RESULTS FROM THE LUNAR SURFACE PROFILING EXPERIMENT,

F. K. Duennebier*, J. Watkins*, and R. Kovach**
* University of Texas, Galveston
** Stanford University, Stanford

The lunar seismic Profiling Experiment is an array of four geophones in a triangular array about 100 meters on a side (with one geophone in the middle) deployed at the Apollo 17 landing site (Kovach and Watkins). Study of the signals received from eight explosive packages deployed at from 0.1 to 2.7 km from the array and from the Apollo 17 LM impact at a range of 8.7 km yields a model for the near-surface lunar structure. The compressional velocities and layer thicknesses are given below:

V_p (m/sec)	h (m)
100	8.5
400	195
1190	990
>2280	?

The 100 m/sec layer is assumed from its presence at the other Apollo sites; the transition from 100 m/sec to 400 m/sec may be gradual. The 1190 m/sec layer may be thicker than indicated if the velocity of the next layer is greater than 2280 m/sec. The model indicates that soil extends to a depth of no greater than 8.5 meters.

An unexpectedly large number of natural seismic events have been observed by the Lunar Seismic Profiling experiment in the passive listening mode. During a four day listening period in July, 1973, an average of more than three events per hour were observed. Study of these events suggests that most are small moonquakes occurring near the lunar surface. Many of the signals match each other in every respect implying identical source and eliminating the possibility of meteoroid impact sources. From the characteristics of similar events observed by the short period components of the Passive Seismic Network, slumping of soil on lunar slopes triggered by diurnal thermal variations is suggested as a possible source mechanism (Duennebier and Sutton). This mechanism may be important in the erosion of lunar slopes. Further study of these events (termed thermal moonquakes) recorded on the Apollo 17 array may yield source locations necessary to verify the proposed mechanism.

REFERENCES

KOVACH, R. and J. WATKINS; "The Lunar Seismic Profiling Experiment", in Apollo 17 Preliminary Science Report, NASA, in Press.

DUENNEBIER, F. and G. SUTTON; "Thermal Moonquakes", J. Geophys. Res., in Press.