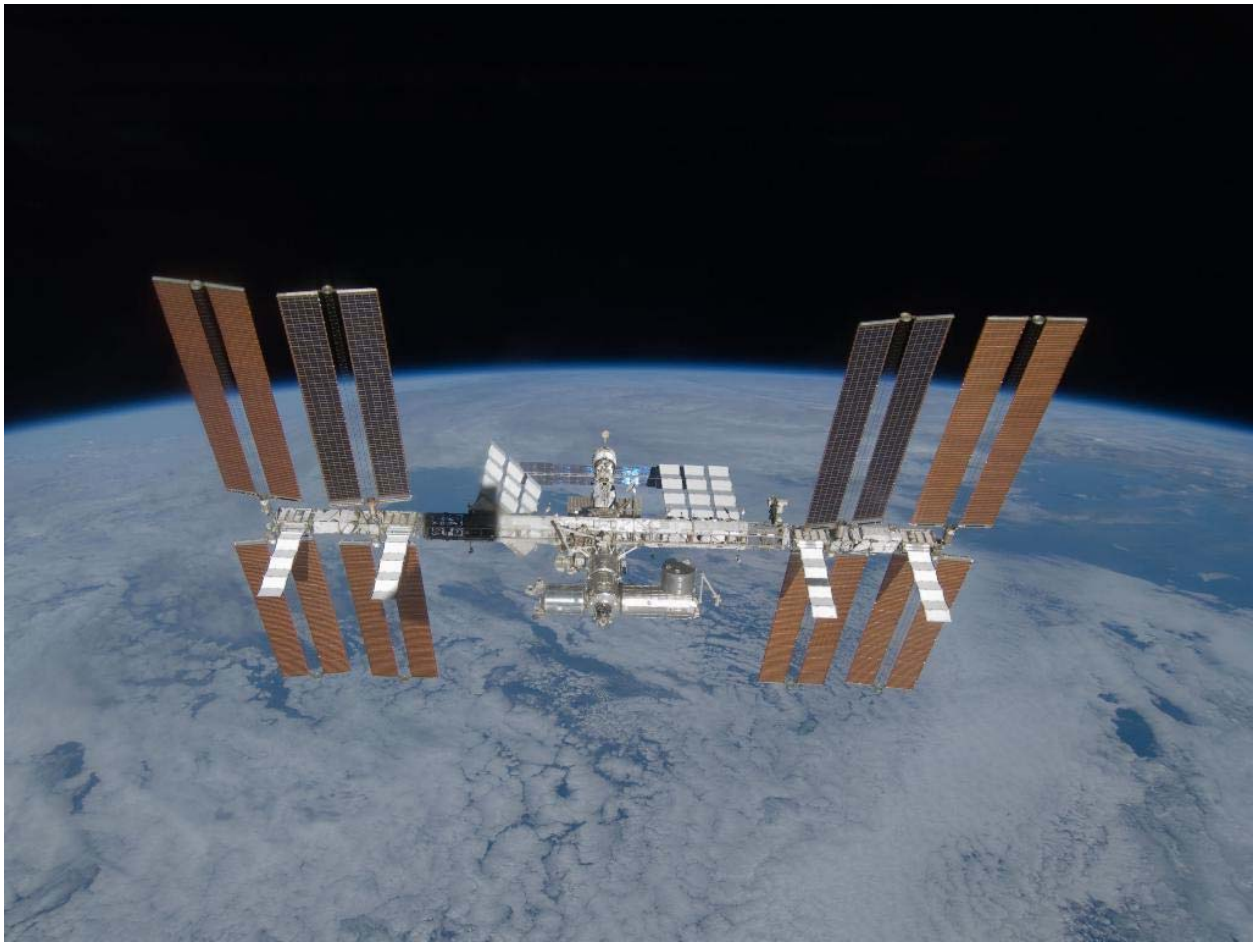
A Teacher's Guide to

ON ORBIT



Presented by the
Cernan Earth and Space Center
Triton College
River Grove, Illinois

Welcome to the
Cernan Earth and Space Center

Introduction

Please take a few minutes to read through this Teacher's Guide before you and your group visit the Cernan Earth and Space Center. It contains important tips and guidelines about your field trip, describes the program that you selected and includes some teacher resources to help you better integrate your Cernan Center visit with your own classroom activities.

