

The Scientific Objectives of Chinese First Lunar Exploration Project

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Abstract

Chinese Lunar Exploration Projects will be executed in three stages: In first stage, one or two lunar mission(s) will be sent to the moon in 2005. Second stage will be worked from 2006 to 2010 and a mission with a vehicle mission will be soft landed on lunar surface in around 2010. The third stage will be taken from 2011 to 2020 and a soft-lander with a vehicle will land on lunar surface to survey the lunar surface, collect some lunar samples and return to the earth in around 2020.

From scientific views, the following issues should be considered for future lunar explorations:

- (1) Distributions and utilization of the lunar energy resources.
- (2) Distributions and utilization of the lunar mineral resources.
- (3) Utilization of the Lunar unique environments(high vacuum, no atmosphere activity, no global magnetic field, stable geological structure, weak gravity, no pollution).
- (4) Determination of the sites of Lunar Base.

To better understand the Moon's resources, environmental characteristics and surface topography, Chinese first lunar mission is an orbiter with an altitude of 200 km and will be launched at the end of 2005, run around the moon for one year, and its scientific objectives include: (1) To detect three-dimension imaging of lunar surface. To measure off the basic units of three-dimension imaging of lunar surface, analyze the lunar structure and topography, and the shapes, sizes, distributions and density of impact craters on lunar surface, and further study the ages of lunar surface and its early evolution history and probe into the lunar structural evolution.

(2) To determinate the contents and distribution of some elements on the lunar surface. The abundances and distribution of fourteen elements on lunar surface materials will be detected including aluminium, calcium, chromium, iron, manganese, magnesium, oxygen, potassium, silicon, sodium, titanium, thorium, uranium and REE. Our aim is to study the sorts of lunar rock and its distributions on lunar surface, to evaluate the lunar mineral resources, particularly the Fe, Ti and REE, and probe into the chemical evolution of the Moon's crust.

(3) To measure the thickness of lunar regolith. Previous exploration data and study results show that the abundances of noble gases in lunar regolith is very high. One important task of our mission is to study and evaluate the resource of ^3He and other noble gases in lunar regolith based the distribution of thickness of soil on the lunar surface.

(4) To explore the environments of the moon. The main task is to obtain some data of the high energy particle flux and low energy ion around the moon, and further to understand the irradiation history of the moon.

In order to fulfill the above four objectives, the following payloads are needed: CCD camera, Multi-spectrum Imaging System, Laser Altimeter, γ/χ Spectrometer, Microwave-Meter, High-energy-particle and low-energy-ion detectors.