



Joint Annual Meeting of LEAG-ILEWG-SRR (2008)  
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***Update on UK lunar exploration plans***

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## Overview

- Current missions
- New activities
- UK exploration review
- Implementing the GES



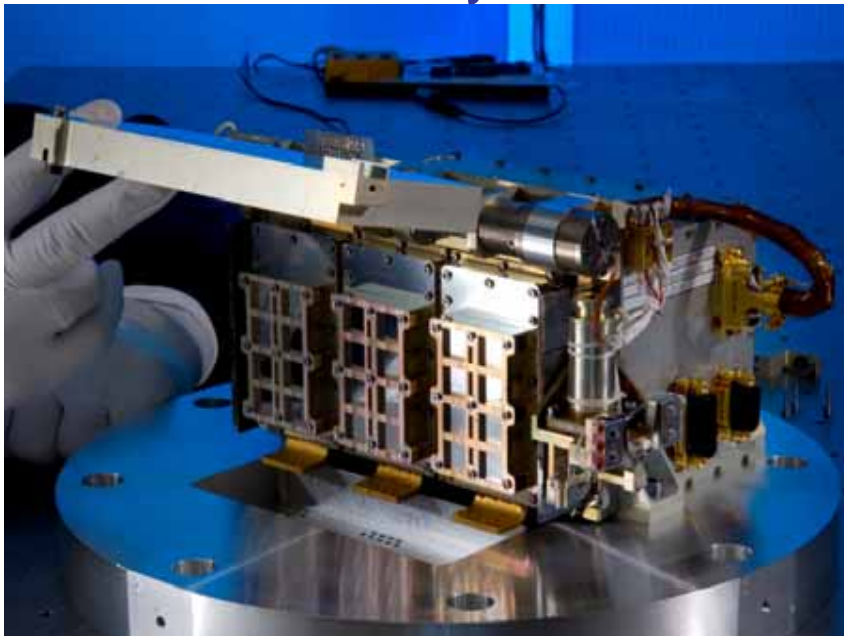


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# Chandrayaan-1



- Launched 22 October
- Carries C1XS (Chandrayaan-1 X-ray Spectrometer)
- Built at STFC's Rutherford Appleton Laboratory in collaboration with ISRO



- Funded via the UK's subscription to ESA
- Builds on demonstrator instrument for SMART-1
- Surface chemistry - detects magnesium, aluminium and silicon
- During solar flares, may also detect other elements such as iron, titanium and calcium



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# MoonLITE - background



## Relevant UK strengths:

- Lunar and planetary science
- Expertise in novel and miniature instrumentation
- World's pre-eminent low cost satellite manufacturer
- World's leading expertise in financing PPP-type projects



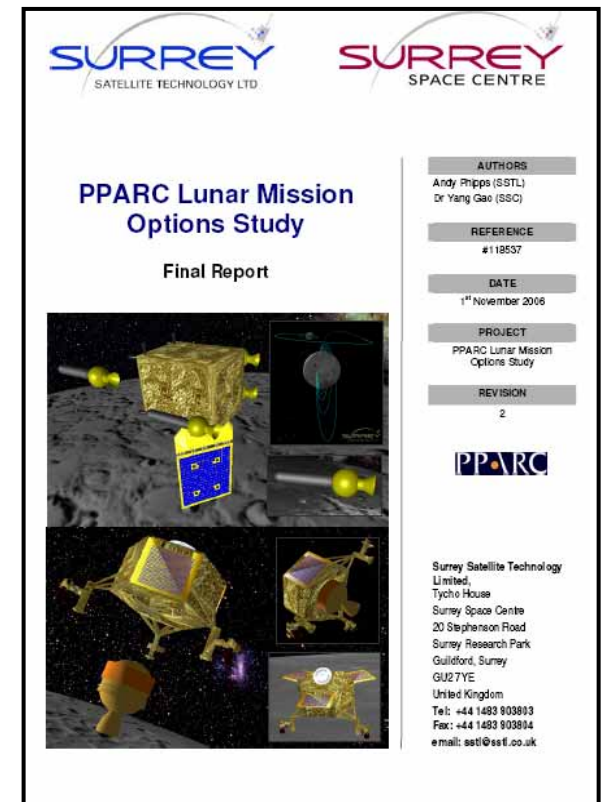
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# Lunar missions options study



