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The Concept of the Asia-Pacific Regional Space Agency Forum (APRSAF)

I. BACKGROUND

1992 was the International Space Year (ISY). The objectives of ISY were to heighten public awareness of the benefits resulting from space activities and to enhance international collaboration for space development.

Following these objectives, the Pre-Asia-Pacific ISY Conference (PAPIC), and the Asia-Pacific ISY Conference (APIC) were held in Tokyo respectively in March and November, 1992. Through these two conferences, it was noted that the countries in the Asia-Pacific region are accelerating their space progress to provide a boost to socio-economic development, and cooperation among space agencies, scientists and engineers in the region is paramount. Therefore, at the closing ceremony of APIC, Japan proposed to organize an annual meeting, an "Asia-Pacific Regional Space Agency Forum", in order to maintain a forum for such cooperative efforts beyond ISY 1992.

In Asia-Pacific region, many national organizations have been engaged in various space programs, especially in the field of earth observation. However, officials of the high rank have not met regularly to exchange views and information on these space programs.

With this background, the first session of the Asia-Pacific Regional Space Agency Forum (APRSAF) was held in Tokyo on September 9-10, 1993 jointly organized by the Science and Technology Agency (STA), the Institute of Space and Astronautical Science (ISAS), the National Space Development Agency of Japan (NSDA), participated in by officials of space agencies from the Asia-Pacific region, in order to actively exchange ideas on space programs.

II. OBJECTIVES

APRSAF shall provide opportunities to:

2.1 Gather the representatives from space agencies and/or international organizations in the Asia-Pacific region.

2.2 Seek measures to contribute to socio-economic development of the Asia-Pacific region and the preservation of the global environment, through space technology and its applications.

2.3 Exchange views, opinions and information on national space programs and space resources.

2.4 Discuss possibilities of future cooperation among space technology developers and space technology users to bring mutual benefits of the countries in the Asia-Pacific region, identify areas of common interest, and assign priorities thereto.

2.5 Review progress in the implementation of cooperative plans and programs for further cooperation within the Asia-Pacific region.

2.6 Consider and recognize importance to cooperate with space agencies and/or organizations outside the Asia-Pacific region that support APRSAF objectives.
Agenda

Date: Sep 9-10, 1993
Place: Shiba Park Hotel, Tokyo, Japan
Organizer: Science and Technology Agency (STA)
Institute of Space and Astronautical Science (ISAS)
National Space Development Agency of Japan (NASDA)
Supporting Organizer: Remote Sensing Technology Centre of Japan (RESTEC)

Program

Thursday, Sep 9 (at Shiba Park Hotel, Tokyo)

9:30-10:20 Registration
10:25-10:30 Welcome and Opening Address
10:30-10:45 Keynote Address
10:45-11:00 Keynote Report on the Pre-AFPC and AFIC Activities
11:00-12:30 Presentation on National Space Program
Australia (ASO)
Bangladesh (SPARISO)
China (CSA)
China (STFC)
China (CNSA)

12:30-14:00 — Lunch Time —

14:00-15:30 Presentations continue
ESCAP
Indonesia (ISAS)
Japan (NASDA)
Japan (NASDA)

15:30-16:00 — Coffee Break —

16:00-17:15 Presentations continue
Korea (KARI)
Korea (KARI)
Malaysia (MMRES)
Mongolia (NRSC)

18:00-20:00 Welcome Reception at Shiba Park Hotel

Friday, Sep 10

10:00-11:45 Presentations continue
Pakistan (SUPARCO)
The Philippines (DENR)
Russia (RSA)
Singapore (NUS)
Thailand (NRCT)

13:30-14:00 Discussion
"International collaboration in the field of space development in the Asia-Pacific region"

16:00-16:30 — Coffee Break —

16:30-16:45 Conclusion of Discussions

Saturday, Sep 11

"Excursion around Tokyo Metropolitan City"

Summary of the First Session of the Asia-Pacific Regional Space Agency Forum (APRS AF-1)

September 9-10, 1993, Tokyo, JAPAN

1. The first session of the Asia-Pacific Regional Space Agency Forum (APRS AF-1) was held in Tokyo on September 9 and 10, 1993, organized by Science and Technology Agency (STA), the Institute of Space and Astronautical Science (ISAS) and National Space Development Agency of Japan (NASDA), and supported by Remote Sensing Technology Center of Japan (RESTEC).

2. The participants were from Australia, Bangladesh, Canada, China, ESCAP, Indonesia, Japan, Kiribati (observer), Korea, Malaysia, Mongolia, Pakistan, the Philippines, Russia, Singapore and Thailand.

3. The objectives of the Forum were mainly:
   i) to gather representatives from space agencies in the Asia-Pacific region;
   ii) to present national space programs;
   iii) to exchange views, opinions and information on space programs within the region;
   iv) to discuss possibilities of future cooperation to bring mutual benefits of the countries in the region.

4. At the opening remarks, Mr. Toshihiro Inoue, Director-General of Research and Development Bureau, STA, welcomed all the participants and explained the objectives of the Forum. Mr. Masato Yamano, President of NASDA made a keynote address, mentioning the prospects of the international cooperation in the Asia-Pacific region. Mr. Akihito Fujita, Director of the International Space Affairs Division, Research and Development Bureau, STA, made a brief report on the Pre Asia-Pacific ISY Conference (Pre-AFPC) and Asia-Pacific ISY Conference (APIC).

5. The following are some of the noted points from the presentation of each country's space program:
   i) Many agencies noted that space technology is very important not only for the benefit of its application but also for improving the economical and social systems in their countries.
   ii) All space agencies in the Asia-Pacific region have their own remote sensing programs.
   iii) Some countries showed strong interest in the practical application of remote sensing technology in the field closely linked to the welfare of their nations.
   iv) However, it is requested by developing countries that space-faring countries support them in catching up with new remote sensing technologies.
   v) Some countries which are receiving remote sensing satellite data by their own ground stations offered the cooperation within the Asia-Pacific region by exchanging data.
   vi) China, Russia, and Japan have had and will have wide varieties of remote sensing satellite developing programs, and Canada will have such programs in the future.
   vii) Representatives from several countries mentioned the values of the satellite communication covering wide regions of their territories.
   viii) Some countries are currently undertaking the development of satellites, and sounding rocket programs.
   ix) Some countries conveyed their expectation to continue this Forum.

6. The free discussion took place in the afternoon of September 10. The discussion was chaired by Professor Ryuziro Akiha, Director-General of Institute of Space and Astronautical Science (ISAS) to cover the following issues:
   i) Remote Sensing Application
      First of all, Professor, Akiha pointed out that the participating countries can be divided into two groups with regard to the status of their remote sensing activities. Those in the first group have their own remote sensing satellites and can provide other countries with the results from the satellites. The others, in the second group, are interested in the satellites owned by the first group countries.

The first group countries indicated their intention to make further efforts to minimize the distribution cost of its data.

The second group countries emphasized the following points:
   a) importance of data not necessarily for the research purposes but for the growth of the countries
   b) necessity to lower the prices of data
   c) necessity of the high ranking officials of the governments to recognize the importance of space remote sensing data for the development of the countries; an ESCAP Ministerial level meeting would be a good occasion for that purpose
   d) necessity to avoid overlapping of coverage by the satellite ground stations, but all of the second group countries did not agree to this point.
   e) necessity to place the importance on human resources and to enhance training programs
   f) necessity to improve the management structure

ii) Satellite Communication
Professor Akiha suggested to proceed to the next topic, satellite communication. He stressed the importance of the satellite communication in the daily living and asked the participants to express their opinions.

Mr. Nakamura described the status of "the PARTNERS Program," which is an experimental satellite communication program using the Japan's IITSV, and
be discussed the possibility of the utilization of the forthcoming ETS-VL. As for the use of the satellite communication network, the following points were indicated:

a) educational purposes
b) environment monitoring data

ii) Space Science
Professor Akiba then, proposed to have discussions on space science as the next topic. Professor Oyama of the ISAS was asked to describe the international cooperative efforts by his institute in the field of space science and to discuss the opportunities for future cooperation. After describing the present collaborative projects, Professor Oyama listed the international cooperation projects which are currently under discussion.

a) with China
   scientific balloon project: development of recovery satellite
b) with Indonesia
   ground based observations
c) with the U.S.
   various kinds of scientific projects
d) with Russia
   PLANET-8 radio science
e) Canada
   frog experiments
f) Pakistan
   ozone-layer observations

For future collaborative projects, some of the objectives in space science were presented by Professor Oyama:

a) education through space science projects for the benefits of all mankind
b) joint efforts in the following fields:
   - solar terrestrial physics
   - solar physics
   - astrophysics, X-ray astronomy
   - planetary exploration
   - material science
c) Others
Professor Akiba suggested that it is necessary to consider the possibility of cooperation in other fields rather than remote sensing application, satellite communication, and space science, for which the opportunities to cooperate have often been studied among countries in the Asia-Pacific region.

a) space experiments
   Mr. Nakamura suggested the possibility to use NASDA's J4 and TR-1 for microgravity experiments with cooperation among countries in the Asia-Pacific region.
   b) launching spacecraft into orbit
   Mr. Nakamura discussed the possibility to provide the piggy back launch for other countries.
   c) joint development of experimental satellites
   Mr. Nakamura indicated the possibility of the utilization of space room in a satellite and of the joint development of experimental satellites.

