

## LUNAR SOUTH POLE - AITKEN BASIN SAMPLE RETURN MISSION (SPA-SR)

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A proposal for a robotic sample return mission to the South Pole - Aitken Basin on the lunar farside is being prepared for submission to NASA's New Frontiers Program. If approved after an intensive and highly competitive review process, this mission could be flown in the 2009-2010 time frame. It would address significant issues in planetary science identified by the National Research Council's Decadal Survey of Planetary Exploration, particularly the timing of early large basin formation events in the inner solar system, the nature of very large impact events and the petrological differentiation of planetary bodies. Detailed objectives include determining the age of the basin by determining the age of impact melt rocks formed by the basin event, determining the composition of the lower crust and possibly the upper mantle penetrated by this huge impact, and study of subsequently-formed basalts and impact materials that will provide evidence on the later history of the South Pole - Aitken Basin. Excavated regolith will be screened to concentrate a large number (thousands) of small (millimeter-sized) rock fragments, which will be returned to Earth for analysis in terrestrial laboratories. The interpretive approach requires the analysis of a large number of individual samples that can be studied by sophisticated analytical techniques, such as mass spectrometry, various microprobe analytical techniques, optical and electron microscopy and other techniques in a coordinated manner, so that the characteristics of rocks and classes of rocks can be distinguished on a statistical basis. Correlation of rock types separated from the returned samples with remote sensing data obtained from Clementine, Lunar Prospector, SMART-1 and SELENE will be essential in interpreting the origin of the materials returned. The samples will be released to the scientific community for analysis approximately six months after their return, allowing time for a careful preliminary examination of the thousands of rock fragments expected in the returned sample.

Because the proposal will be in a competitive arena, details of mission design will not be discussed at this time. However, the science advisors and team members for the SPA-SR mission believe that it will compete well in terms of scientific productivity and cost with other likely proposals to the New Frontiers Program. Significant opportunities exist in this mission for participation by a broad technical community as well as the public. Initial selection of several proposals will be made by NASA in the spring of 2004, with a final selection in the spring of 2005.