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Low-cost lunar mission options: MoonLITE and MoonRaker

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We present results from the recent 'Low-cost Lunar Mission Options' study carried out in the UK, with national funding, by Surrey Satellite Technology Limited. A fundamental driver was that any UK-led mission must be affordable, while satisfying key science objectives not yet addressed and offering the opportunity for educational outreach and stimulation of the UK's capabilities in space exploration. Additional motivations were the demonstration of technologies important to the UK for other missions (e.g. within Aurora for Mars Sample Return, or within Cosmic Vision for a Europa mission), and the potential for strategic / programmatic compatibility with the global exploration programme. The study assessed the scientific and technological requirements and the benefits of three mission options, namely orbiter, lander and sample return. An initial mission system definition was performed, including mission analysis and a preliminary assessment of key performance budgets. Cost drivers in terms of science performance and required technology were identified. In the end, two mission proposals were established, namely MoonLITE and MoonRaker. MoonLITE (Moon Lightweight Interior and Telecom Experiment) is a small orbiter carrying four penetrators for seismology and heat flow studies. MoonRaker is a single soft lander targeting the near-side for *in situ* geochemical analyses and K-Ar dating of young lava flows in Oceanus Procellarum.