The Cernan Earth and Space Center

The Cernan Earth and Space Center of Triton College is a unique and exciting place for persons of all ages. The Cernan Center houses a 100-seat dome theater, a Space Hall with exhibits on space exploration and astronomy and the Star Store gift shop.

The Cernan Earth and Space Center is named for astronaut Eugene A. Cernan, who flew aboard the Gemini 9, Apollo 10 and Apollo 17 space missions. In December of 1972, as the commander of Apollo 17, Captain Cernan became the last human to leave his footprints on the moon. Cernan was born and raised in suburban Bellwood, not far from where the Triton College campus and the Cernan Center now stand. The original Cernan Center building opened in 1974, and in 1984, it re-opened in a new and larger facility.

The Cernan Earth and Space Center's 44-foot diameter dome theater is equipped with a planetarium star projector, a special C-360 motion picture projector, a sophisticated laser projection system, a large format video projection system, a powerful stereo sound system and scores of slide and special effects projectors. Using this equipment, the Cernan Center presents a wide range of educational programs that discuss such diverse subjects as the current night sky, the planets of our solar system, the weather and climate of earth, the space shuttle and the age of dinosaurs. For pure entertainment, the Cernan Center also presents laser light shows that choreograph laser images and planetarium effects to rock music.

The Cernan Earth and Space Center's Space Hall contains a variety of exhibits related to astronomy, space science and earth science. Included are Captain Cernan's Apollo 10 spacesuit and coverall garment, Apollo 17 moon gloves, an Apollo lunar landing diorama, a moon phase exhibit, a weather radar station, a 1/15th scale space shuttle model, a life-size dinosaur footprint model, an Illinois fossil exhibit, a telescope exhibit, an exhibit on recent space discoveries and a variety of other Apollo artifacts. Outdoor exhibits include an Apollo practice capsule and a Nike Tomahawk missile.

The Cernan Earth and Space Center's Star Store gift shop offers an assortment of unique gifts, many related to the popular themes of astronomy, space exploration and the study of our own planet earth. Books, t-shirts, sweatshirts, binoculars, science discovery kits, coffee mugs, posters and unique toys are just a few of the many items for sale. Some items are even $1.00 or less, so even younger patrons can buy a souvenir or two during their visit.

Important Field Trip Information

Listed below are a few tips to help make your trip to the Cernan Earth and Space Center run smoothly and stay on schedule:

1. BEFORE YOU ARRIVE. If for any reason you need to reschedule or cancel your reservation, please call the Cernan Center and let us know as soon as possible. Doing so allows us to better accommodate other groups that may prefer your original time slot and may prevent your group from being charged a cancellation fee.

2. ARRIVAL. Plan to arrive at the Cernan Center at least 15 minutes before your scheduled show. This will give you time to check in your group, use the restrooms if necessary and instruct your group to line up at the entrance to the dome theater. If you are planning to eat lunch or visit the Star Store before your show, you should arrive even earlier. Buses and vans should park along the curb directly in front of the Cernan Center and should remain there for the duration of your visit. Automobiles should park in the North Parking Lot just north of the Cernan Center building after dropping off their passengers.

3. CHECKING IN. When you arrive at the Cernan Center, the group leader should check in at the Star Store. Remember to bring the confirmation card that you received in the mail. Please make a note of the number of students and chaperons that you will be paying for. Remember that you must pay in bulk, so please collect the students' money beforehand or have a check made payable to Triton College. In special circumstances, you can make arrangements in advance to have us bill your school or institution after your visit.

4. ENTERING THE THEATER. Your group should be lined up at the dome theater entrance five minutes before your scheduled show time. Please remind your group that they are on a college campus and must remain quiet because of classes in session nearby.

5. SEATING IN THE THEATER. A Cernan Center staff member will let your group into the theater and instruct you on the best place to sit. Since more than one group is often scheduled at the same time, your group should sit together. No food, drink, candy or gum is allowed in the theater.

