**Introduction**: The Passive Seismic Experiment Package (PSEP) deployed by the Apollo 11 astronauts in 1969 provided the first seismic data from another body in the Solar System [1, 2]. The primary sources of noise in the Apollo 11 seismic data were the movements of the astronauts and their instruments. Here we use these anthropogenic sources of seismic signal to investigate the possibility of conducting an active-source seismology study of the subsurface at Tranquility Base.

**Background**: The PSEP instrument was deployed by astronauts Neil Armstrong and Buzz Aldrin on July 21st, 1969 during their extravehicular activity (EVA). As the instrument was placed approximately 16.8 m from the lunar module (LM) and collected data during the EVA and the LM’s departure from the surface, it recorded seismic signal from a number of anthropogenic events. The PSEP remained active until turnoff on August 27, 1969, after the system failed to receive and execute commands [1].

**Astronaut Seismicity**: The PSEP short period seismometer recorded seismic events due to the astronauts’ activities during their EVA and after they reentered the LM. The locations of these activities in relation to the LM and the PSEP have been marked on traverse maps and observed in great detail by the Lunar Reconnaissance Orbiter Camera Narrow Angle Camera (LROC NAC) [3]. The PSEP seismometers were activated at 04:39:20 UTC [4, 5], and the astronauts terminated their EVA at approximately 05:11:13 UTC. The seismic sources during the EVA include the hammer strokes from the core tube sample collections, parts of the solar wind array striking the ground during disassembly, and the Hasselblad camera pack dropping onto the surface as the astronauts loaded equipment before reentering the LM. Seismic sources after the termination of the EVA include the pressurization and depression of the LM, and the jettison of the astronauts’ portable life support systems (PLSS).

**Audio and Seismic Timing**: The time of arrival of the seismic signal to the PSEP is crucial to the constraint of approximate seismic velocities. The time delay between generation and arrival is calculated using the time differences between the event signals in the seismic data taken from PSEP and the event signals in the audio data, taken from the astronauts’ microphones from their correspondence with Mission Control in Houston, Texas. At the onset of each event (i.e. each hammer stroke to the ground, each impact of equipment onto the surface) the time associated with record of the event in the audio signal will be assumed to be the time of the signal generation, and the time associated with the signal in the seismic data will be the time of arrival.

**Time corrections**: Time corrections must be applied to both the audio signal and the seismic signal to account for the signals’ transmission to Mission Control in Houston, Texas, and should return the event timings on the lunar surface.

**Preliminary Results**: In the catalog of events compiled during and after the Apollo 11 EVA, approximately half have both an associated seismic signal and an audio signal. The time delay for these events are displayed in figure 1. Most audio events occur within 1 second of their seismic event, but the occurrence of seismic events preceding their associated audio signal indicates that further time constraints must be accounted for before a P-wave velocity study can be done.

![Figure 1. The calculated time delay in seconds between signal in audio data and corresponding seismic signal.](image)

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