

Space education strategy using data obtained by lunar and planetary missions



Hayabusa

Kaguya

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Photo: JAXA



Background

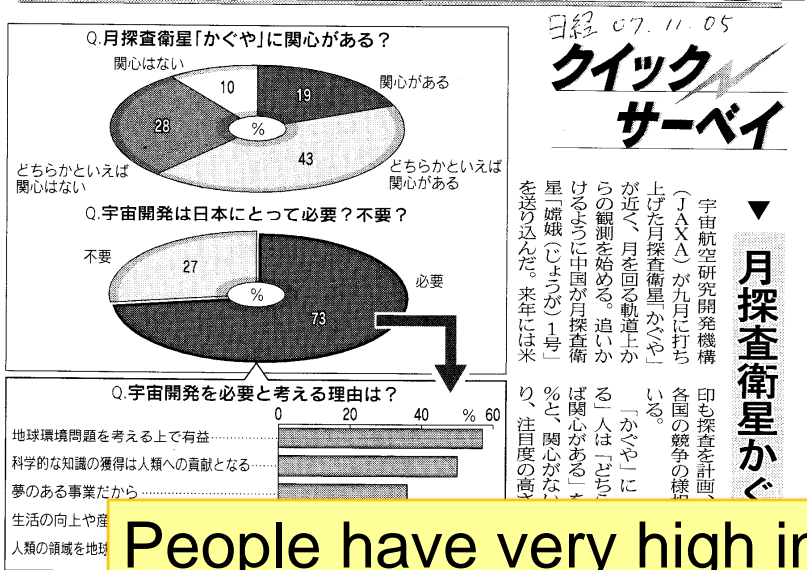


- Recently, Japanese lunar and planetary missions are attracting public interest by their challenging attempt (asteroid) and a familiar target (moon).
- Hayabusa (asteroid) and Kaguya (moon) became popular by TV coverage, network communication, books and so on.

The Launch of H-IIA F13 with Kaguya onboard (14 Sep, 2007). Photo by MHI.



Opinion poll on Japanese space development



- According to the opinion poll by *Nippon Keizai Shimbun* on 5 Nov. 2007, 62 percents of people answered that they are interested in Kaguya mission.
- Also, 73% answered that

People have very high interests in space development, but simultaneously, they want more information and explanation of mission outcome.

資金
調査の方法 調査会社マクロミルを通じ十月二十六日二十九日にネット調査。全国の二十歳以上の男女千三百二十二人が回答。

- Also, 62% of people replied that the agency should open more information to the public.

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クイックサーベイ
▼月探査衛星かぐや
宇宙航空研究開発機構 (JAXA) が九月に打ち上げた月探査衛星「かぐや」が近く、月を回る軌道上からの観測を始める。追いかけるように中国が月探査衛星「嫦娥(じようび)一号」を送り込んだ。来年には米

62%
回答をクロス集計すると二極分化の一因が見える。断定はできないが、「かぐや」に関心が高い人ほど有人飛行や観光飛行にも積極的で、関心が高い人は「積極的に進めたい」と答える人が多かった。宇宙開発の必要性については四分の三近くの人認めていて、不支持の中には「税金の無駄遣い」「福祉や医療など身近な問題に資金を投ずるべきだ」「必要性が理解できない」といった意見が多い。必要と答えた人たちの中にも「もっと進めるべきだが、効果的に」「国民にわかりやすい説明を」「成果を目に見え形を示してほしい」など、現在の進め方への注釈は多い。資金の使われと成果の説明が必要だ。(編集委員 滝順一)



The term “space education”

As the term “space education” are often used in the different context, we need to mention the background why it comes to an important issue.

Three viewpoints of space education (after Terazono *et al.* (2004))

- increasing the interest in the space development
 - ensuring future human resources of space development.
- increasing the budget for space development
 - leading to national consensus for funding for space development.
- utilizing materials brought from space development to the education
 - As an ideal materials demonstrating the nature.



Three aspects and three targets

Three aspects of space education

- Education to increase personnel engaging in space development.
- Data-type education utilizing knowledge of space.
- Cultivation of aesthetic sentiments utilizing knowledge of space.