Chairman concluded as follows:

i) The discussions during the two-day Forum were very fruitful and successful.
ii) It was recognized that the continuation of this Forum would be very beneficial for further international cooperation in the Asia-Pacific region.

iii) Therefore, the second session of the APRSAF (APRSAF-2) would be held in Japan in the next fiscal year.

iv) The results from this Forum would be forwarded to APRSAF-2 as the basis for further discussions.

7. Mr. Yoshihiro Iriki, STA, made a closing remark, appreciating the cooperation of the participants.

Opening Remarks
Toshihiro Iriki
Director-General
Research and Development Bureau
Science and Technology Agency (STA)
JAPAN

At the occasion of the First Session of the Asia Pacific Regional Space Agency Forum, on behalf of the sponsoring organization, I would like to say a few words.

First of all, thank you very much for coming to attend this meeting from the countries of the Asia and Pacific region. And you may know, last year was ESY, International Space Year. The spirit of the ESY was to look into the 21st century and to promote space development through international cooperation so that the wellbeing of mankind can be improved. Building upon this spirit of the ESY, in this forum, I would like to consider with you about the significance of space development activities for the cherished earth where our lives are living and the future of mankind.

For the past few years, international situation has undergone a great change. From the era of competition, we have now entered into or standing at a threshold of the era for cooperation and collaboration. Space development is no exception to this trend. Here in Japan, too, we have always maintained as a pillar for our policy to promote the international cooperation. And we are to work even harder to promote the international cooperation.

At this session, taking today and tomorrow for two days, we are to listen to the reports from various countries regarding their space development programmes, and also to have free discussion regarding international cooperation in the Asia and Pacific region. I hope you will have your discussion on the reports to be given and take part actively in the free discussion and exchange of views. At the same time, we are willing to reflect your precious opinions and proposals at these occasions to our policies in future.

ESY had ended last year, but we have just started on our international cooperation in a full scale in the area of space development. I hope that a new page will be turned with this session in the history of international cooperation in space development area in Asia and Pacific region.

Lastly, I wish that this session will mark a great success together with you. And with this, I would like to conclude my opening address.

Keynote Address
Masato Yamamoto
President
National Space Development Agency of Japan (NASDA)
JAPAN

Thank you for your introduction. Distinguished guests, representatives of Space Agencies, and other participants to the Asia-Pacific Regional Space Agency Forum: It is indeed a great honor for me to have the opportunity to deliver a keynote address before all of you.

As it was recognized at the Asia Pacific ESY Conference last year, it is of great significance that policy-makers and space development experts from Asia Pacific region gather in one place to discuss how to promote the development and utilization of space and international cooperation in this region, in order to generate common understanding and to formulate specific action plans.

Based on this perspective, Asia Pacific Regional Space Agency Forum was proposed. This proposal was accepted affirmatively from many Space Agencies of Asia-Pacific countries, and as a result, the First Session of Asia-Pacific Regional SAR came to be held in Tokyo. It is very significant and we are very pleased for your support.

Needless to say development and utilization of space contributes to the improvement of daily lives such as in meteorological observations, telecommunication and broadcasting. Also, it makes contribution to scientific and technological research. There are many issues which are common to all human beings or natural resources and energy stemming from the finiteness of the earth, and deterioration of earth environment. In order to overcome these problems, and to achieve sustainable social and economic growth, it is very effective and indispensable means.

However, to be quite frank, in many of the countries in this region, contrary to European countries and the United States, the development and utilization of space activities have just been started. People in this region are not fully enjoying benefits of space activities. Therefore, it is necessary to enhance the capability of space activities in each country in this region. In order to achieve this, not only the individual promotion of development of space activities in respective countries, but also the international cooperation must be enhanced because of its efficiency. By the way, like many of you, before I leave for work every morning, I have the habit of watching the weather forecast programme on TV, and I watch the image of the clouds. As many of the astronauts have said that they see no boundary on earth from space, when I watch the image of the clouds on TV, I have very strong feeling that there is a great deal of common interests shared by people in Asia Pacific region. Therefore, it is necessary that in an extent of fields including space activities, the countries in the region should cooperate in order to overcome the many common issues, so that development of the region as a whole can be achieved.
Concerning the international cooperation promoted by Japan in this region, I would like to say a few words.

First, in the area of earth observation. In last year's Asia Pacific ISY Conference, we have proposed to distribute data in a marginal cost, and also provide software for analysis, in order to promote the use of earth observation satellite data for research purposes. The "Second Asia-Pacific Regional Remote Sensing Seminar on Tropical Ecosystem Management" is now being held in Malaysia in order to deepen understanding of remote sensing and to learn the application technology. We will organize this seminar annually in a country of the region.

In addition to data distribution from Japan, direct reception of data from Earth Resource Satellite 1, JERS-1 is already done in many countries such as Japan, China, Thailand and those data are now used effectively. In Indonesia and China, new receiving stations are expected to be built this year.

In order to enhance the satellite Earth observing activities, ADEOS (Advanced Earth Observing satellite) is expected to be launched by our country, with the mission of monitoring global changes in the global environment. In addition, TRMM (Tropical Rain Measuring Mission, whose mission is to elucidate the mechanism of global energy balance, will be launched.

Committee on Earth observation satellites, COSMO has been established and held to coordinate worldwide Earth observation satellite programme and their utilization plan at an international level. Our country is to host this meeting, the plenary meeting, in November of this year. "Global Satellite Observation and Information Network" will be discussed to utilize data from global Earth observation satellites, and also, standardization of data and data distribution policy will be discussed. We will put emphasis on that benefits to the Asia-Pacific region will be fully considered.

And at this forum, between our data center and other centers in the region, data network should be established, so that Earth observing information will be utilized on a real time basis in the Asia-Pacific region. "Asia-Pacific Regional Earth Observation Information System" will be proposed. Using the satellite, data sets related to oceanography, water circulation, desertification and vegetation, will be incorporated by the Institutes of the region in "The Global Research Network Program". Conceptualization of this will be discussed later. We would like to solicit your views.

Next, I would like to move on to the communication areas. In this region, there are many countries that have vast land or composed of many islands. Therefore, we think that the communication satellite has a great role to play in this region. And, therefore, has, together with the universities and research institutions in the Asia Pacific region, implemented the so-called "PARTNERS Project". In this project, the Engineering Test Satellite V of Japan is used, and the simple Earth stations are installed so that radio wave propagation experiment between the satellite and the ground station in the tropical region could be carried out, the remote education could be carried out with an increased speed, and medical information system could be operated. And, therefore, we are implementing such joint experiments.

Furthermore, regarding the scientific research area, centering around the scientific satellite programme of ESAS (Institute of Space and Astronautical Science) under Ministry of Education, we have very active international cooperation. For example, we have the Yoshikai, SOLAR-A, which observes the X-ray of the ionosphere of a satellite, and we also have observed the high energy astronomical phenomenon of the space including the supernova and black hole by Asahi, ASTRO-D. And also, GEOFIT satellite is clearing the phenomenon of geomagnetic field, especially the aurora. And so, we have very active research cooperation with various countries.

We would like to further strengthen and enhance these cooperation in the future.

Next, I would like to talk about the developments of space of the world. When we look at the 21st century, we find that the space activities will expand beyond for example, the use of satellites for earth observation and communication, to the phase that human kind will go to the near celestial bodies man-made satellite, Moon and Mars, from the planet Earth. However, we have to overcome various problems such as on energy and nature resources arising from the limits of the earth in order to achieve sustainable growth of mankind. It means that I think we need to further promote the space development and go into a new frontier for mankind.

In order to develop and utilize the space, we must have the recognition that the global cooperation is indispensable because it is a common task goal for the mankind to save resources and energy, and because the size of the development is enormous.

And in the 21st century, the Asia Pacific region is expected to become the major player in the world because of its increase in population and growth in the economy. And therefore, it is expected that regarding development and utilization of space, this region is going to play and bear the substantial amount of role and responsibility.

From such perspective, in order to facilitate global international cooperation system, it is indispensable for us to establish the cooperation in this Asia Pacific region.

And we think that we need to, therefore, start the discussions for achieving such international cooperation.

As I have explained so far, the meaning of this Forum is quite significant. We hope that active discussions in this Forum, will lead to various concrete projects in the region, and further, develop into the international global cooperation.

Last but not the least, on behalf of the sponsors, I would like to express our deep thanks to all of you for participating this Forum, hoping that the Asia Pacific Regional Space Agency Forum will become a better forum as time passes by. And therefore, I would like to ask for your stepped-up effort and support and cooperation.

And with this, I would like to end my comment. Thank you for your kind attention.

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Keynote Report
on the Pre-APIC and APIC Activities

Akihiro Fujita
Director of International Space Affairs Division
Research and Development Bureau
Science and Technology Agency (STA)
JAPAN

I would like to report to you about last year's Pre-Asia, Asia Pacific Regional Space Agency Forum, as well as the Asia Pacific ISY Conference.

Now, first of all, may I report to you about the Pre-Asia-Pacific International Space Year Conference held in last March. And I would like to report to you the outline of the space development programmes disclosed at that occasion. And also, I would like to refer to the Asia-Pacific ISY Conference held last November. And I would like to mainly focus on the projects which have been established or have developed regarding space development programme and utilization in this area.

