NASA SBIR 2006 Phase I Solicitation

S1.01 Surface Robotic Exploration

Lead Center: JPL

 Participating Center(s): ARC

Sample acquisition and handling will be important elements of future landed missions. Sample manipulation technologies are needed to enable handling and transfer of unstructured samples from a sampling device to instruments and sample processing systems. Shallow core, rock, and regolith samples may be variable in size and composition so a sample manipulation system needs to be flexible enough to handle the sample variability. Core samples will be on the order of 1 cm diameter and up to 10 cm long. Soil and rock samples will be of similar volumes. Actual samples to be analyzed in instruments will likely be small subsamples so the means for subsampling and manipulation of the original sample and subsamples needs to be developed. Minimal size and mass components and systems have the greatest benefit.

Mobility technology is needed to enable access to difficult-to-reach sites such as distant locations or access through steep terrain. Many scientifically valuable sites are accessible only via terrain that is too steep for state-of-the-art planetary rovers to traverse. Sites include crater walls, canyons, and gullies. Tethered systems and marsupial systems are two examples of mobility technologies that are of interest. Tether technology could enable new approaches for deployment, retrieval and mobility. Innovative marsupial systems could allow a pair of vehicles with different mobility characteristics to collaborate to enable access to challenging terrain, e.g., a primary vehicle could provide long traverse to the vicinity of a challenging site and then deploy a smaller vehicle with steep mobility access capability for access to the site. Innovative low-mass, low-power, and highly modular systems and subsystems are of particular interest.

The program is also interested in new sensors such as small, low-power lidar for more robust navigation.

Examples of planetary robotics system are shown at http://robotics.jpl.nasa.gov.