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**Lesson Plan: "Astronomy and the Cold War: How the United States Used the Moon to Target the Soviet Union."**

Center for Russian, East European and Eurasian Studies

### Lesson Objective

Students will learn how astronomical observations were used to help target sites in the Soviet Union during the Cold War and why such special targeting was needed. Students will then be taught how to make predictions and make observations of the same astronomical events for their experience today, even though such observations have only peaceful purposes when observed in today's world.

### Classes and Grade Levels

This would be for World History but lessons can vary according to subject taught and questions appropriate for grade levels addressed. (Standards would also vary with subject and grade level).

### Goals and Objectives - The student will be able to:

Take the information obtained from the various Internet URLs and readings of primary and secondary sources on a given topic and classroom discussions directed by the instructor and demonstrate the appearance of the astronomical event as shown by the various programs suggested and by the various videos enclosed and that can be obtained from the suggested URLs. The purpose is to allow the student to connect the history they are reading with information they can obtain from the various sources on current astronomy within their view and attempt to come to an understanding of how this information was used over 50 years ago. The class will find that, though the original purpose of these observations is no longer needed, the insight this process gives may broaden their understanding of a far larger world around them.

### Curriculum Standards Addressed:

#### Eleventh Grade World History:

Benchmark #7

Benchmark #8

### Time Required - Class Periods Needed

There should be at least 1 class period allowed for exploring Internet sites and discussion and 1 class period allowed for demonstration of astronomical prediction programs. Students can use the astronomical prediction programs to explore future astronomical events on their own as they have time. A final class period should be used for written essays of conclusions found by students.

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[Video of Grazing Occultation of Ups Gemini by the Moon, Observed by Derek C. Breit.](#)

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### *Occultation Internet Sites*

<http://lunar-occultations.com/iota/iotandx.htm>

<http://www.occultations.org/>

<http://www.iota-es.de/moon.html>

<http://lunar-occultations.com/iota/occult3.htm>

<http://www.projectpluto.com/>

<http://www.doa-site.nl/>

<http://www.qni.com/~bobgraze/>

<http://www.lowell.edu/>

<http://www.usno.navy.mil/ppm/>

<http://lunar-occultations.com/iota/zcstars.htm>

<http://sorry.vse.cz/~ludek/zakryty/pub.phtml>

### **Required Materials**

The instructor must have enough Internet enabled computers to allow reading of materials online. The instructor can also obtain the WinOccult Freeware from the first or fourth URLs listed above. The instructor can also purchase Guide 8 Software from Project Pluto listed above.

## **Vocabulary**

Atomic Bomb, Continents, Datum, Geodetic Graze, Hydrogen Bomb, Lunar, Moon, Nuclear Weapons, Occultation, Satellite, Telescope.

## **Procedure**

The teacher can review the political and military tensions of the Cold War of the 1950s and 1960s in classroom discussion. The teacher can use the enclosed paper, "The Marginal Zone of the Moon: Chart of Apparent Gradients," to lead a classroom discussion as to how the US Military used Geodetic Grazing Occultations to help in precisely targeting Soviet Military sites for Nuclear Missile attack. The program Winoccult can be downloaded and properly configured to provide extremely precise total and grazing occultation predictions for the region of the class. The predictions can be used to display them graphically in either Winoccult or Guide 8. The teacher could also find an appropriately bright event close by that could be used as a field trip for the students to use small telescopes to actually observe such an event for themselves. This would allow them to witness an event similar to those observed by special US Military teams sent around the world in the 1960s to do their mission of connecting the datum of North America with those of Europe and Asia.

## **Questions:**

Do students understand the importance of datum in world geography?

Do students understand the problem of launching a missile from one geodetic datum and having it land with precision inside a different geodetic datum when the two are not connected in any measurable way?

Do students understand the term lunar grazing occultation and how a geodetic lunar grazing occultation could be used to connect datum?

Do students understand the use and meaning of Universal Time and its requirement in precise astronomical work?

## **Assessment/Evaluation**

Students will be required to write their answers to the assigned questions. The answers must contain information and ideas obtained from both primary and secondary sources as well as their own original ideas related to the assignment and their own experiences, which may vary widely. The teacher will then provide a short quiz of about 10 questions derived from the questions covered in the assignment. The difficulty of the questions should vary depending on the abilities of the class. Students should pass the quiz based on the usual teacher grading method.