6. BEHAVIOR IN THE THEATER. Teachers and chaperons are responsible for the behavior of their group. Since the show operator is seated at the top of the room, he or she is often unable to hear or see minor incidents of disruptive behavior. Although the show operator will certainly stop the show for a disruption in the audience, we would prefer that the group leaders control the behavior of their own group.

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7. VISITING THE STAR STORE. If your group plans to visit the Star Store gift shop, please do not allow everyone into the store at once. If you have over 20 students, allow only 10 or 15 students in the store at a time. We also ask that only children with spending money be allowed into the store. This lessens the handling of the merchandise and prevents it from becoming soiled or damaged. We would also appreciate that one teacher or chaperon remain in the gift shop to help maintain order with their group.

8. HAVING LUNCH. With prior notification, the Cernan Center can usually arrange to have Triton College set aside tables on which your group can eat their own bag lunches. Groups can also pre-arrange with the Triton College cafeteria to purchase lunch packages. If your group has reserved this lunch area, we recommend that your group keep the lunches together in boxes or large bags rather than having the students carry them individually. As long as your lunches are in some sort of container, we will be able to provide an area for them to be stored while you are in the dome theater. A staff member will provide you with a campus map to direct your group to the Triton College cafeteria, which is a five-minute walk from the Cernan Center.

9. ANY QUESTIONS? We pride ourselves in offering friendly, personalized service, so if you have any questions pertaining to your trip to the Cernan Center, just give us a call at **(708) 456-0300, Ext. 3372** and we'll be happy to answer them. You can also contact one of our staff astronomers if you have a question related to astronomy, space science or earth science.

WE LOOK FORWARD TO SEEING YOUR GROUP AT THE CERNAN EARTH AND SPACE CENTER!

VISIT THE CERNAN CENTER ONLINE!

Visit the Cernan Center online at: **www.triton.edu/cernan**. To shop our Yahoo! Store online, please visit: **http://store.cernanstore.com/**. You can also e-mail one of our staff astronomers if you have a question related to astronomy, space science or earth science at: **cernan@triton.edu**.

For more information about the Cernan Center, its programs, field trips or events, please call (708) 456-0300, Ext. 3372. For public program information, please call our Program Line at (708) 583-3100.

Earth and Space Exhibits

The Cernan Earth and Space Center has a number of earth and space exhibits in its main lobby, as follows:

APOLLO / MARS LANDSCAPE DIORAMA

This large exhibit, covered by a plastic dome, is a two part exhibit. One half of the exhibit commemorates the successful Apollo missions to the moon, while the other half celebrates the present and future exploration of Mars. The Apollo side of the diorama contains models of the lunar module (the Apollo spacecraft that brought two astronauts to the lunar surface each mission) and the lunar rover, which astronauts used in the final three Apollo missions (15, 16 and 17) to extend the range of their lunar explorations. The Mars side of the diorama re-creates the rocky and sandy Martian landscape, complete with scale model of the Sojourner probe.

APOLLO 10 SPACE SUIT

This was the space suit worn by astronaut Gene Cernan on the Apollo 10 mission. This space suit was never worn on the moon, since the Apollo 10 mission was not designed to land astronauts on the surface. Instead, this mission served as the final “dress rehearsal” before the first lunar landing mission of Apollo 11 two months later.

OTHER APOLLO ARTIFACTS

This case contains other Apollo artifacts, including a coverall garment worn by Gene Cernan en route to the moon and several pieces of Apollo spacecraft navigation equipment.

EARTH VIEW EXHIBIT

This computer generated video exhibit, which updates every five minutes, displays a world map that shows the current day and night hemispheres, along with the locations on earth that have the sun directly overhead and the moon directly overhead.

DOPPLER WEATHER RADAR

On days when there is rain or snow in the Midwest, the Doppler Weather Radar exhibit displays the intensity and movement of this precipitation.

“MOON SHADOWS” EXHIBIT

This interactive exhibit uses a model of the earth-moon system to assist viewers in understanding the phases of the moon. By looking through an eyepiece built into the exhibit, viewers can observe how the moon phase changes as they manipulate the position of the moon along its orbit.

TELESCOPE EXHIBIT

This exhibit shows cutaway models of the major types of telescopes and describes a few of the many celestial objects that can be seen with small telescopes.