About the Pre-Asia Pacific ISY Conference held, about 14 countries (Australia, Bangladesh, Canada, China, Indonesia, Japan, Korea, Malaysia, Mongolia, Pakistan, Philippines, Russia, Singapore and Thailand) were taking part, like this time, and it was held for two days in last March. The current status of the space activities as well as ISY-related activities were reported, and the exchanges of views were made on that.

In the Asia and Pacific region, there exist two space development powers, namely, the United States and CIS, and also on top of it, India, China, and Japan, and these as also are implementing comprehensive space programmes including the development of launch vehicles, which can be termed as industrialized countries in space development area. And all the rest of the countries are mainly implementing space programme concerning around the application of space technology in a diversified manner with a view to developing their own countries.

First of all, the most active space activities seen in Asia and Pacific region is, of course, earth observation as well as the application of data to earth observation satellite data. The meteorological satellite data coming from GMS and NOAA are being received by all of the countries located in this region, and they are being utilized for weather forecast and to minimize of the disasters. The great changes meteorologically in these areas are giving great impact upon the meteorological changes in a global scale. So, it was considered that it is indispensable to continue the observation of earth through weather satellite.

The location of the earth observation satellite or the location of the application of the GMS, rather, are indicated in the Table 1. With regard to the application, utilization of earth observation satellite data, much activities are seen in this region. The data coming from LANDSAT, SPOT and Japanese MOS-1 are being utilized by all of the participating countries in that conference. The earth observation data are being used for resources management, monitoring of the environment and other various areas. By using those data, the land use maps are being made, in addition to all other kinds of maps in those countries.

And GIS is considered to be an indispensable tool for monitoring environment and resource management. So, remote sensing satellite data need to be processed and utilized by updating them, by maintaining GIS.

And to further the application of remote sensing technology, presently various forms of R and D programmes are going on, either bilaterally or multilaterally. And also, Asia Pacific countries are taking part in UN-ESCAP, ASEAN remote sensing cooperation, Asia remote sensing association related activities, etc.

There are so many areas in Asia Pacific region which are covered by clouds, which means that it is indispensable to have the microwave remote sensing technology or synthetic aperture radar for the observation of these areas. The location of the ground station of earth observation satellite as well as for coverage of the data acquisition, these are indicated in Table 2.

The second active space activity seen in the Asia Pacific region is the satellite communication. In China, they are going ahead with the Eighth Five Year Plan, and they have a plan to establish 19 regional remote communication stations and to have a trunk communication covering remote areas. And they said more than 30,000 receiving stations are located for receiving satellite television throughout China.

In Malaysia, they have 21 ground stations comprising satellite through communication network, and providing telephone, tele and broadcasting and TV broadcasting services. And they are to improve on that further. And they have a plan to launch METASAT 2, and MEASAT2, which will be their own satellites in Malaysia.

In case of Mongolia, the domestic satellite communication system began its operation in 1969, and they have begun to provide international communication and television services. And presently the improvement work is going on using the financial assistance coming from Japan.

In 1992, China had launched Australian communication satellite. That is the typical example of international cooperation scene in the space programme area in the Asia Pacific region. In case of South America 1996, they have a plan to launch two own satellites, communication satellites, KOREASAT. Pakistan has a plan to launch low-cost experimental satellite for the first time. And Australia will begin the nationwide mobile communications service in 1996.

In Japan, we had implemented PARTNERS. This is an experimental programme for covering Pacific region for information communication. The ETSV has been launched, and this will be used for the PARTNERS purposes to demonstrate the small satellite communication service. Beginning from November 1997, these PARTNERS have been implemented with the participation of Fiji, Indonesia, Thailand, Papua New Guinea, Hawaii, in the United States.

Third area for activity is the area of space science projects. In various ways, many countries are engaged in these areas. China has more than 300 basic research projects, and also doing research on solar system energy transport process. The LAPAN of Indonesia has a ground radar programme related to the meteorology and climatic research in tropical region. The SUPARCO of Pakistan are engaged in various space science activities including the research on astronomy and ionosphere. And Korea would have the scientific experimental unit on board
on KITSAT-B satellite. And Mongolia is doing research on atmosphere, particularly using the upper atmospheric meteorological observation rocket.

As of March, 1992, Japan has launched 55 China 33, India 13, Indonesia 6, Australia 5, and Pakistan 1, satellites so far. And Korea had just launched their own developed KITSAT-1A in August 1992, and in September 1993 they have a plan to launch KITSAT-1B. The schedule and plans for launching satellites in Asia Pacific region are indicated in Table 3 China, India and Japan have been implementing its launch vehicle programs. The relevant information is given on Table 4. Countries like Indonesia, Korea, and Mongolia are pursuing their meteorological observation launch vehicle programs. And China, India, Japan and Australia have facilities for launching vehicles as well as tracking and controlling facilities for satellites.

There are so many ways that countries participate in these activities. Indonesia, Bangladesh, India, Japan have dedicated space organizations, which are dedicated to the work of space development. And Australia, China and other countries have a joint work going on. In Malaysia and the Philippines, and so forth, they are engaged in space activities as a part of already existent research institutes. Please see in Table 5 with regard to the structure of these organizations.

We need the public support for space activities and their understanding. Otherwise, space activities mission cannot be implemented. All the countries involved in their own space organizations are trying to enhance the public recognition, particularly about the significance of remote sensing out of all the space technologies available. Also, many countries related to various ISY events to celebrate the International Space Year.

Now, may I move on to explain to you about the Asia Pacific ISY Conference held in last November. Thirty-two countries including Japan, seven international organizations, more than 900 people, have attended this five-day period conference. It's impossible for me to explain to you all the things which went on at that conference. So, I will just focus myself on the highlight, which was Session 3: "Space Development in Asia and Pacific Region." This was a session held during that conference, and this was a panel discussion held there. Ten countries (Australia, Bangladesh, India, Indonesia, Japan, Korea, Malaysia, Philippines and Singapore) from Asia and Pacific region had taken part in this discussion. And active discussions were held.

We are living in this beautiful and limited earth. And this should be handed down to our next generation, so that Asia-Pacific region need to cooperate with each other so that development can take place, which is in harmony with the global environmental preservation and economic and social development. The role that space development can play is very large.

Remote sensing, communication, and space science areas are the space technologies application area, and particularly from the perspective of earth environmental preservation, remote sensing technology is important. And unified efforts need to be waged amongst the developing countries and space-faring countries in these areas to cooperate. And having that in mind, the discussion took place regarding the promotion of international cooperation and space development, utilization, particularly in the Asia and Pacific region. And the recognition was made that common understanding and concrete action programme will be needed. And that was why we have come to organize this First Session of Asia-Pacific Regional Space Agency Forum, because of the recommendation issued then.

Some problems were raised from the developing countries side regarding space utilization. The first point was raised was the access problem of the earth observation data. There are obstacles such as the securities related matter for developing countries and the commercial utilization by advanced countries in space area. Those obstacles need to be removed. And what level of information can be provided in a timely manner and at low price was something that we needed to address. Concretely speaking, they expressed that it is important to provide inexpensive data for the purpose of earth environmental research, and to make networks for the information access, to provide communication measures in an inexpensive manner and timely manner by satellite, and also, to promote and manage properly mutual information dissemination for international cooperation.

Secondly, in order to have a continued observation of global warming and ozone holes which are problems on global scale, it is pointed out to need to accurately implement the planned launching schedule for the earth observation satellite. Also, particularly, countries of Asia-Pacific region requested launch satellites for the monitoring of the natural disaster, the mapping exercises which are needed in those areas.

And finally, common issue in the area of satellite communication and earth observation is a technology gap problem between the space-faring countries and developing countries. The means of setting devised which meet exactly the different needs, interests, and technological level of each country. That was also pointed out. And it was recognized and pointed out, also, that it is significant to implement step by step to have an expert level meeting in various areas, also to have expert level meeting and training, and to move to joint work for the transfer of technology and experts training.