- PPARC study looked at possible UK involvement in lunar exploration and ways to harness UK capabilities
- 2 concepts proposed – MoonLITE and a near-side soft lander called Moonraker



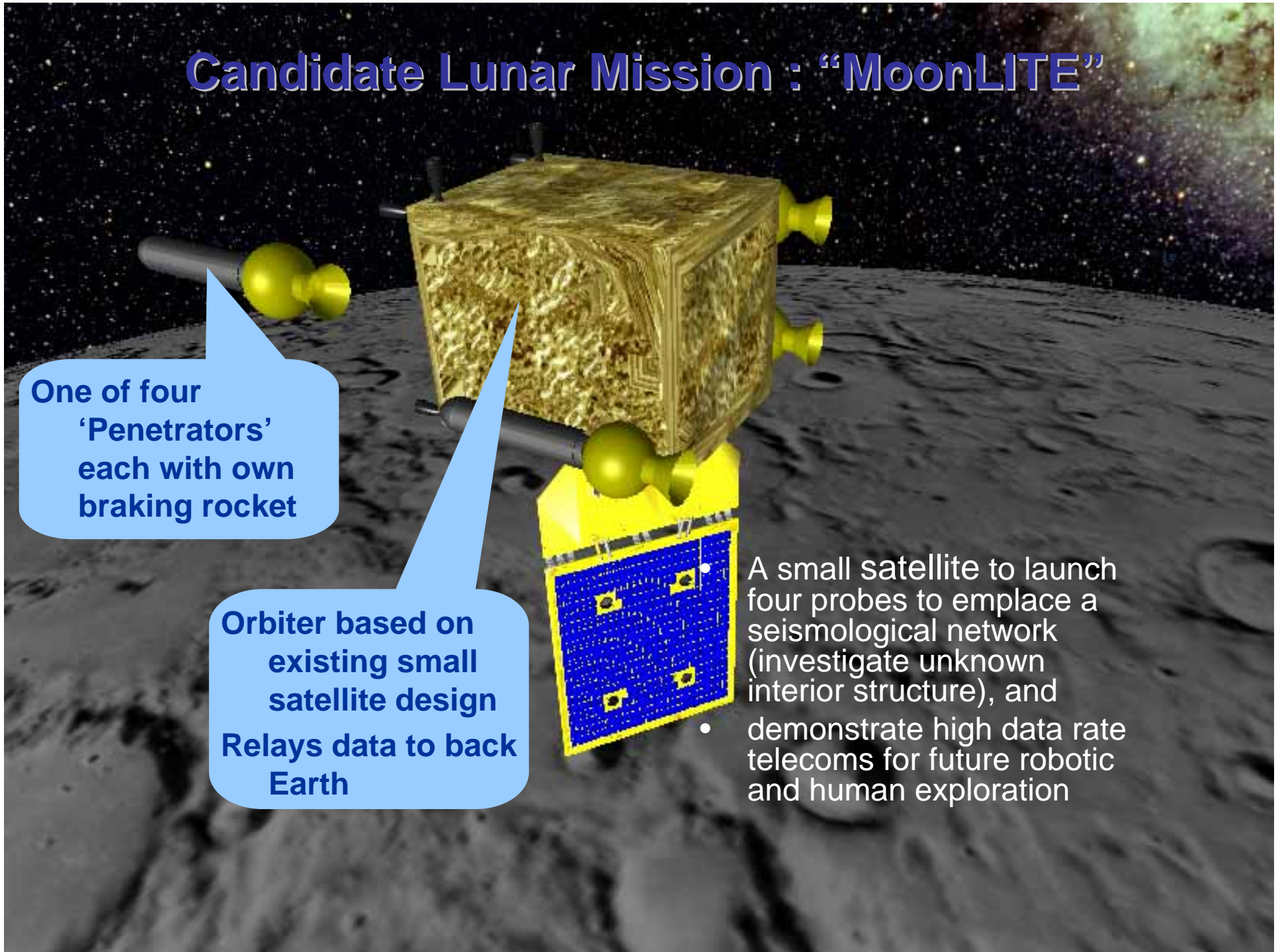
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# Candidate Lunar Mission : “MoonLITE”

