



PRESENTATION

ON

AN EXPERIMENTAL STUDY OF LUNAR RECONNAISSANCE BASE



WITH THE ROBOTIC EMPLACEMENTS



DONE BY
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FACILITATING EXPLORATION AND SETTLEMENT

October 31, 2008 , Friday 10.10 a.m.

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With Dr.
Madhavan Nair –
Chairman ISRO

With
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A.P.J
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Kalam



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Goal !!!

- Human settlement
- Human Shelter
- In situ lunar resources
- Field work
- Sample analysis
- Remote sensing on moon
- Exploring lunar surface
- Robotic regolith system
- Site preparation





Settlement On The Moon

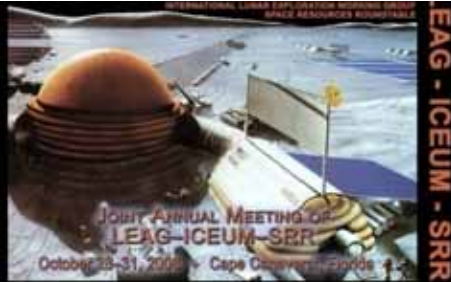
It's high time to search a new place for existence of Human beings

- Near To The Earth
- Free Of Atmospheric Distortions
- Low Gravity
- Clean Electromagnetic Environment
- Seismically Quiet Zone



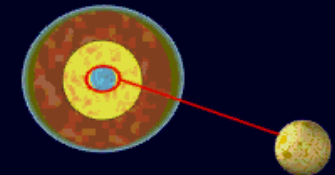
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Drawbacks

- Low Gravity
- Diurnal Thermal Cycle
- Lunar Dust
- Meteoroid Collision
- Volcanic Activity
- Solar Flares





System Development

- Propulsion
- Launch
- Robotics
- Environment
- Life Support System
- Gravity
- Power
- Communication



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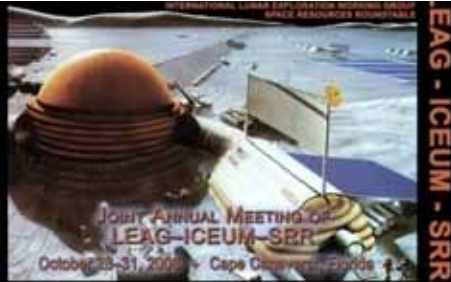


Robots !!!

The Next Generation Astronomer

- Is it a virtual Machine ?
- Can Replace Humans !
- Key Role in Exploration
- Search Resources
- Validates The Engineering System
- Requirements
- Supervised autonomy
- Reactive engine, preprogrammed behaviors
- Manned missions, Crew time is precious
- Maintenance is time consuming
 - E.g. ISS is for scientific experiments
- Planetary Robotics





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Nanonics Robots

Mechanism

- Chain Of robots
- Communication
- Utilisation Of Lunar Dust
- Powered by Solar Energy
- Nano Robot with artificial Brain
- Automatic Loco – Motion



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A Small Video!



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Components

- Self Re-configurable robots with associated connection mechanisms
- Multi-robot self-assembling systems
- Robot Communication
- Hardware
- Camera & Image Processing
- Control
- Navigation
- Precision & Timing
- Simulation & Scalability





Features

- **Response and stability of control systems**
- **Human movements**
- **ladder-climbing**
- **use of energy efficient modes**



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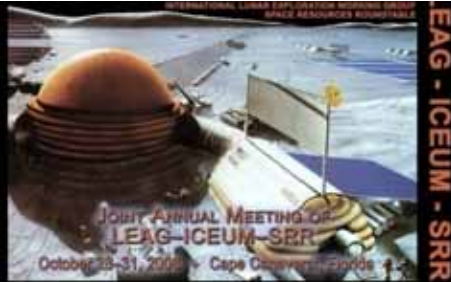


Advantages Of Robots

- **Cost**
- **Risk**
- **Space manipulation**
- **Surface mobility**
- **Self-sustaining, or preparatory for human colonies**
- **Compactness & Lightness**
- **Robustness**
- **Versatility and adaptability**

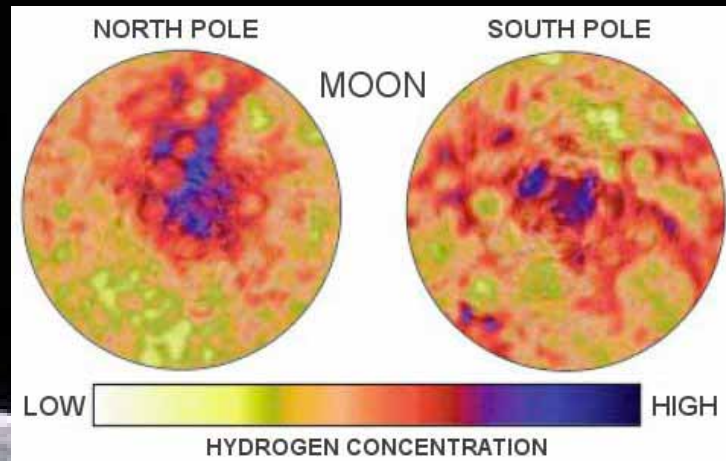


The way to Success !!