DINOSAUR FOOTPRINT

This is a full-scale model of a footprint and lower leg bone of a Brachiosaurus that illustrates the size of these great prehistoric animals. This is not a real footprint, nor was this the footprint from a dinosaur found locally. No dinosaur bones have ever been found in northern Illinois due to the fact that glaciers from the last Ice Age "scoured away" any dinosaur fossils that may have once existed.

FOSSIL EXHIBIT

This exhibit displays a wide variety of Illinois fossils including our state fossil, the "Tully Monster."

SPACE EXPLORATION EXHIBIT

This exhibit displays information about the Hubble Space Telescope and other unmanned spacecraft and some of the recent astronomical discoveries that they have made.

CURRENT EVENTS BULLETIN BOARD

This bulletin board contains a current sky map; the latest astronomical images from the Hubble Space Telescope; and news stories featuring recent scientific discoveries, often obtained the same day from Internet sources.

OUTDOOR EXHIBITS

The Nike Tomahawk missile was used to collect weather information in the earth's upper atmosphere. The Apollo Practice Capsule never flew in space, but was used by the U.S. Navy to practice ocean recoveries.

The Cernan Earth and Space Center also offers an **Exhibit Hunt handout** that can be distributed to each student before or after their scheduled program(s). To complete the Exhibit Hunt, students must find answers to the questions among the artifacts and text panels throughout the Cernan Center's lobby exhibit area. The activity takes approximately 20 to 30 minutes to complete.

If you'd like to arrange an Exhibit Hunt for your students, please let the Cernan Center know before your scheduled visit.

The Cernan Center's exhibits are subject to change. Any changes to the exhibit area will be posted to the Cernan Earth and Space Center Online, which can be found at: **www.triton.edu/cernan**. Click on "Exhibits" to access this information.

On Orbit

This is the Cernan Center program that you made a reservation to see. Below is some basic information about the show that should help you prepare your class for their upcoming visit.

Show title: *On Orbit*
Grade Level: Grades 3 and up
Length: 38 minutes

Summary of show:

On Orbit is a multimedia planetarium show that provides viewers with a virtual tour of the International Space Station, using a great deal of NASA video footage taken by the astronauts themselves. The program is divided into 15 chapters, which are described as follows:

Mankind's First Space Station. This chapter looks back on the history of the space station and what it represents – namely, a permanent outpost in space. The Soviet Union's Salyut space station and the United States' Skylab of the 1970s and the Russian MIR space station of the 1980s and 1990s are briefly shown and described. The Space Shuttle/MIR cooperative venture of the 1990s laid the groundwork for the current Space Shuttle/ISS program.

Mankind Dreams of Living in Space. Using archival film clips and paintings, this chapter reflects on how space travel was first envisioned by science fiction writers and movie and television producers.

Astronauts Train at NASA. This chapter shows how astronaut candidates are trained at the Johnson Space Center in Houston, including classroom instruction and intensive training in simulators and full-scale space mockups.

Shuttle Flight and Space Station Training. This chapter shows how astronauts prepare for and train in NASA's huge neutral buoyancy tank, which is the world's largest indoor swimming pool. Since the underwater world is similar to the weightless conditions experienced in space, this is an ideal place to practice the tasks that they will later perform on actual space walks.

Zero Gravity Training Aboard KC-135. This chapter briefly shows the other way of experiencing zero gravity, albeit only for 20 seconds at a time. NASA's KC-135 airplane flies high and then free falls as many as 40 times each flight to give astronaut candidates a brief taste of the weightless environment.

Survival Training. This chapter briefly shows the survival training that astronauts undergo, which includes water landings and survival in winter-like conditions.

Space Shuttle – Transport to Station. This chapter shows an actual Space Shuttle launch and describes the short span of time needed to reach Earth orbit. For the next two days, the Space Shuttle will pursue the International Space Station, reaching it and docking with it on the third day. The ISS is described as five times larger than MIR, with a wingspan of 356 feet, a length of 290 feet, and a living space equivalent of two 747 jumbo jets. Over 100 components comprise its modular

construction. When completed, 160 space walks and 1,900 hours will be needed to complete its construction. A time-lapse sequence shows all the components being added to the ISS to reach its final status.