Three targets of space education

- Children (elementary, junior high, high)
- Adults (university students, working people)
- Senior people (retired, voluntary workers)



Space education utilizing mission results

- Events and lectures
 - These are ideal approach because people recognizes these are precious opportunity to meet with experts.
 - As the all scientists and engineers involved in the missions are difficult to gather, the conference is a good chance to hold such an event.
- Education materials
 - Video materials are most suitable media for educational purposes.
 - One is education-oriented materials, and another is introductory movies for the mission.
- Websites
 - Some of space-related websites, originally came from mission introduction, now turns to the education-oriented sites.
 - Web systems' interactivity and versatility is recognized useful to develop space-related education and outreach.



Pre-conference public event at Sapporo, October 2007

In October 2007, we held an pre-conference public event at Sapporo, Japan. This event was held in prior to the “*The Joint Meeting of Space Technology and Science*”.

Approximately 160 people attended in this event!



Left: Prof. S. Sakamoto talks about Kaguya.

Right: question and answers in Hayabusa lecture.



Video materials

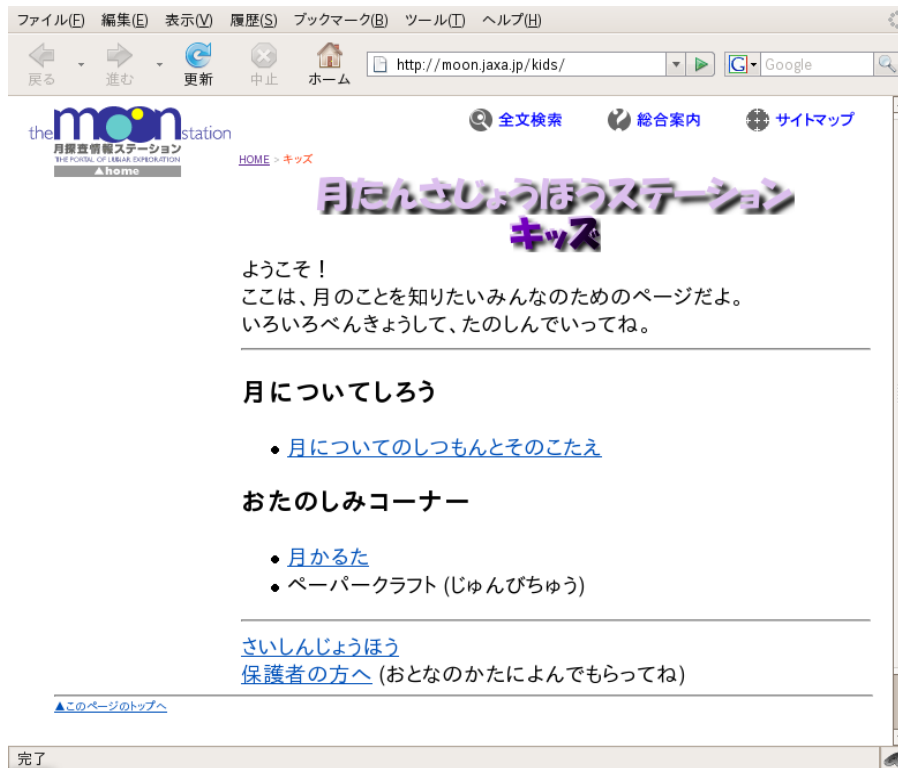
- The video “*Inori*” (the prayer), featuring Hayabusa’s great success, created by JAXA space education center.
- DVDs are distributed for the education organization for free.
- Kaguya’s high-definition lunar movies are also provided for educational organizations with no charge.



(left) A scene from “*Inori*”. (Right) the full Earth-rise of Kaguya HDTV movie.



Websites



The screenshot of the top page of *The Moon Station Kids* (<http://moon.jaxa.jp/kids/>).

- The site in JAXA, *The Moon Station* has launched its kids-oriented site on April 2008.
- This site aims for the education and self-learning material for children, teachers and parents.
- The contents of *The Moon Station* are widely utilized for space education and outreach programs.



What is obstacles for promoting space education?

- **Data amount**

Most lunar and planetary missions return vast amount of data (TB-order). Such large data are too difficult to be handled by each educator, teachers and even students.

- **Data handling**

The scientific data are provided as generally “raw” or specially designed format. It means that some post-processing procedures required to view or understand the content.

