will consist of actual observations, rather than simulated sequences generated from a shape model. They will enable the viewer to see all the details of the topography, morphology, and distribution of compositional units as the viewing and illumination geometries change. Several different video sequences of Geographos are anticipated, including separate sequences for each imaging system and merged datasets. The LIDAR will provide the highest spatial resolutions (in four colors), the thermal-IR detector will provide nightside imaging, the UV/VIS camera will provide the highest resolution of the entire visible and illuminated surface during the 75 s before and after closest approach, and the UV/VIS plus near-IR detectors will map the mineralogy.

**SOURCES SOUGHT FOR INNOVATIVE SCIENTIFIC INSTRUMENTATION FOR SCIENTIFIC LUNAR ROVERS.**

C. Meyer, Solar System Exploration Division, Mail Code SN2, NASA Johnson Space Center, Houston TX 77058, USA.

Lunar rovers should be designed as integrated scientific measurement systems that address scientific goals as their main objective. Scientific goals for lunar rovers are (1) to develop a more complete understanding of the stratigraphy, structure, composition, and evolution of the lunar crust by close examination of the geology and geochemistry of multiple, wide-spaced landing sites on the Moon; (2) to improve the understanding of the lunar regolith and history of solar system events that have affected the lunar surface; (3) to improve the understanding of the lunar interior and set constraints on planetary evolution using geophysical techniques; and (4) to identify and characterize potential lunar "resources" that could be utilized by future human missions.

Teleoperated robotic field geologists will allow the science team to make discoveries using a wide range of sensory data collected by electronic "eyes" and sophisticated scientific instrumentation. Rovers need to operate in geologically interesting terrain (rock outcrops) and to identify and closely examine interesting rock samples. Analytical instrumentation should measure the maturity of soils and the chemical composition (major, minor, and trace) and mineralogy of soils and fresh surfaces of rock samples. Some ingenious method is needed to obtain fresh rock surfaces. Manipulator arms are needed to deploy small close-up cameras and lightweight instruments, such as alpha backscatter spectrometers, as "stethoscopes" to the clasts in boulders. Geoscience missions should also deploy geophysical packages.

Enough flight-ready instruments are available to fly on the first mission, but additional instrument development based on emerging technology is desirable. There are many interesting places to explore on the Moon (i.e., the lunar poles) and it is highly desirable to fly multiple missions with continuously improved instrument sets. For example, there are needs for (1) in situ reflectance spectroscopy measurements (with high spectral resolution TBD) to determine the spectra (-0.3-2.5 μm) and mineral contents of rocks and soils in a manner analogous to what is done from a distance by Earth-based telescopes or from lunar orbit; (2) Mössbauer spectroscopy to determine soil maturity and mineralogy and relative abundance of iron-bearing phases; (3) close-up images by a "field-lens" electronic camera with artificial lighting and good depth focus (autofocus?) allowing scientists in the control room to have the ability to make discoveries and document what has been analyzed by the analytical instruments; (4) precise and accurate analytical measurements of the chemical composition of soils and rocks—especially the critical determination of the Fe/Mg ratio and one or more of the large ion lithophile elements; (5) cryogenic systems to cool solid-state detectors such as infrared sensitive CCD arrays, Si(Li) X-ray or Ge gamma ray detectors; (6) multispectral imagery by CCD cameras including telephoto, metric, or panoramic; (7) bore-sited laser range-finding equipment with gimbal that read out angles for precise site survey; and (8) thermally evolved gas analysis.