And lastly, the importance of taking part in international cooperation through the activities of international organizations were stressed. And the technology coordination and information exchange amongst advanced countries in space area, like in CEOS were also touched upon. It is pointed out that the reflection the unique needs of Asia-Pacific region and the participation to CEOS activities from the region is necessary to be reported considered to international coordination forum such as CEOS.
Figure 5.7 Korea Space Organizations and Their Missions

<table>
<thead>
<tr>
<th>Organization</th>
<th>Mission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea Aerospace Research Institute (KARI)</td>
<td>- Development and System Integration of Satellite and Scientific Rocket</td>
</tr>
<tr>
<td></td>
<td>- (Design, Test, Assembling)</td>
</tr>
<tr>
<td>Electronic Telecommunication Research Institute (ETRI)</td>
<td>- Development of Communication Instruments for Satellite and Earth Receiving Instruments</td>
</tr>
<tr>
<td>System Engineering Research Institute (SERI)</td>
<td>- Research of Remote Sensing Technologies</td>
</tr>
<tr>
<td>Satellite Technology Research Center (SuReaC)</td>
<td>- Development of Small Satellite (KITSAT)</td>
</tr>
<tr>
<td>1a Korea Advanced Institute of Science and Technology (KAIST)</td>
<td></td>
</tr>
<tr>
<td>Korea Telecommunication (KT)</td>
<td>- Procurement of Koreasat System</td>
</tr>
<tr>
<td></td>
<td>- Operation of Koreasat</td>
</tr>
</tbody>
</table>

Figure 5.9 Organization of Space Activities in Pakistan

- Space Research Council (SRC)
  - The Executive Committee of the SRC headed by the Prime Minister
  - SPACO
    - Space and Upper Atmosphere Research Commission
    - SPACONT
      - Space & Atmosphere Research Center
      - SPAC
        - Space Applications & Research Center

Figure 5.10 Organization of Space Activities in the Philippines

- Cabinet
  - NATIONAL COORDINATING COMMITTEE FOR REMOTE SENSING
    - Members: DNRD, DOST, DA, NAMRIA, DND, DPR and PAGASA
    - Created until 1994
  - Department of Science and Technology (DOST)
  - Philippine Council for Industry and Energy Research and Development
  - National Mapping and Resources Information Authority (NAMRIA)
  - National Remote Sensing Project
  - Remote Sensing Department
  - Coast and Geodetic Survey Department
  - Information Management Department
Figure 5-11 Organization of Space Activities in Singapore

Government of Singapore

- Ministry of Communications
- Ministry of Education
- Statutory Boards
- Meteorological Service
- National University of Singapore
- Nanyang Technological University
- Research & Education in Remote Sensing
- Research & Education in GIS
- GMS/NDOA/ISBPT Satellite Ground Receiving Station
- Telecommunications Authority of Singapore
- Satellite Communication

Figure 5-12 Organization of Space Activities in Thailand

- CABINET
- MOSTE (Ministry of Science, Technology & Environment)
- NROTC (National Research Council of Thailand)
- Executive Committee
  - Commissioner: Dr. Saje Sothari
  - Secretary-General: Dr. Apitike Aramit
  - D. Secretary-General: Dr. Somrak Mathan
- SAC (Space Activities Commission)
- SDA (Space Development Agency)
  - Director: Mr. Sendh Varichith
- Thailands Remote Sensing Center
  - Director: Dr. Palthai
- Ground Receiving Station
  - Director: Dr. Palthai

Discussion

"International collaboration in the field of space development in the Asia-Pacific region"

Friday, September 10, 1993
13:30-16:48

Chairman: Dr. Ryoji Akiba
Director General
ISAS

Mr. Fujita (Japan): May we start now? We would now like to begin our Afternoon Session. Until 4:00 p.m. we shall have free discussion on the international cooperation in Asia and the Pacific. As far as the moderatorship is concerned, I would like to ask Dr. Akiba, Director General of ISAS, to take the floor.

Chairman (Dr. Akiba (Japan)): Thank you. I am Akiba of ISAS. If may, I would like to chair the session from now on. Yesterday Mr. Fujita, the Director of International Space Affairs of STA, had reported on the Pre Asia-Pacific ISY Conference and Asia-Pacific ISY Conference held last year. Also until the morning today each of the 13 countries as well as one international organization have given their report about their current status of their space programs, respectively. I believe that those presentations have enabled you to have common recognition about the current status of each of the countries concerned.

From now on, we will have a free discussion. The theme is international cooperation in the area of space in Asia and the Pacific. The objective is to find out how space activities can contribute to the development of society and economy of the countries in this region and how can we contribute to the preservation of the global environment, what can we do together, and how can we cooperate with one another, which are the ways and means to achieve that. Those will be the topics to be discussed today.

Of course, we are free to discuss anything we would like at this time, but I hope you will relax and take part in the following discussion.

There are certain items we would like to have you discuss. First is the common interest item, which is the remote sensing and the topic about the satellite communication. Further, it might not be the common interest nowadays, but thinking about the future the academic aspect of space science is one important area that we can also discuss today.

And, lastly, we would like to discuss specifically what we can do to cooperate with one another, and I hope that certain proposals or suggestions can be given on that topic when we come to discuss that at a later part of this discussion.

As the Director had mentioned to you, we have time until 4:00 p.m. in the afternoon. Otherwise, we don't have any set chart or charted course for this free discussion. The only confinement we have is the ending time of 4:00 p.m.

We have had today presentations so far, and we have come to understand our common interest is remote sensing and its utilization. Let us talk about remote sensing via satellite. With regard to remote sensing, presently there are certain countries who own remote sensing satellites and who have capability to launch them, on one hand. On the other, we have the user countries, so to speak, of the remote sensing satellite but, of course, some of those countries are also willing to have the ownership of the remote sensing satellite in the future, too. But let us focus on the countries who have the capability to provide remote sensing satellite to the rest of the world. Let us hear from them what has been done in their countries so far and what they are willing to do in the future, and also what cooperation they can extend to the countries who are interested in remote sensing satellites.

It is all right if you overlap with the presentations you have given either yesterday or today, but we are also looking forward to hearing some new information, too.

May I just give the floor, first of all, to the organizers, Japan. May I give the floor to Mr. Nakamura of NASA.

Mr. Nakamura (Japan): Then from NASA I would like to explain the Japanese plans.

First, about the satellite plans, the Japanese Earth Observing Satellite Plan started with the MOS-1 which was launched in 1987, and MOS-1b was launched in 1990, and with this it has been sending data which is useful for ocean observation, agriculture, forestry and fisheries, and environment preservation. In 1992, that is last year, JERS-1 was launched. This JERS-1, its main objective is exploration of resources, and its main objective is for national land survey, agriculture, forestry, fisheries and environment preservation, and has an optical sensor of ground resolution of 24 meters and SAR that can take data independent of weather conditions.

So, those are the Japanese satellites that were launched for observing earth.

Furthermore, in order to have a more comprehensive observation of the land, sea and atmosphere, continuing the observation of MOS-1 and JERS-1, the ADEOS will be launched in 1986. This ADEOS has two sensors — this AVHRR high performance visible new infrared radiometer of ground resolution of eight meters, and OCTS, and has the AO sensor that would observe the wind direction, velocity, ozone and aerosol, so it has six sensors.

So, all in all, it would have eight sensors. And so this data of ADEOS, we believe, will contribute to monitoring the global environment by obtaining data responding to the changes in the environment, such as the global warming, ozone depletion and reduction in the tropical forests and the outbreak of abnormalities.

Furthermore, in 1997, a TRMM will be launched which is a joint project between the Japan and the U.S. This TRMM would measure the precipitation intensity and distribution in tropical
areas, and by analyzing this TRMM data we believe that we can contribute to clarifying the climatic change on a global scale.

Also, as a part of the WWF Plan, Japan has been observing the weather in the Asia-Pacific region with its GMS from 1977. At present, the GMS is under operation. This data also prove to be helpful not only for Japan but for countries in this region.

In 1993, that is two years from now, the follow-up of GMS-4, the GMS-5 which will be launched.

So those are the satellite observation program, and now I would like to talk about the future of these satellites.

NASA at present is studying two projects for the satellites as the next earth observing satellite program. One is ADEOS II that observes a wide area environment, and the HIROS, which has a high resolution observation with the objective of environment preservation. Therefore, we have two satellites for those researches.

As for ADEOS II, data will be obtained which will be necessary to clarify the mechanism of the water and energy cycle on a global scale by sophisticated the environment observation taken by ADEOS, and this will be launched around 1999.

As for this high resolution observation engineering satellite HIROS, this will further sophisticated the high resolution observation of ADEOS and will contribute to national land usage survey, disaster monitoring, and environment preservation, and it is expected to be launched around the year 2000.

Now, as to the detailed specifications for the sensors to be on board, and as for the data processing and development of analysis software, a full information service also formation of the satellite data, we would like to consider this with the cooperation of the scientists and users in this region.

So that was the satellite under our study and project. Now, next, I would like to talk about the observing satellite which is being used by the data of high resolution sensors, such as JERS-1 and ADEOS.

Next, I would like to talk about the mission of these satellites. As we have proposed at this panel discussion to which I referred earlier, from April this year we have been supplying the satellite data at cost basis to the researchers inside and outside of Japan, and we expect this with the research on the global science and technology will be facilitated because of this training.

In the area of global observation, we have been providing short-term training to around 10 researchers in this region for receiving of satellite data, operation processing and also technology analysis techniques, and we further intend to expand this and to lengthen it.

And not only limited to this earth observing area, but we also are thinking of receiving trainees for other general areas of space technology, for example, tracking, control technology and satellite technology.

That ends the presentation from NASA.

Chairman: Thank you very much. Yesterday, Mr. Shimodaira gave a presentation, and on top of it right now Mr. Nakamura has given supplementary remarks. I am sure you have various thoughts and views of your own. At this point in time, is there anyone who would like to take the floor, your views or thoughts, comments? ESCAP, please, Mr. He.

Mr. He (ESCAP): Thank you, Mr. Chairman. Since I am only one representative on behalf of the ESCAP countries, and to the United Nations, I feel obliged to report to you as complementary information to what I have given yesterday.

First of all, I think the United Nations is very much thankful to regional member countries and to those non-regional member countries in the field of remote sensing.

