

**WHAT IF APOLLO EXPLORED WASHINGTON D.C.? LUNAR EXPLORATION IN THE CONTEXT OF OUR NATION'S CAPITAL.** W. B. Garry<sup>1</sup>, L. V. Bleacher<sup>2</sup>, J. E. Bleacher<sup>3</sup>, N. E. Petro<sup>3</sup>, S. C. Mest<sup>3,4</sup>. <sup>1</sup>Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, Washington, D.C., [garryw@si.edu](mailto:garryw@si.edu), <sup>2</sup>SSAI, Code 690, NASA Goddard Space Flight Center, Greenbelt, MD, <sup>3</sup>Planetary Geodynamics Laboratory, Code 698, NASA Goddard Space Flight Center, Greenbelt, MD, <sup>4</sup>Planetary Science Institute, Tucson, AZ.

**Introduction:** Apollo Astronauts landed at six different locations on the Moon between 1969 and 1972. While the general public is familiar with this fact and have seen photographs and video footage of the Astronauts walking around and driving the lunar rovers, the scale of these missions can be deceiving to the untrained eye. While traverse maps show the routes the Astronauts took on the lunar surface, without the context of familiar landmarks, it is difficult to grasp just exactly how much ground they covered. Comparing Apollo traverse routes to cities here on Earth provides that context.

**Statistics from the Apollo Missions:** Comparing the statistics for Apollo missions 11, 14, and 17 illustrate the increase in the number of extra-vehicular activities (EVAs) (A11:1, A14: 2, A17: 3), total EVA duration (A11: 2:31, A14: 9:22, A17: 22:04 hours:minutes), distance from the Lunar Module (LM) (A11: 100 m, A14: 1.4 km, A17: 7.4 km), and total distance traveled (A11: 100s m, A14: 3.5 km, A17: 36 km) from the first to the last mission [e.g. 1, 2].

**Apollo in Washington, D.C.:** Here, we place the traverses for the Apollo missions in the context of Washington, D.C. using the Smithsonian Metro Station as a common landing site. The Apollo 11 crew would not get to visit any of the museums or monuments and would have been confined to a small area on the Mall the size of a baseball field. Mission priorities can be illustrated using the Apollo 14 traverse. If the crew travels to the east, they could visit several museums and make it to the U.S. Capitol. If they traveled west, they could visit the Washington Monument and the WWII Memorial, but would not reach the Lincoln Memorial. Using the lunar rover, the Apollo 17 crew could visit any of the museums and monuments downtown, plus cross the Potomac River into Virginia to visit Arlington Cemetery.

**Education:** Classroom activities that involve the lunar missions can combine map reading, scale, unit conversion, geography, problem solving, and decision making skills. Example questions that could be asked to students: 1) *If you had to choose one Apollo EVA to do in DC, which one would it be and why?* 2) *If you could create your own EVA in DC, but only had 6 hours, where would you go, and why?* 3) *If you had to plan an Apollo-style Mission in your hometown, where would you send the Astronauts and why?*

**Summary:** These comparisons show the significant progress made with each mission, the importance of choosing a landing site, and the enhancement in mobility that technology provides to surface exploration on the Moon.

#### Apollo 11



#### Apollo 14



#### Apollo 17



**Figure 1.** Traverse routes for Apollo 11, 14, and 17 overlain on satellite images of Washington, D.C. Base images from Google Earth.

**References:** [1] Orloff R. W. (2001) *Apollo by the Numbers: A Statistical Reference*, pp. 348. [2] Lunar and Planetary Institute (2010) Lunar Mission Summaries website, <http://www.lpi.usra.edu/lunar/missions/>.