Adjusting to Weightlessness. This chapter briefly shows how astronauts exercise to overcome the loss of muscle that is experienced in the zero gravity environment. Additional research is needed to prepare for the day when astronauts will make longer space voyages, or perhaps even make several extended missions during their careers.

Cosmic Rays and Other Dangers in Space. This chapter describes some of the dangers that astronauts face, including high levels of radiation and intense heat and cold. Spacesuits are amazing feats of engineering, providing the safeguards of a spaceship in a multi-layer wearable suit.

Low Earth Orbit. This chapter briefly describes the increasingly crowded realm of Low Earth Orbit, which is where the Space Shuttle and International Space Station operate. NASA must track about 10,000 objects (many of which are pieces of man-made space junk) to provide a warning system for potential collisions that could damage spacecraft or injure spacewalking astronauts.

Three Robot Arms. This chapter describes the ISS's three robotic arms – the 56-foot "Canada Arm," the "Mobile Remote Service Based System," and the "European Robotic Arm." – as well as other devices to handle payloads aboard the ISS.

NASA Food. This chapter describes the food that astronauts eat aboard the Space Shuttle and International Space Station, how they plan their meals, and how they prepare their meals. The subject of sleeping in zero gravity is also described.

Time to Relay, Workout, or Just Look Out. This chapter briefly describes how astronauts spend their leisure time on each space mission, performing tasks such as reading, sending e-mail messages to colleagues and family members, and/or simply looking out the windows to the skies above and the Earth below.

Station Upkeep. This chapter briefly describes how astronauts must perform tasks to maintain the ISS, just as homeowners must similarly do on Earth. This section also highlights science and medical experiments that are undertaken to better understand the unique properties of the zero gravity environment.

Completing the Space Station and its Future. This chapter briefly continues the brief discussion about future research and how it will benefit not only the astronauts in space, but us Earthlings as well.

Space Shuttle Departing the Space Station. This chapter describes the procedure by which the Space Shuttle undocks from the ISS, begins its re-entry into Earth atmosphere, and follows a steep glide path back to Earth. Safely back on Earth, our virtual mission to the ISS now ends.

Pre-visit Preparation:

Like all the dome theater shows presented at the Cernan Center, no preparations are needed for students to enjoy and learn from their visit. If, however, you would like to conduct some pre-visit class discussions, you can start by using information contained in the "Summary of Show" and/or the "Post-visit Activities" sections of this Teacher's Guide.

- Visit NASA's International Space Station webpage at www.nasa.gov/mission_pages/station/ , which contains a great deal of information about the ISS, including current mission status, future plans, image galleries, video clips, and more.

- Visit the Wikipedia entry for the International Space Station at http://en.wikipedia.org/wiki/Iss . This article contains a very nice overview of the ISS, its purpose and history, a list of its component modules, and much more.

- Research the evolution of America's manned space program (i.e. Projects Mercury, Gemini, Apollo, Skylab, and the Space Shuttle). Explain their differing mission goals, the number and qualifications of their crews, and their major accomplishments.

- Research the evolution of the space station, including the Salyut space station (Soviet Union), Skylab (United States), Mir (Soviet Union/Russia), and the current International Space Station. How are they similar? How are they different? For a good start, visit the Wikipedia entry for Space Station at http://en.wikipedia.org/wiki/Space_station .

- Write a report on why you believe it is important to explore space. In addition to fulfilling the "exploratory nature" of mankind, this report could also research and describe the many space "spin-offs" (i.e. products that we use in our everyday lives that directly resulted from space science research).

- What are the various careers in the field of space science, besides being an astronaut? What types of people today become astronauts? How is this different from the people who were astronauts in the early days of space exploration?

Teacher Resource Pages

Whether your class is studying astronomy, dinosaurs or earth science, the dome theater programs offered by the Cernan Earth and Space Center serve as an excellent supplement to your classroom instruction. However, if you would like to further research your subject area, or are looking for additional information on the topics presented in our shows, please refer to the following list:

ASTRONOMY AND SPACE SCIENCE

A wide variety of online resources can be found at the Cernan Center's Astronomy/Space Links page by visiting www.triton.edu/cernan and clicking on "Space Links."

