Joint Annual Meeting of LEAG-ILEWG-SRR (2008)
Cape Canaveral, Florida, 28 October 2008

Update on UK lunar exploration plans

Jeremy Curtis
UK Delegate to ISECG

British National Space Centre

BNSC *space for science, enterprise and environment*

Overview

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

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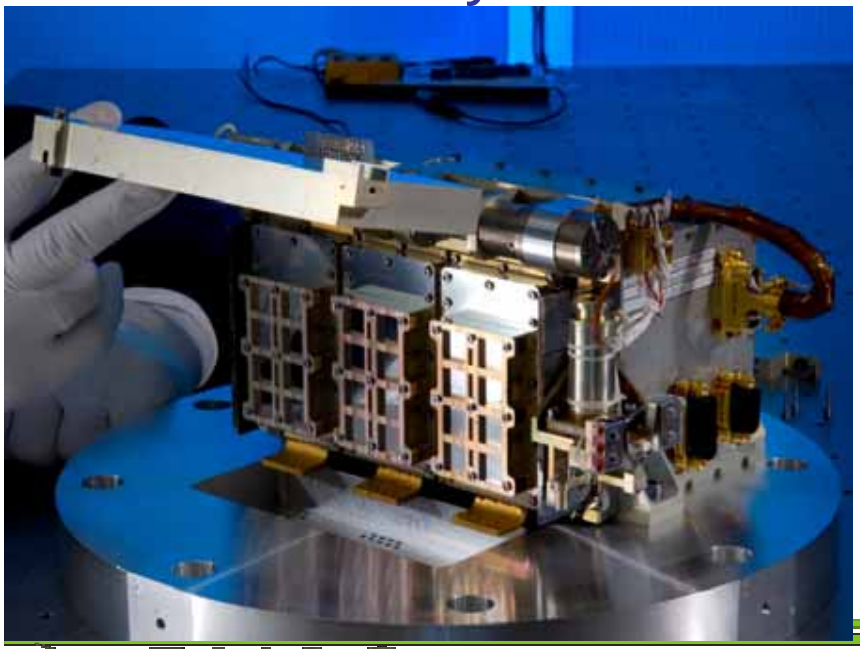
Chandrayaan-1

- 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

MoonLITE - background

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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

Lunar missions options study

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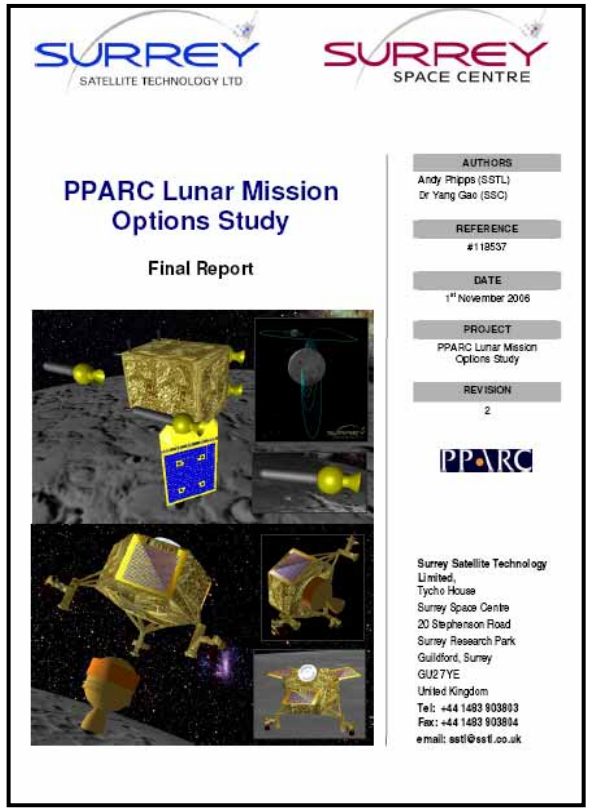
- PPARC study looked at possible UK involvement in lunar exploration and ways to harness UK capabilities
- 2 concepts proposed – MoonLITE and a near-side soft lander called Moonraker


