Could the moon really be made of cheese?

Abstract

Over the years, a number of theories have been proposed to account for lunar chemical composition. Despite its earlier popularity, no serious investigation of the theory that the moon is made cheese has ever been attempted. Instead, more mundane explanations have been sought by a perhaps overly-cautious scientific community. This proposal seeks to redress the lack of a thorough study of the question by sending a set of surface probes to the moon in order to finally determine its composition compared to a set of well-defined cheeses.

Background

By some counts, there are 166 natural satellites, or "moons", in our solar system. As a class of objects, these greatly outnumber the planets (8), and therefore may be considered even more important than the larger bodies. The clues in the structure, composition, and magnetic fields, in their surface features and even in their atmospheres (when present) may well provide information on the origin of the solar system and the possibility of life on planets or objects other than Earth.

Among this class, Earth's Moon is unique in several ways. While it is only the fifth largest moon in the solar system, it is larger proportional to its planet than any other moon. It is the moon closest to the sun. Close study of the moon is required to determine the origin of the Earth-Moon system.

The importance of lunar studies is indicated by the number of current and planned missions. India, Japan, the United States, China, Great Britain, and Russia all have missions which have already landed probes on the surface or placed observational satellites in orbit around the Moon, or have missions planned for launch within the next 6 years. Lamentably, none of these missions includes test platforms to determine whether the moon is made of cheese.

Research proposal

I propose to send 6 Land Rover probes to different regions of the moon to determine whether it is made of cheese. The regions will be chosen for the diversity and include Mare Imbrium and Mare Tranquilatis (to provide a comparison of Mare terrain), the central floor of crater Giordano Bruno (the youngest crater on the Moon), the central floor of crater Mail L (at the Moon's north pole, possibly containing water ice), the

South Pole Aitken Basin (a lowland not covered by mare), and the Moretius-Curtius area (a southern highland are).

Each probe would be equipped with a refrigeration unit containing a carefully selected set of sample cheeses, bore drilling equipment, optical microscopes for visual inspection of the samples, volumetric equipment, and chemical decomposition and analysis equipment.

- Refrigeration Unit and Cheese Samples

  The refrigeration unit must be specially designed to operate under lunar conditions of vacuum and radical temperature change. It must have capacity not only for the cheese it will carry to the moon, but also for the core samples taken for comparison.

  The cheese samples will consist of 6 cheeses: whey cheese (Mizithra), a soft-ripened cheese (Friench Brie), a semi-hard cheese (Meunster), a blue cheese (Stilton), a hard aged cheese (5-year Goat Gouda), and a processed cheese (Velveeta). These will supply a wide range of cheese componsition, density, and water content. The cheeses will be shaped as flat cylindars and “stacked” to create a column of cheese to be inserted into the lunar surface for acclimitization.

- Bore drilling equipment

  Each probe must contain two bores, one capable of drilling and extracting a core sample at a 25cm depth, and the other capable of drilling and extracting a core sample at a 75m depth.

- Optical microscopes

  Each probe will include an optical digital microscope capable of providing views of the cheese and lunar samples for inspection in infrared, visual, and ultraviolet ranges. Data will be transmitted to Earth for ground-based image processing.

- Volumetric equipment

  Volumetric equipment will provide volume and mass measurements for density calculations.

- Chemical decomposition and analysis equipment

  Each probe will contain the latest generation of recent wet chemistry lab equipment available: the Robotic Chmemical Analysis Laboratory (RCAL). This device provides 24 individual sealed chambers in which samples can be mixed with a variety of agents, incuding water, to decompose the sample for composition analysis and chemical reactive properties. Electrodes placed in the chamber measure chemical reactivity and identify products.

Procedure

Probes will be launched and directed as closely as possible to their target locations on the Moon. After landing, trajectory and telemetry information will be used to direct the probe from Earth to its precise target location.

Each probe will then load a cheese "bore" sample into each of the two bores. Using the drill, the samples will be injected to the target depth (25cm and 75m), and the bore sealed to prevent contamination from falling regolith dust. The cheese sample will remain in position for one lunar cycle. This will allow the sample to come to equilibrium with lunar conditions.

After the acclimitization period is complete, the cheese bore will be withdrawn, along with a lunar bore sample of equal dimensions from just below the position of the cheese bore.

The volumetric unit will be used to verify volume and measure mass for each of the cheese cylindars, and the extracted lunar bore sample. At this time, the optical microscope will also capture images of the appearence of both cheese and lunar samples.

Each type of cheese will be cut in two and placed in the RCAL, filling 12 chambers. Each bore sample will also be cut and samples placed in the remaining 12 chambers. The RCAL will then perform a series of reagent reactions, and gather data using its detection electrodes. The optical microscope can be used as well to capture further images of the samples after each reaction.

Analysis of Data

Volumetric measurements will allow us to identify which cheese is closest in density to the lunar core sample.

Chemical analysis will allow us to identify whether the lunar core samples match any specific cheese, or lie within the range of cheese densities, water content, and chemical composition.

Implications of Analysis

It is obvious that a match with any particular cheese, or even the range of cheeses in density and composition, even if it were only in one location, would have profound implications. It would indicate the presence of water on the Moon, mechanisms capable of creating organic molecules, and to some extent, the lack of imagination in current astronomical exploration of the solar system. There are also implications for the future of lunar exploration and exploitation, as a near-infinite supply of fine French brie, available simply by tossing it down Earth's gravity well, would delight Earth's gourmands.

A negative result, however unromantic and disappointing to cheese lovers everywhere, would finally lay to rest the claim that the Moon is made of cheese.