In the past decade, ESCAP had gone through a very, very rapid development in remote sensing. You will already see that in this region there are more than 20 countries which have set up national satellite observation systems or remotely sensed, so some have to connect with the international management arrangement, so if the forum, or one of the forums, could also call the attention of the participating countries to solve some policy matters on this, this could also be a good contribution.

In relation to those questions, Mr. Chairman, the United Nations' main mission has been to assist mainly the developing countries in developing their national capabilities. But one thing we feel, for instance, is that the price of remote sensing data is a time-honored unsolving problem, so how to tackle this. We may not notice that one satellite data, one high resolution satellite data, is many enough to cost an annual income of one professor in some developing countries. So you could imagine how we may have to pay two, three, eight of satellite data in order to do some real meaningful operational work.

Of course, this is a burden to the developing countries, but also to developed countries who own the satellite. Particularly after 1984, the Reagan Government's Commercialization Act, there was a belief that remote sensing can earn money, but that was not true. So we in this forum, since we are calling upon the high level participants from different countries, this kind of message we think should be addressed to the decision making people who allocate the financial resources for the space programs, particularly earth observation.

In connection with this again, some people have been complaining that ground receiving station operators could not timely provide data or do not want to reduce the price. It is also not true.

As far as we know, each ground receiving station is losing more than US$2 million in order to cover the operational costs. Those directors here could verify the figures.

So what I mean is here how the satellite operators, ground receiving station operators, particularly those users who come together under the forum, to think carefully the policy for present programs and the policy for data distribution in the future programs.

Thank you, Mr. Chairman. I might take up the forum again later.

Chairman: Thank you very much. You have referred to many of the important points. I think we were talking mainly about the utilization of remote sensing and remote sensing data.

We shall listen to each case of the user countries, too, so let us for a while focus on the countries who can provide satellites and remote sensing services. May I, first of all, ask Canada to take the floor, please. Mr. Giroux, please.

Mr. Giroux (Canada): Mr. Chairman, thank you.

As exposed yesterday, Canada has so far not been a provider of satellite imagery. Our first remote sensing satellite system RADARSAT-1 will be in early 1995 only.

The Canadians are working on with respect to the distribution of the RADARSAT data is the following. We have decided to set up a private organization which is called RADARSAT International. It is a completely private organization and has no linkage at all to the Government of Canada and Canadian Space Agency.

This organization will be the sole provider of the RADARSAT-1
data, and the role of the Canadian Space Agency will be solely to operate and control the system during its operational life. RS1, which is the acronym of RADIASAT International, is based in Vancouver, Canada. It is an organization which exists already and actually has at its disposal a number of countries around the world to promote their future projects. As far as the data policy is concerned, it is the following, and it has been exposed and explained in forum like CIEOS of IGOS. When the data is being discovered, it will be provided on a cost basis solely with no margin of profit. When the data is to be used for commercial and/or value-added purposes, it will be sold with a profit margin. I believe, Mr. Chairman, that Canada is very much in line with countries like France on this particular matter, and if I understood correctly the Japanese position so far, it seems to me that there is also a similar, I guess, understanding vis-à-vis what kind of data.

So as to prevent a question which might come later, as far as the provision of data to developing countries, at this point in time, Mr. Chairman, the official policy of our government has not been finalized, but I believe that we will try to ensure that through our Aid Development Agency that this data is provided either free of charge or at a very low cost, that is the cost of repackaging the imagery itself.

Finally, Mr. Chairman, for the information of my distinguished delegates here, RS1 has signed agreements with organizations like SPOTIMAGE to commercialize the SPOT satellite system data in the field of forestry. It has recently entered into an agreement with the European Space Agency for the reception and the distribution of the ERS-1 data. Thank you, Mr. Chairman.

Chairman: Thank you very much. I know you have many more things to say, but we are listening from the countries which can provide the remote sensing capability. Now, may I go back to Russia. Please make additional comments to what you have presented before.

Mr. Michodkhlov (Russia): What concerns the remote sensing segment in the Russian Space Program, we have developed a number of remote sensing systems which are operational all the time. In addition to the various remote sensing satellites which I mentioned in my presentation, that is RESURF-E and RESURF-D0, I haven't mentioned such satellites as ALMAZ and OCEAN, which are also remote sensing satellites. A lot of data has been collected which is constantly fed additionally and is available, and it is available in photographic form or tapes and other presentations. What concerns the ground segment, the processing centers, in this field Russia has not achieved such high qualityback as SPOT IMAGE or perhaps LANDSAT, so in each case we have to look into the problem of what the users will require. Although we have very high quality data obtained by the satellites, the processing on earth we have not achieved the high quality which has been achieved by companies like SPOT IMAGE. There is a lot of information, a vast amount of information, which is collected during actual remote sensing presentations, which is available, so any request that might be coming in will have to be discussed on a personal basis and then we can see what we can provide on this request.

Anyway, the data which we presented in Europe and the United States aroused very much interest, and very much interest was expressed in obtaining it. We can say that we can provide photo information with resolutions, spatial resolutions of 5 meters and better. Unfortunately, we do not have a well determined system of distribution and sale of this data to foreign countries. It is because the whole of the country is in a period of transition, and this system of data distribution is also undergoing some troubles and distribution difficulties as the rest of the country.

In concluding, I must confess that we have not yet learned how to profitably distribute or use this information. But I will suggest that we are going to develop some system that will apply to us and we will find the data and find the ways as to how we can sell or provide the data to the countries, and I think that during the coming meeting more detailed and more definitely determined policies will be presented because we are now preparing some of the presentations for that meeting. Thank you very much.

Chairman: Thank you very much. We have listened to the four corner points that a country must have, as far as the ground station is concerned and its related services. In what way the data can be distributed is something which has not been finalized, but we heard from ESCAP that there is an overlapping of the coverage and price remaining about the pricing, so there are pending issues that need to be addressed in the future.

So let us leave the providers side and go to the users' countries view. Anyone who would like to take the floor?

Dr. Yamashita (Japan): We heard from the ESCAP. I believe in your hand you have a handbook that explains about MOS-1 data distribution scheme applied on a commercial basis, and the other one is the distribution for the research purposes which has begun in April, so this is offered under discount rate, and the announcement of such is indicated in the material.

For research purposes, in principle we are to offer the data on marginal cost basis, if you go through the joint research framework with NASA and others then you can enjoy further discount which makes the final cost to be almost zero.

Chairman: Now, anyone is free to take the floor. Who would like to take the floor first representing the user country side? Indonesia, please.

Prof. Wiriyosumarto (Indonesia): Thank you, Mr. Chairman. Indonesia is going to have a ground receiving station, and in this case, of course, the purpose of that ground station is to receive the data required not only for the development of the country, but also the cooperation from ESCAP here because the first time when we tried to build our ground station, of course, we sold the idea to the government, but it was done in the framework of the development of the country. But, then, when we come to the financing we need for the operation, then the government will say it is more expensive than just buying the data from other sources.

So in this case, actually a great effort to develop the space technology in remote sensing, in the receiving ground station but, on the other side, there is opposition from the government because it will be very expensive to operate that, so it has to be found out what way we can overcome that difficulty.

On the other, the pricing here, what we discuss here, some of the countries which are producing the data are now providing data for commercial and providing data for research, but mostly in the developing countries I think they what need is not research. Mostly are needed for the development of the country, and in this case there is still no way how to get the lower price on that.

I received some offers from Japan. Hopefully, it will get to the price which is affordable by the developing countries.

In the Asian region, there are many ground stations and as, has been explained, there is much overlapping between the ground stations at all any way, we plead, and I think it is necessary to have cooperation between the ground station operator so that we know what to do, what is the best way to get the data, and so on.

Besides that, of course, it is necessary to have cooperation, collaboration between the satellite operator and the satellite operator because most of the satellite owners — I say satellite "owner" is government but, then, the satellite operator is other, and it may be actually privatizing the price. If you go from the ground station and the satellite operator, this operator will, of course, add up the operational price so that the price itself increases. So, in this case, we have to try to know how to overcome this problem.

I can give some contribution to how to solve this, but this is the problem that I face. Thank you very much.

Chairman: Thank you very much. Dr. Mahmood, please, from Malaysia. Thank you very much, delegate from Indonesia, for your comment.

Mr. Mahmood (Malaysia): Thank you, Mr. Chairman. I would like to relate Malaysian experience with regard to the problem of data accessibility. As I mentioned in my presentation earlier, one of the major problems we are facing is trying to operationalize the use of remote sensing technology in the country is the aspect on data accessibility in addition to the manpower and expertise requirements.

We have real need for remote sensing data in Malaysia mainly for the management of our natural resources and also the monitoring and protection of our environment.

We rely on a lot ground station in Thailand at the Thailand facilities at the National Research Council of Thailand. Some time ago, we made our request of SPOT data which came to about 100,000 dollars' worth of data. After we had made a request and we made an advance payment, 100 percent advance payment, for the data, we received a note from Thailand informing us, 'Sorry, we cannot supply the data because the contract with SPOT IMAGE has expired and we are in the process of negotiating, and it is very unlikely for the negotiation to be completed within a couple of months due to the commercial repercussion.'

As a result, we were suggested to choose LANDSAT data, instead. Therefore, I had to go back to our central authority again to present a new request, and it took us another couple of months before we could get any LANDSAT data instead of SPOT data which we really wanted in the beginning.