One of four  
‘Penetrators’  
each with own  
braking rocket

Orbiter based on  
existing small  
satellite design  
Relays data to back  
Earth

- A small satellite to launch four probes to emplace a seismological network (investigate unknown interior structure), and
- demonstrate high data rate telecoms for future robotic and human exploration





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## MoonLITE - Joint review



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- Six-member MoonLITE international peer review committee evaluated science merits in July 2008
- Chaired by Carle Pieters
- ‘...scientific potential of the MoonLITE penetrator network concept exceptionally high in the context of the international exploration activities.’
- Possible ‘stand-alone cornerstone to the proposed International Lunar Network’
- ‘...valuable contribution to the early phases of a broader Global Exploration Strategy (GES)’



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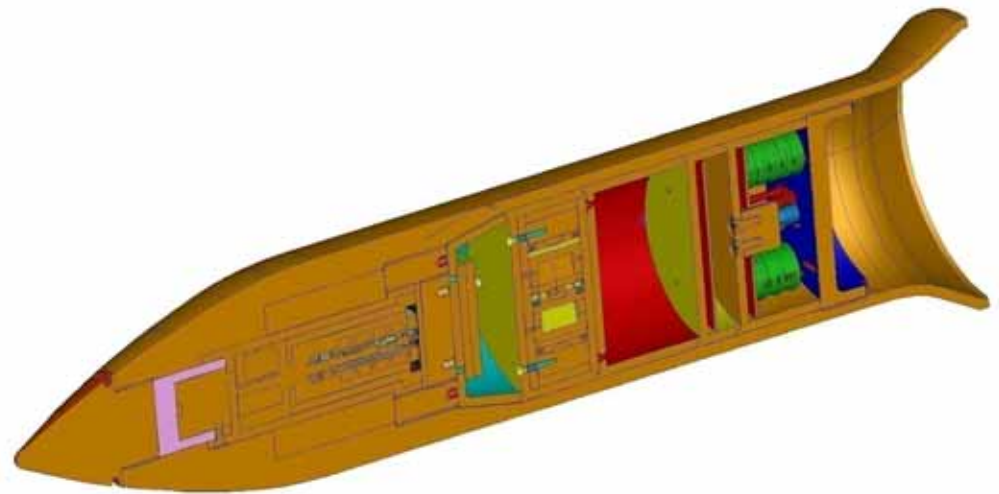




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# Penetrator tests (1)

- Demonstration penetrators tested at QinetiQ test range in Pendine (Wales) in May 2008



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QinetiQ Pendine





# Penetrator tests (2)



- Tests successful
- Further work planned for 2009







## MoonLITE – Phase A study

- STFC will announce Phase A study this week
- To be carried out by industry (selected through competitive tender) working with academia
- Study to be complete by end 2009
- No decision to fund full mission, but this is vital first stage
- Launch not before 2014 (depending on funding)
- UK-led, but with US involvement
- Collaboration with international partners welcome (technology, instruments, launch, etc.)





## MoonLITE – benefits

- Demonstration of penetrators for use elsewhere in the solar system
- First demonstration of low cost satellites outside Earth's orbit
- UK contribution to the global lunar exploration architecture through demonstration of advanced navigation and telecommunications
- Inspiration to young people for increased take up of science, technology, engineering and mathematics
- Training opportunities (in both UK and USA) on a mission with a rapid development cycle to build up the next generation of experienced space scientists and engineers





# Space Exploration: developing a UK strategy

The UK is involved in three levels of analysis:

## **International**

- Strong contributor to Global Exploration Strategy

## **European**

- exploration scenarios within ESA Aurora programme
- Mission proposals to ESA Cosmic Vision 2015-25 (e.g. Jupiter/Europa Explorer, Venus mission, asteroid sample return...)