SURREY SATELLITE TECHNOLOGY LTD

SURREY SPACE CENTRE

PPARC Lunar Mission Options Study

Final Report

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DATE
1st November 2006

PROJECT
PPARC Lunar Mission Options Study

REVISION
2

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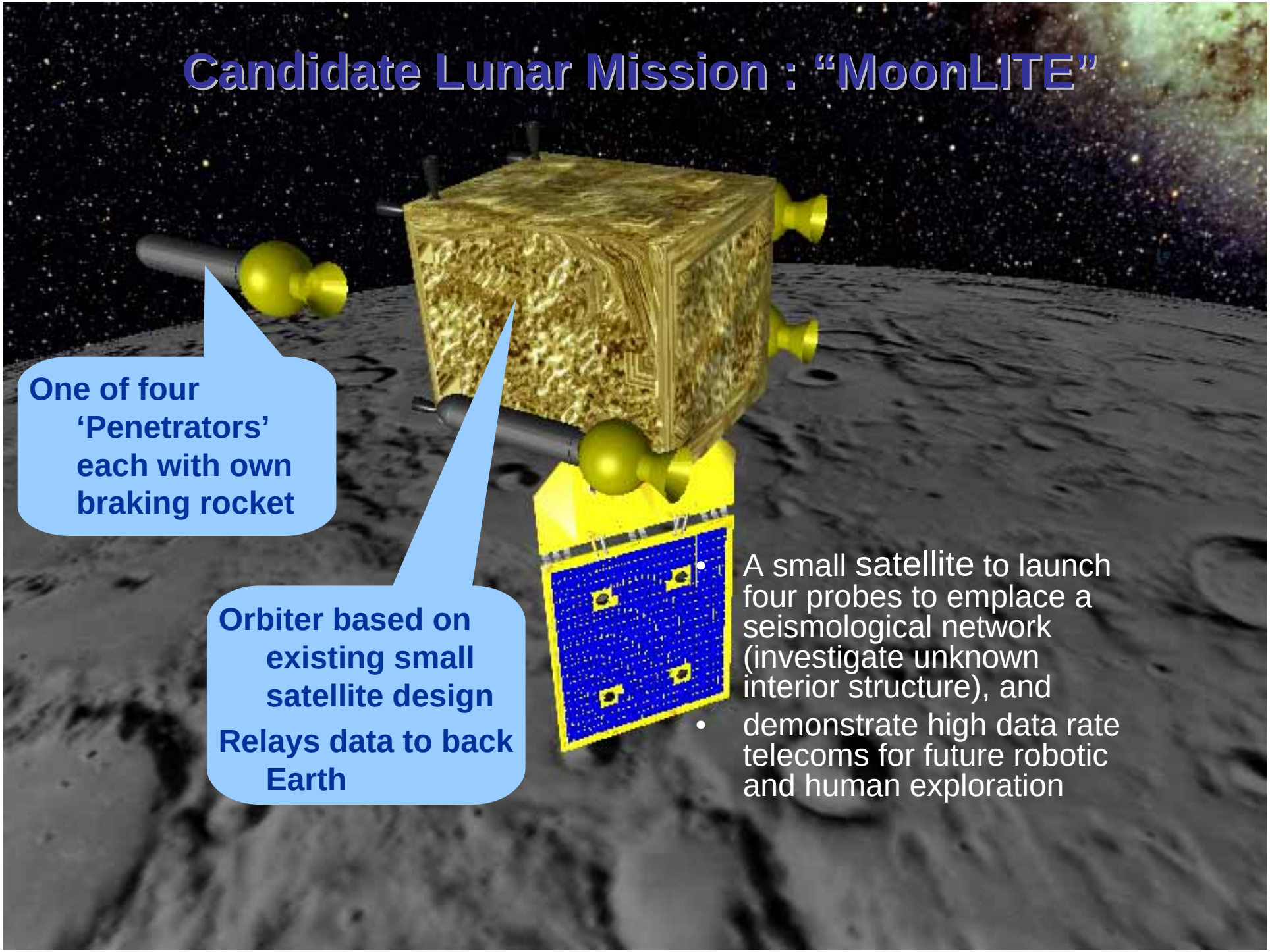
Candidate Lunar Mission : “MoonLITE”