I quote this situation to put the blame on Thailand, but, instead, the complication arises due to the restriction put down by the satellite owner, in this case SPOT IMAGE.

In the case of Malaysia, my center has been allocated a substantial amount of funds annually to acquire data satellite of the countries which meet the users' requirements in the country. However, every year we have to refund to the Treasury Office at the end of the fiscal year because we cannot finish the amount allocated to us due to problems such as I mentioned earlier, and others, too.

This has prompted us to a decision made by the government to look for alternative possibility to get the data, if possible, in this presentation earlier, for Malaysia to have our own ground station. Apart from overcoming the reliance on other station owners, we also have to overcome the problem of data accessibility.
the country. With this decision also we realize that the region will have complicated networks of ground stations, as has been mentioned earlier, but somehow we need to overcome this and to sit down together and find the best solutions in order to minimize the complication that could arise, and also to economize or to maximize the usage of the existing facilities in the region.

I am glad, Mr. Chairman, to note that Japan has taken initiatives in this direction to minimize the difficulties being faced by users of satellite data. We heard just now, or in the process of the presentation yesterday, that Japan agrees to deliver the data free, or with minimal charge, for research purposes for the satellite data acquired by Japan.

We have also heard just now that a sort of earth observation information network is being initiated in order to create database for the benefit of countries in the region. This will go a long way to assist the countries in the region.

I would like to further request Japan, Mr. Chairman, to do more for developing countries in the region, firstly, by relaxing on conditions, such as by reducing cost and restrictions for data access to the ground station owners in the region. As we have seen, too much restriction is just to soften other satellite owners especially from the West.

Secondly, Mr. Chairman, I would also request Japan to use its influence. Especially through the forum of advanced countries, you have a dialogue among seven advanced countries, which takes place annually, to influence the satellite owners from the West that our satellite data should be given to the satellite owners and also ground station owners in the developing countries. Thank you, Mr. Chairman.

Chairman: Thank you very much for specific aspects. You have also mentioned some events related to Thailand. The delegate from Thailand, please, you are raising your hand, Mr. Rungsiwi.

Dr. Rungsriwi (Thailand): Thank you, Mr. Chairman. For the duplication of the station, we should have overlap so that we can exchange the data. Sometimes in the crisis areas or crisis times we could not have the data of them. That is the problem, but ones that we have we can share. Like, for example, we have one experience in Peninsular. We could not find any LANDSAT TM data or any SPOT data, but we got from MOS, so this can help a lot.

In some cases we are thinking that we need data from India because we have a coverage, some parts of India. Anyway, some countries would like to purchase the data in that area so we have to access to India. We can exchange the data when you need it. I think that China has its own data, so it is already satisfied. However, for instance, oil exploration, they are waiting for Thailand four years already who costs to make an agreement to get that area. That is the problem. We are the government, so we could not advertise. We could not say anything because we are government officers.

This is hard, so in case of that, we would like to help in this region that we can utilize remote sensing to upgrade human rights and to promote social and economic development of the neighboring countries. So, in this portfolio we can provide the data to them. Indonesia also, they have their own station but, it is an island, so it is hard to get good data. There is cloud cover all the time, so Thailand has to provide some data to them, not only data but transfer technology also. Sometimes we have to ask ESCAP to do some symposium or some kind of training, so this is very important in this region. For the access of data, like my companion said, it is sometimes quite long. The problem is like this. The contract is okay. We can contract throughout the year, but the price is expensive for SPOT data. We could not use LANDSAT data, something like LANDSAT TM. We have to program to be for many months, I think nine months a year, in the south there is cloud cover. That is why we contract in some months. When you order it is already less of control. Pro soror, we have or contract, you to utilize the LANDSAT TM, which is cheaper but quality is, of course, a little bit lower.

Anyway, I went to the U.S. last year and I tried to talk to the SPOT IMAGE in Washington, but I was told that SPOT makes very good sale, but within this region SPOT have never tried to make a very high resolution. Of course, I asked them who is the customer. Most of the U.S. customers are the private sector who are involved in consulting firms, engineering works or some kind of exploration. That is why they can make sales to the private sector.

For the government, of course, we have to provide subsistence. This is my opinion. I don't like to talk about the policy of the country. My boss would kill me some time. I came from a layman. I am a user. I have been working in the field of project planning since I graduated from civil engineering. I have worked with the World Bank, with many countries -- U.S., Germany. Hunting also introduced remote sensing to me, but it never told me that this is remote sensing, just only let me have a cloud cover checking.

But I know that the cost of surveying or the cost of acquiring data is about 75 percent of the project. That is big enough. If you utilize just one image, you can save a lot of money, save time, save labor, so you can develop ahead of time.

In case of some projects like, for example, the dam construction, if you wait for five years or ten years you have to stop the project in case of environmental problem or something. But with the remote sensing you just need to apply for four months, the whole southern part of Thailand. This is done by JICA. I also worked with them.

So, in this case we can identify the area for replanting the forests, domestic consumption treatment treatment treatment. So, we can make a feasibility study, so save your money. Talking about the economics evaluation, as I told you, I am just only an engineer, I am an economist also. In the project evaluation, if you classify it into benefit/cost ratio, the project that is done by remote sensing can be cheaper than one thousand through the conventional method. So in the small areas the cost is too expensive, but in the larger areas it is a little bit cheaper. For the price it can save a cost from my station, and then they sell it Europe, not in Asia. It is five times my country price. This is the lowest price in the world that we have done to serve this region.

Anyway, we are not satisfied with the price. We would like to lower the price. That is why some of the countries like Japan or ESA or the other countries tried to provide the data close to free distribution. Even we compete and try to price down from SPOT IMG, so it is a very good idea that we can have a very low price in the near future.

We have more people to become involved. We have more users so that we can lower the price in the near future. We have to sit down and talk in a forum like this. So the price is very high in this region. In many countries. I even tell the Philippines that if you have money like an international organization fund you may utilize that money. It seems to you that it is cheaper because you get just only a small amount of the investment. I think it is much more important to prevent the project and you will save money, save labor and save time.

So I would like to say this first. Thank you very much.

Chairman: Thank you very much. We have been taking up the issue of prices, which is a major problem, but we cannot just focus only on this issue, so maybe I can give one more floor to Bangladesh. Dr. Ahmad, please.

Dr. Ahmad (Bangladesh): I think that understanding the situation in Bangladesh's perspective, we have to realize what is the real condition in Bangladesh. As I said, Bangladesh, first of all, is a country with very big population and one of the most populous countries in the world. Also it has very limited natural resources, and this limitation of natural resources I think prompted us from the very beginning to find out some cost effective ways to apply the technology of remote sensing in our planning purposes.

In fact, that was the idea which prompted Bangladesh to establish the Bangladesh Remote Sensing Board, that was the first in this region, and that was supposed to have pictures from both SPOT and LANDSAT satellites.

Though our work with meteorological satellites started also, as I said, in the beginning we were continuing with that work receiving pictures from GMS and NOAA from our advanced meteorological ground station.

Now, another particular geographical feature of our position is the river and the delta. It is usually premonsoon and postmonsoon, sometimes of the dry months also, but with the more sensitive technology, that means minus the SAR data, we have to depend on some cloud-free days. So far to our country I think the SAR I have captured, in fact, we found this also after the 1991 cyclone, so data from JERS, for example, would be very, very useful for our purpose.

Also, for a country like Bangladesh where we have too many disasters like cyclone, flood, climate variations -- what we do need is either real time or near real time data.

There are certain practical problems. Now we have to depend on other stations outside Bangladesh to have resource satellite data, and that always has some sort of time delay. I think which is not always very desirable, and also it does not suit the purpose of Bangladesh.

Now that we are trying to integrate both remote sensing and GIS into our national planning, and also in almost all these sectors, this think has become now almost imperative on the part of Bangladesh. It is to have a ground station which would have capabilities of receiving pictures from JERS, MOS and also future aerial systems which will be satisfied with certain problems. As I said in yesterday's talk, three climatic issues, these environmental issues, they don't know any regional or any international boundaries, these are issues where international and regional cooperation will be needed.

So I would certainly request for cooperation from Japan and, for that matter, from other countries also, so that we have this ground station to have the capability, as I said earlier, to receive pictures from the existing and the future satellites, and also upgraded to receive LANDSAT-T4 and SPOT-3. So that is a project which we are now just planning in Bangladesh, and we will be very soon submitting that project to the government from our agency.

Besides our limitations in natural resources, and because of high density population, we would like to further enhance the use of remote sensing data in all our development planning and environmental monitoring activities, and also for disaster mitigation. SPARSSO, with all its meteorological ground station facilities, played a very important role, and that has been lauded throughout the world press that SPARSSO joined also a very important role in giving a warning which saved a number of human lives, and we want to upgrade that capability.

So, to do that we have, and this is in consonance with our objectives of UNDP's program, develop human resources through training, which we have been doing through our regional cooperation and international cooperation, and also to enhance the institutional capabilities.

This can be achieved, as Dr. He pointed out. It is very heartening to note that in the whole region we have now a number of forums where we are talking of these international and regional cooperation. I think this is a very good sign, and I get encouraged by these developments.