Right Choice

- Lunar north pole
- Dark Mantle Deposits
- Dark Areas near the South Pole





Economy

- Economic considerations
- Inherited power system
- Previous lunar observation
- Average cost per mission



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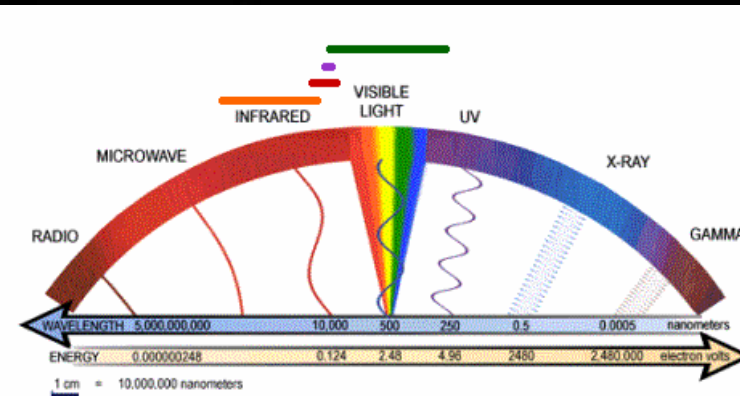
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Experiment

Melting
Ice
Laser Beam
Different Regions Of Spectra



Approximate Wavelengths Covered by TMT's Science Instruments

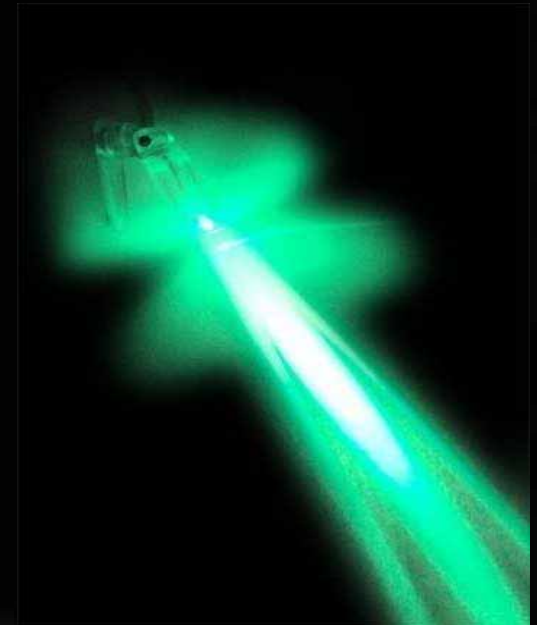
- Approx. 0.8-2.5 microns: IRIS, IRMOS, PFI, WIRC
- 5-28 microns: MIRES
- 1-5 microns: NIRES
- Approx. 0.31-1.8 microns: HR0S, WFOS



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Application

- Passing Laser Beams
- Observing the Spectral Lines
- Understanding the Lines
- Analyzing the Lines
- Characterizing



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Analysis & Results



LUNAR FACILITY	SOURCE OF INPUT	EXPECTED OUTPUT
Research Lab	Lunar soil	Research Products
Mining	Lunar soil	Slag, residuals, rocks, free iron natural gas,
Chemical Processing	Beneficiated soil, solid chemicals.	Organic wastes
Mechanical Processing	Organic waste, lunar oxygen, hydrogen, mixed lunar gases.	Material for lunar facility, repairs, replacements.
Biological Processing	Oxy gas, carbon-di-oxide and water	Food water and air residual.
Fuel Station	Ice ,Helium -3 , Hydrogen	LOX/LOH
Electricity	Solar Power	Highly Efficient and reduces the cost of the operation



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Suggestion

- Exploring the Dark Side
- Variable Acceleration – Small body less impact
- Reducing Volcanic Activity
- Decelerating Meteoroid Collision
- Cracking the Quakes
- Liquid Mirror Telescope
- Mining
- Transportation





Conclusion



Maintenance Of Lunar Base
Resource utilisation
Protecting Our New Home

All Set to Migrate !!!

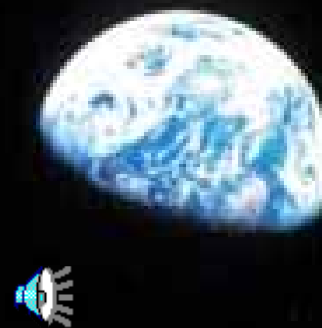
Freedom to Mother Earth !





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Thank You



Lunar and Planetary Institute

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