- **Evaluation of data**

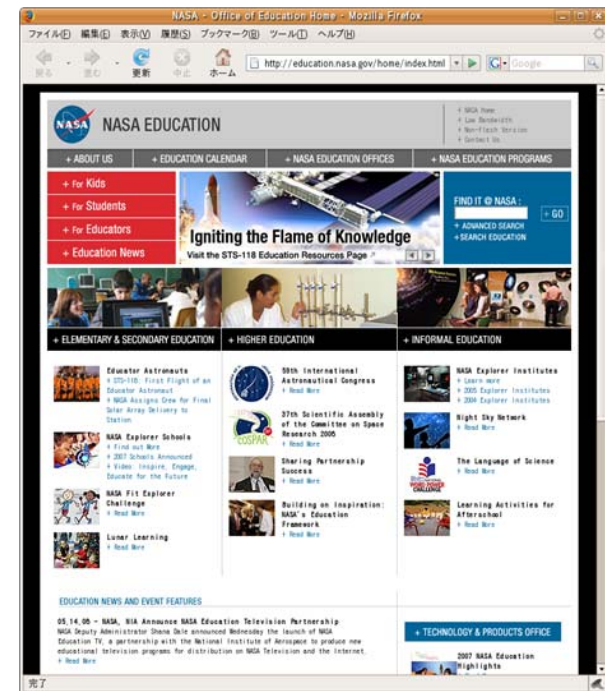
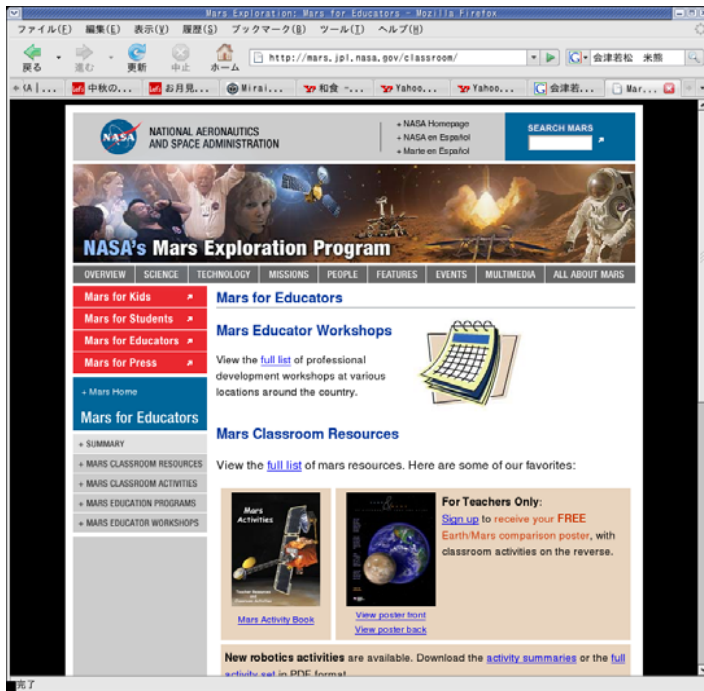
Without any explanation and commentary, these data cannot be utilized in educational use. However, most data are distributed with few comments or notes. This makes educators’ data usage more difficult.

Under these circumstances, the utilization of lunar and planetary data for the educational purpose is very difficult.



NASA's space education approach

NASA emphasizes on space exploration outreach and education. Each mission has its outreach programs, and “NASA Education”, the integrated home of space education offers all kinds of education materials.



Left: Mars for Educators, the mars exploration site dedicated site for educators.
Right: NASA Education. It offers many programs and materials.



Current and Future

- By contraries, Japanese lunar and planetary missions have no education-related activities (except Kaguya's HD distribution).
- Generally, staff involved in the mission are extremely busy (operated smaller number of people compared to one in the United States and Europe). And there are very few or no budget allocation for the outreach.
- Currently, these activities are initiated by the voluntary people and outsiders.



- **Supporting mechanism are strongly required (budget, human resource, recognition as the achievement)**
- **Every (future) lunar and planetary mission should have their own outreach programs.**
- **The center of the activity should be the mission team. External support teams are favorable.**



Conclusion

- Utilization of results obtained by lunar and planetary exploration becomes important in recent years.
- In accordance with the success of Japanese lunar and planetary missions, Hayabusa and Kaguya, people are expecting more information and explanation.
- To accomplish these demands, several outreach and education activities are conducting, including events, material creation and website communication.
- As the main current of these activities are currently supported as the voluntary basis, the future missions should have several supporting mechanism to enhance publicity.