NASA -- Educational materials including fact sheets, newsletters, slides, and videotapes.

1. NASA Educator Resource Center; Museum of Science and Industry; 57th Street & Lake Shore Drive; Chicago, IL 60637. Phone: (773) 684-9844, Ext. 2426. FAX: (773) 684-5580.
Website: **www.msichicago.org**. It has an extensive NASA video collection. Copies available free of charge if you provide blank tape. Many other resource materials available.

2. NASA Glenn Research Center; NASA Educator Resource Center; 21000 Brookpark Rd., MS 8-1; Cleveland, OH 44135. Phone: (216) 433-2017. FAX: (216) 433-3601.
Website: **www.nasa.gov/centers/glenn/education/**. NASA Teacher Resource Centers are established to provide educators with NASA-related educational materials for use in the classroom. These materials can be references or duplicated at the Center; they include classroom activities, lesson plans, teacher guides, laser disks, slides, audio and video tapes. Most materials and services are also available at Chicago's Museum of Science and Industry.

3. "Report to Educators" Free quarterly periodical about NASA for educational use. Request subscription on school letterhead by writing:

NASA Report to Educators
Education Affairs Division
Code XE
NASA
Washington, D.C. 20546

ASTRONOMICAL SOCIETY OF THE PACIFIC – "The Universe in the Classroom." A quarterly newsletter on teaching astronomy. You may request a free subscription by completing the electronic subscription form at **www.astrosociety.org/education/publications/tnl/tnl.html.**

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PERIODICALS:

1. SKY AND TELESCOPE Magazine. Monthly periodical. For subscription information, please write or call:

Sky Publishing Corporation
49 Bay State Road
Cambridge, MA 02138
(800) 253-0245 Website: **skyandtelescope.com**

2. ASTRONOMY Magazine. Monthly periodical. For subscription information, please write or call:

Kalmbach Publishing Co.
21027 Crossroads Circle
P.O. Box 1612
Waukesha, WI 53187
(800) 533-6644 Website: **www.astronomy.com**

3. ABRAMS SKY CALENDAR. Monthly sky map and astronomy events calendar. For subscription information, please write:

Abrams Sky Calendar
Abrams Planetarium
Michigan State University
East Lansing, Michigan 48824
Website: **www.pa.msu.edu/abrams/SkyCalendar/Index.html**

4. ODYSSEY Magazine. Children's monthly astronomy periodical. For subscription information, please write:

Cobblestone Publishing Company
30 Grove Street, Suite C
Peterborough, NH 03458
(800) 821-0115 Website: **www.odysseymagazine.com**

Please help us keep our information current. If you discover an address, phone number, or Internet address in our Teacher's Resource Pages that has changed, please inform the Cernan Center at **(708) 456-0300, Ext. 3372.** Thank you very much.

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EARTH SCIENCE

A wide variety of online resources can be found at the Cernan Center's Earth Science Links page by visiting www.triton.edu/cernan and clicking on "Earth Links."

DINOSAURS:

The best local resource for educators is the Field Museum of Natural History in Chicago. Call (312) 922-9410 and ask for the Teacher Resource Department. Website: **www.fmnh.org**

GEOLOGY:

U.S. Geological Survey (USGS) Website: **www.usgs.gov**
Boulder, Colorado

WEATHER:

National Climatic Data Center Website: **lwf.ncdc.noaa.gov/oa/ncdc.html**
NOAA Environmental Data Services
Federal Building
Asheville, North Carolina 28801

National Weather Service Website: **www.nws.noaa.gov**
Public Affairs Office
Silver Springs, Maryland
(301) 899-3296

Illinois Emergency Services and Disaster Agency
100 E. Adams
Springfield, Illinois 62706
(217) 782-2700

MISCELLANEOUS:

National Geographic Society Website: **www.nationalgeographic.com**
Educational Services
Department 38
Washington, D.C. 20036
(800) 368-2728

Please help us keep our information current. If you discover an address, phone number, or Internet address in our Teacher's Resource Pages that has changed, please inform the Cernan Center at **(708) 456-0300, Ext. 3372.** Thank you very much.