So I think that what we reiterated in a lot of our previous meetings, the ICC meetings of the ESCAP/UNDP Regional Remote Sensing Program, there is always the question of this data acquisition fees. You see, the data acquisition fees of some of the satellites, Bangladesh was paying, is a bit rather exorbitant, from our point of view. They may not be so from the supplier's point of view, so we recommended in our previous meetings that the providers should look into whether this is possible, at least for the developing countries who are using these data for their developmental purposes, not only research but also for their developmental purposes.

Well, I think for the time being that we all that I would like to say, and thank you very much.

Chairman: Thank you very much. Perhaps we should leave this topic of remote sensing. I know this is a very important topic, so maybe there are some others who would like to take the floor, nevertheless.

Dr. Mirza (Pakistan): Thank you very much, Sir. If you will kindly permit me to elaborate what I have been listening to different views, and since Pakistan got into this remote sensing technology in the very early days, in my presentation I did not mention about the experimental satellite station. The first Asian satellite station was at Islamabad from 1976 till 1977.

Before that, we used remote sensing data through principle investigated scheme. If you recall, NASA was distributing these data free of cost. Later on, they started charging only $3.50 for a very small chip measuring 70 mm by 70 mm covering 185 km by 185 km.

At that time there many countries in the Asian who introduce this technology. Moreover, for Pakistan region, the American company used Imperial Valley cultivation in California as an example, and Kansas City, the large cropping area, and all
of us jumped into it, and I think we were lured to jump into it that this can do a lot of good for the developing world. At that time, nobody was talking about the access fees.

This problem was a lot of time debated in many forums, particularly in the income resolution was the one I could think about, and later on it was 50 meters and, France came in a very big way when they declared 10 meter and 20 meter.

So in Pakistan, after going through these experimental phases and seeing what is happening left and right, we consciously decided not to go far into remote sensing station because of two reasons: One, at least we believed that the 20 meter resolution is going to solve the problem. It is good for some statistics like I showed you a couple of examples, but for dynamic purposes, and when I say "dynamic" I don't mean floods only. I mean agricultural statistics. We knew 80 meter resolution does not go to be very useful.

When we talk about the availability of data, timely lesson, even if we know data is available in our hand today, we cannot use it for cropping statistics. It is because the field sizes are very small, the cropping patterns are heterogeneous, and the timeliness, which is 26 days for the SPOT, 16 days for LANDSAT, is a very bad timing for crop statistics, so we need rapid data appraisal but, then what do we do? We go to IBTT only, which is one kilometer resolution.

We are told about AGRISTAR, the project which was run by USDA. We know about LACIE, Large Area Crop Inventory Experiment, but we know that the equipment that we demand for a particular region is not available, I mean if they do their purpose, but our conditions in the smaller countries are not conducive for making use of a real operational remote sensing in the real sense.

Another thing, which is very perturbing, is when the prices were charged by these so-called operators — when I say "so-called" I mean either the owner are the operators — the owner keeps on telling us, that they spend huge amounts of money in these operations. It is of the order of $100 million. Now, for them, this user access fee, which I might tell you is far less than $1 million in one case, and in another case it is about $2 million, or $1.5 million, so that money is really peanut.

I believe that many stations in the country and in the world — I can name them but for their sovereignty I should not be naming them — they have had very bad experience of having their own ground stations. So all their governments, or our friends were saying on this floor, they keep on asking what for and why we should go on subsidizing you, because, in a way, we are the technocrats and scientists, we oversold this technology to them, to the planners, and now when we cannot deliver the goods, they ask us very hard questions and, therefore, we find it now in a very awkward position. Many of us, as Dr. Was talking about, at least 10 out of 15 participants keep on talking about these things.

That means, at least in my case personally, I have been involved in this remote sensing technology long, long time ago. Some 30 years I have spent in this space business, so I have been telling to operators that we are not giving you some support, so I am responsible so, for god's sake, for those people who are trying to get into this technology now, they must keep that in mind, that we should not turn around and tell our government, that's well, we made a mistake. That is one thing.

Secondly, I dare say that whatever remote sensing can do, but we must realize it today, or we should have realized yesterday, that we should not overcommit ourselves, our nation, our country, to a point where we are not able to do these things. I believe nobody believes that good things have been done, can be done, like my friend from Thailand was telling about his experience working with the Hunting people and how much percentage, 75 percent, he said they are not able to get the timely data, and so on.

But please appreciate they talk about geology, land use, land cover, and those maps can be made without a ground receiving station. You can buy data, historical data, from anybody. You can actually request SPOT IMAGE, EROSAT to provide you these data at a cost which is not very much, though.

But, mind you, if you go for your own station and later on you discover that the cloud cover is a problem, or even with this high resolution data now you cannot do the cropping or forest inventory, please think about it.

Lastly, I would say that this overshadowing, which has been touched by Dr. He, and duplication and overshadowing, he said. "Overlapping" is the right word, sure, but I think let's take it in yet another perspective. Overlapping is okay for checking the technology once in a while. For example, our stations covers a lot of area of China. Let me correct. We don't overlap, we cover what is left of China, so we don't overlap, but with India, with Saudi Arabia, if Iran go on the grid, we do have overlap, and we can share these data once in a while to check upon the performance of our station, but it is not always desirable.

So I must suggest that many countries which are covered for four times, rather, by four different stations, rather than going for their own station they must hook up to somebody. And, lastly, may I tell you that SPOT is not only negotiating agreement in Europe, they have had shocks of their life already. Many countries have canceled those agreements. There are many countries who are not under grid of SPOT any more because of the high translation of cost. May I tell you, in Europe SPOT IMAGE, through their hard learned lesson, have reduced the price from somewhere FFR.7 million per year to some realistic figure of about 2735 million a year.

Even then many countries, many governments, are finding it difficult to review these agreements. Likewise, EROSAT from previously $8.5 million dollars, they have reduced to $6.5 million and plus certain royalties and so on, and I think perhaps it will be difficult for them equally. I have tried to be very candid, very honest and fair. I have tried to bring my experience, our experience in Pakistan, and knowing what is happening in the developing world, Third World countries, particularly, I dared say whatever I said, and forgive me if I have been digressing or being very frank. Thank you very much.

Chairman: Thank you very much. There was a comment from the users from a different perspective. We are behind the schedule, so we would like to move back to the countries that can provide the services, and Dr. Boyd from Australia, can we have words from you?

Dr. Boyd (Australia): Thank you, Mr. Chairman. I did not realize I was being seen in the position of a data provider. I don't think we are quite in that category, but I did want to make some general comments, knowing of several of the issues that have been raised in the discussion so far.

Firstly, before I forget, let me say I am pleased to see my colleagues here. We have not had the access fees to the extent I think it is important, and I should mention up front that in Australia we made the same mistakes, that is in overlooking the capability of remote sensing and then having, and let's say it's coming up a little bit late, the opportunity of getting into this field, trying to recover the situation in an attempt to convince the providers of funds, that is mainly the Federal Commonwealth Government, that remote sensing with observation technology is capable of doing the real work as desired.

I thought it might be a little useful for me to do something I did not do yesterday, and that just describes very briefly the arrangements in Australia for remote sensing, and I notice that we are all here now; we are all here today, and the good thing is this conference at this stage. I think that's perfectly reasonable, of course, because in my understanding these technical and economic and financial and models or structure of remote sensing is quite different from that in communications. In Australia, the Australian Center for Remote Sensing, which is part of the Australian Land Information Group, ASLIG, and that is part of the Department of Administrative Services, has the responsibility to operate the Australian receiving stations, at least those for which international arrangements are required. That is, the Australian Center for Remote Sensing is the agency responsible for doing the deals with EROSAT, SPOT IMAGE, NASA and ESA for the delivery and the access fees.

I will just mention on the side, of course, that many stations around Australia receive NOAA data for which no such arrangements are required, and those stations include the Bureau of Meteorology, and the CSIRO. The situation for the funding of ACREs (Australian Center for Remote Sensing) is very analogous to that of the satellite operators in that the front end of the operation in the case of ASCRE and that the access fees, and so on, is covered by public expense, public cost from the appropriation of the Commonwealth Government.

At a point in the operation around that point, it can vary a little bit, but certainly in the interface between the raw data and any value-adding processing, the operation becomes commercial and is conducted by a company under contract to ACRE, and so that company has the responsibility to market the data on a commercial basis, and the access agreements with EROSAT, SPOT and so are negotiated on that basis.

That's just a brief outline of how we actually operate in Australia. Making a comment on some of the issues raised this afternoon, I think my conclusion is, for what it's worth, that the problem of the cost of data has to be addressed at government level. The data providers, as is the case for our own operation in Australia, are under great pressure from their governments to recover costs, as Dr. Mirza mentioned and everybody is aware of this, and that means that, apart from anything else, these operators are going to make their decisions on a commercial basis, so I think when SPOT IMAGE are making decisions on their overall commercial programs, not just in the overseas markets, but in their geopolitical markets, not just in the overseas market, but in their geopolitical markets, not just in the overseas market, whether the price or the cost is, and that is established then the few tens of thousands of dollars that it might cost would be relatively small compared with the net value.

