

# Mapping of the Moon in gamma and alpha rays by SELENE mission

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## MAPPING OF THE MOON IN GAMMA AND ALPHA RAYS BY SELENE MISSION

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Alpha particle spectrometer onboard SELENE mission can measure intensity of outgassing events on the lunar surface detecting decay of gaseous Rn-222, Po-218, Po-210, and Tn-220. Alpha ray detector investigates the nature and global distribution of transient lunar outgassing events and their roles as sources of lunar atmosphere. Using alpha particle spectroscopy of the Moon it will be possible to determine the outgassing rate from the lunar interiors, distribution of outgassing sites and their correlation with young impact craters and tectonic features, the global rate of tectonic events that may be responsible for origin of shallow moonquakes, provide an assessment of lunar volatiles as possible utilization sources.

Radon and polonium are daughter products of the decay of uranium, the background level of alpha particle activity is a function of the U and Th content in the lunar regolith. Knowing U content and outgassing activity, it will be possible to estimate the diffusion rates of radioactive gases in the lunar regolith. This technique is shown on the example of Lunar Prospector data about U, Rn, and Po distribution on the Moon. Moonquakes can lead to increasing of outgassing activity. So, alpha particle spectroscopy can be used for search of regions with high seismic activity.

SELENE gamma ray spectrometer employing Ge detector with excellent energy resolution will map abundances of ten elements. We conducted Monte Carlo simulations of SELENE gamma ray spectrometer observations using GEANT 4 code. Knowing background level, it is possible to estimate statistical error of measurements of U and Th abundances on the lunar surface. For example, the sensitivity of SELENE Gamma ray spectrometer to Th is sometimes better than that of Lunar Prospector gamma ray spectrometer. Gamma ray spectrometer and alpha particle detector provide an independent source of U and Th content data, as well as indicating the possible presence of subsurface deposits of U and Th. Correlative study of Th and U will be made by SELENE gamma ray and alpha particle spectrometers.