

## Present status of development of the LUNAR-A penetrator

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The scientific objective of the LUNAR-A mission is to explore the lunar interior by using the seismometry and heat flow measurements. These measurements will be made by two axes seismometers and thermal sensors on board of the penetrator probe. The seismic data are expected to provide the key information on the deep mantle structure of the moon, especially on the size of the core. The thermal data are expected to provide the important information on the thermal state and also the bulk abundance of the radio-active elements in the interior of the moon.

In the previous Japan Geoscience meeting in 2005, we presented the LUNAR-A mission status which has been suspended since February of 2004, and the prioritizing of the development of the penetrator technology. The shock durability of the each component of the penetrator such as, the sensor, battery section, and so on had already been established, although the robustness of the total system was required as the conclusion of the technical assessment of the project which was made on January 2004 by the technical review board. We have approached two different aspects having the robustness of the penetrator system. The first one was a reliable operation after the penetration. At the penetration moment into the regolith, some electrical noises by the ESD or other origins are considered to cause a fatal operational errors. In order to avoid this possibility, we developed a power-on system after the penetration in the regolith. Shock experiment of elemental parts, which consist of miniature shock-triggered switch, and electronics circuits, was performed in November 2005. All the sensors and the electronics circuit functioned successfully after the impact experiment.

The second approach to have the robustness of the system is to have enough margin of the communication link between the penetrator and the mother spacecraft. From our investigation, one of the main reason to reduce performance was the effect of noise originated from the digital circuit board(DPU). Therefore, we fully re-designed the DPU board and are now manufacturing the test circuit board to confirm the validity of our design.

At present, the manufacture of a penetrator, which has a full configuration (but not the flight model qualification) with having the power reset system mentioned above, is proceeded. The penetration experiment is planned on June 2005. And the flight model qualified penetrator will be manufactured in the future and we are planning to have the Qualification Test in 2007.