## **National**

- Long term: BNSC Space Exploration Working Group (SEWG)





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## UK Space Exploration Working Group

Four expert sub-groups have reviewed global and European plans and established UK interests and opportunities:

- Science
- Technology
- Commercial opportunities
- Society and public engagement

Report published on September 13<sup>th</sup> 2007 to widespread interest



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- The UK should prepare for involvement in the era of global space exploration in both robotic and human aspects.
- Existing UK robotic exploration programme is a success
- Expansion to include robotic exploration of the Moon is desirable
- Seek international partnership within the frame of the Global Exploration Strategy
- A permanent human outpost on the Moon has good science potential in period after 2020.
- Increased cooperation between robotic and human space systems is likely
- Commercialisation aspects important
- Joined up education and outreach policy is a must





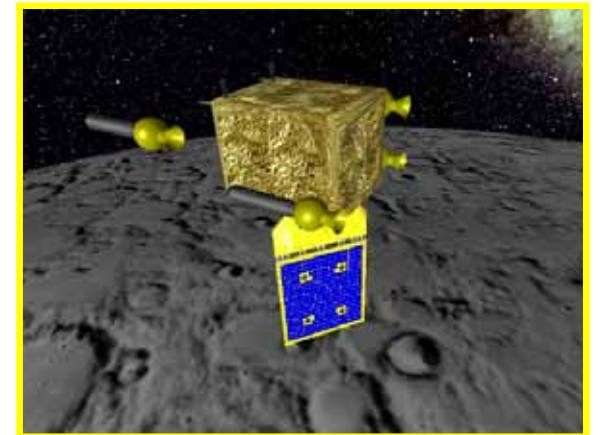
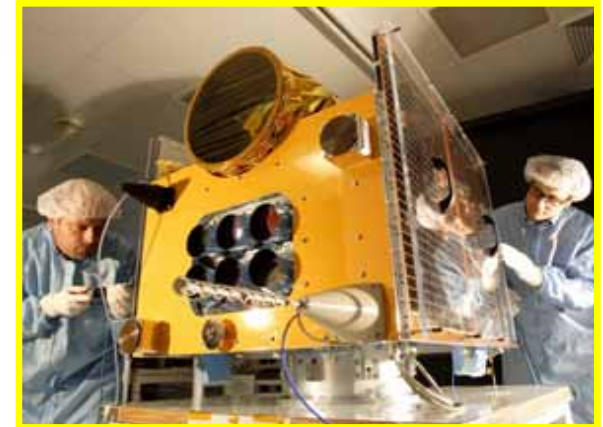
- UK SEWG reported *to* Government
- New review being carried out *for* Government
- Builds on work of SEWG
- Considers options, costs, benefits
- Includes formal economic assessment as well as intangibles (e.g. inspiration, skills)
- Completion due Q1 2009





## UK aspirations

- Develop a rolling programme of bilateral/trilateral missions with international partners
- Build on UK scientific, technical & commercial strengths; sustainable and cost effective
- Flexible missions with rapid development using incremental technology development





## Our Vision for UK Space Science and Exploration

### ➤ Science

- Answering fundamental questions about how the Universe came to be, how it works and the place of life

### ➤ Innovation

- Creating innovative technology, exploiting our industrial capability and helping the wider economy

### ➤ Training and Education

- Attracting and training new generations of scientists and technologists, under-pinning the whole economy

### ➤ Inspiration and Outreach

- Demonstrating the role of science and technology in 21<sup>st</sup> Century Britain





# Implementing the Global Exploration Strategy



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- Explain ISECG to other bodies (in hand, interview in Space News?)
- High-level support from Agency Heads (perhaps sign annual report?)
- Formal ISECG session at IACs?
- Agencies to use GES in planning
- Begin to involve industry (vital expertise to use, future services may be provided by private sector)