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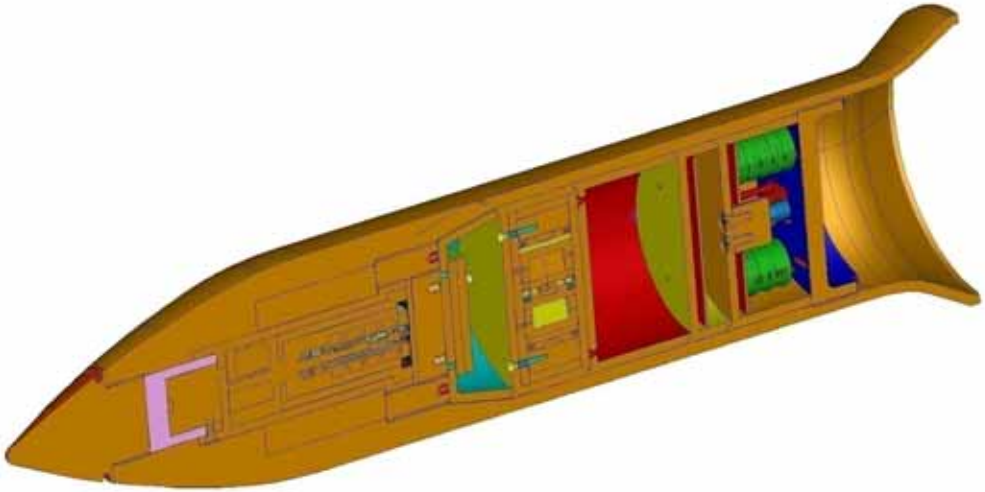
- Six-member MoonLITE international peer review committee evaluated science merits in July 2008
- Chaired by Carle Pieters
- '…scientific potential of the MoonLITE penetrator network concept exceptionally high in the context of the international exploration activities.'
- Possible 'stand-alone cornerstone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

Penetrator tests (1)

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




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

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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 13th 2007 to widespread interest

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UKSEWG: Key Conclusions and Recommendations

- 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 space Exploration Review – next steps

- 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

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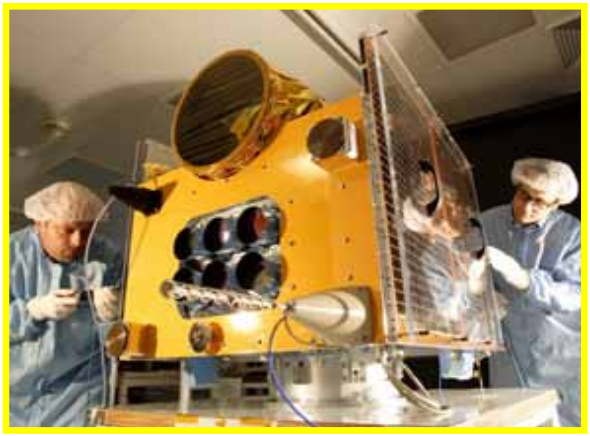
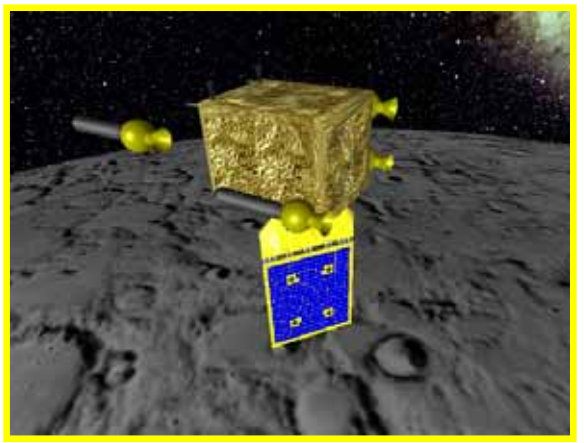
UK aspirations

↗ 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





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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 21st Century Britain

Implementing the Global Exploration Strategy

Implementing the GES

- 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)