Going back to the Australian program just briefly, I might say, too, that the access fees, as I say to you, as far as I am concerned, the access fees, as I say to you, as far as I am concerned, the SPOT and EROSAT and so on, we are, as a matter of conscious policy, evolving a strategy to become involved in the space sector, specifically with a very long-term view of maintaining our capability to provide the data, and I am not talking about the access fees, but about the use of the ready-to-use data, looking at the long-term requirements and some of the work being undertaken by the Australian Space Office which is similar something like that.
It uses actually ETSV satellite, and it covers presently Thailand, Indonesia, Papua New Guinea, Fiji and Cambodia, so five countries are taking part in this scheme.

As part of this scheme, NASA has proposed to have effective utilization internationally of the earth observation data. Thus, experimental transmission of earth observation data and the technology research for measuring the radio propagation, characteristics of the communication over tropical areas are going on, and although it would expire, within two years' time we would like to continue on with these programs and experiments as much as possible.

The ETSV is a 14-meter satellite to be launched to replace the ETSY, which means that we can also provide the transmission experiment facilities, and also MFTB and NASA would like to address these questions for the possibility of usage in the future.

Thank you.

Chairman: Thank you very much. Now, who would like next to take the floor? Yes, please, ESCAP.

Mr. He (ESCAP): Thank you, Mr. Chairman. As far as satellite communication is concerned, our distinguished colleague from NASA has already reminded us that the subject itself is quite commercial as other agencies in the space sector indeed may not have much to offer at least at the moment since it is being so commercialized and the technology has been so mature as compared with the earlier day.

Nevertheless, I think from the United Nations point of view, if we think of potential developments, we do believe that there are some things that both developing countries and developed countries could do in order to make use of this technology, and this is particularly true, as has been mentioned by the Chairman already, in the area of education.

In the case of Japan, satellite communication has been used to address university level education, but in most developing countries, especially those in the rural areas where illiteracy is so high, we think that some programs, some actions, might be needed to be taken or this area should be promoted how to use this satellite communication technique in the education or to elevate poverty in the rural areas. This is one aspect.

On the other aspect, when we are thinking of implementing Agenda 21 addressing the environmental problems, for instance, the United Nations has a Natural Disaster Information Decade where it is believed that the real time data transmission for natural resources and disaster monitoring purposes, and technologies and methodologies, problems, institutional, etc. and the use of this satellite communication for environmental purposes could also be addressed.

For that, the developed countries would have something to offer to developing countries. I think, in addition to this, another example which we are talking about, sharing global information, sometimes time matter is concerned, so information networks, the data network on environmental issues, could also be addressed.

Nevertheless, although satellite communication has been commercialized in the vendor's hand, in the ground segment, on the institutional considerations, there is a lot which the developing countries indeed are hoping to have some share on this technology. Thank you, Mr. Chairman.

Chairman: Thank you very much. So usage of satellite communication was discussed from the perspective of the United Nations. Thank you, Mr. Teamako from Kiribati.

Mr. Teamako (Kiribati): Thank you very much, Mr. Chairman. On behalf of my delegation, I thought that we were not going to say anything at this forum. However, we believe that it is something that is very important to our situation. Indeed, we must thank first of all, the organizers of this forum for having invited Kiribati to participate in this very important forum.

Kiribati, as you know, is a small island in the Pacific Ocean in the central Pacific spanning at 3,300 to 3,500 kilometers from east to end.

Now we are end users of space technology, and we believe that communication is very vital to our situation. We have only one international telecommunications outlet using INTELSAT, and we have on Christmas Island, which is about 3,500 kilometers from the capital island of Tarawa, just recently opened a VSAT station which is capable of communications to Tarawa and the rest of the world.

In the way of space technology, we have no space program at all, and I can say it is going to be years before we are involved in this area of technology.

However, there is the presence of an agency in one of our islands, that is Christmas, which is operating on a monitoring and tracking operation. Our government, thus, gives moral support to this project, and we are already giving importance to the future of Kiribati at the same time.

We do not have problems which have been discussed here in the way of remote sensing. However, with the vast ocean that we have, there is no opportunity, especially when it comes to fishing, which is one area that is important to the economy of our country.

I would not like to take much of your time. However, once again, we are very fortunate to be here to share the experience of those countries in the space technology as of now.

Again, I must thank the Government of Japan and then, in particular, those organizations who have made our visit or participation to this forum possible. Once again, I must thank you all. Thank you.

Chairman: Thank you very much. Our time is running fast, so let me rush. Three minutes, please. I may give the floor to THAILAND, please, three minutes.

Dr. Rangsiwut (Thailand): Thank you, Mr. Chairman. In Thailand we expect to utilize the communications satellite very widely because, as I told you, Thailand is subject to develop the whole country. We have a program of the up country, eastern seaboard, southern seaboard, economic zone, and try to connect to China and the other countries.

The tourist industry is also very important. It has increased to about 1.5 million a year, so we are going to have another airport very soon, so we need communications satellite. According to the tourist industry throughout the regions, we may go to China, Burma, Vietnam, USSR, or down south to Cambodia, Singapore, Indonesia, Australia, or something like that. This is the crossbow of the tourist industry which will extend in the near future, so we need air transportation.

For investment, as I told you, we have to throw into this region, we have to increase communication, stock market, industry, fishing and education, medical via satellite. Thank you very much.

Chairman: Yes, another speaker for two minutes, please.

Dr. Mirza (Pakistan): I need for myself less than 120 seconds. There is so denying the fact that space communication is a proven and one of the best methods of reaching all the masses for education, for any purpose. However, there can be two ways of reaching all the people. One is national space program and they are very powerful. They are secure, and they can be used wherever you want to use them.

So, again, my request will be to ponder into this problem rather than going into a huge capital investment which, in many cases, does fail. We have seen many national satellites failing, and the launching cost and then the insurance cost are always to be added.

Now, Sir, if I have not consumed my 120 seconds, my small thing I want to add is that the Indian Ocean is devoid of geostationary satellites. We heard China launching at 105 degree, Japan at 130 degree, I suppose. Major areas of the Indian Ocean, the eastern side of Africa, I mean Madagascar, etc., and particularly Pakistan, which we do not have any operational satellite data set, and my request is that China and my friend from Japan might consider providing a continuous supply of data map, if they can, by organizing their satellite orbit in such a way that they can provide us with METEOSAT ends and you can take over. Thank you very much.

Chairman: Thank you very much for the valuable contributions under 120 seconds. We will take those.

We would have liked to discuss space science, but we do not have enough time, but our laboratory is deeply involved in this area, so I would now like to call upon Dr. Oyama to briefly talk about this issue.

Dr. Oyama (Japan): Time is running, so I would briefly like to discuss about international collaboration between ESAS and other countries.

When we say "space science", we have a large variety of fields, such as solar terrestrial physics. That is about the earth, and interplanetary physics which studies our sun, and then astrophysics. That is about the distance of sun, like X-ray observation. And, fourth, we have also planetary exploration. These are included in what we call "space science".

A little bit different from this category, we have material science which also can be done by microgravity field in the space. In this whole field we have international collaboration with different countries. This is the present or the future status for international collaboration in different countries. For example, with Australia we had the balloon experiment in 1985-1986. In 1992 we used the Australian balloon site with collaboration with the United States of America.

With Canada, we launched the iono satellite which was in 1989, and 1990. We are still collaborating with the Canadian scientists. Also we might continue our collaboration with our MARS
Mission which will now be planned in 1958. Then in China, in the past, in 1946-1948 we had a three-day balloon experiment between Japan and China. The balloon was released from the southern part of Japan where we have a rocket launching site. Then a balloon was recovered in Mainland China. But this project just ended in 1988. Now, last year, for this satellite experiment, a Professor of the University of Tokyo just carried out some material science by recovery satellite, as the Chinese representative mentioned. Now we are discussing. When I put "under discussion" this is just individual scientist level discussion, no formal discussion between the governments. Until our international collaboration starts with individual scientists discussions, drinking beer, Japanese sake, or something like that. Now in China we are talking about the minor measurement by balloon technique.

In India we had several times a rocket campaign in early 1970s in terms of X-ray star observation and ionospheric rocket, but we terminated just at the end of 1970s. Now we don't have a present project, but we are discussing again to conduct a rocket experiment about ionospheric physics as well as observation at very low altitude by using balloon. Regarding Korea, we are just in a very, very preliminary stage of the collaboration. This is also on a personal basis. We just started data evaluation obtained by our Japanese satellite. I hope we can continue this research work even in the future. I don't need to say about the collaboration with the United States of America. We have a lot of collaboration work from many, many satellites like YOKO, GEOTAIL, and also have rocket collaboration. We have just carried out last March in Alaska. We are also again discussing future rocket ionospheric collaboration. Indonesia, this is rather different from the space science which we can do by using rockets, sounding rocket or sounding satellite, but the University of Kyoto is actively collaborating with Indonesia. In Russia, in 1990 by using MIR when the first journalist from Japan was on board MIR, at that time he brought frogs to watch the behavior of frogs. That was I think the first collaboration with Russia, and we are now under discussion to carry out radio science by using the radioswaves transmitted from our MARS Mission — again this was mentioned previously — in 1998. With Pakistan, we are just exchanging information about the measurement of ozone density. I think that is our present status in international collaboration between ISAS and the foreign countries. For the future collaboration, this, I think, is very important. We should make our efforts to get further exchange of scientists and engineers. This should not be in an impulsive way. We should have a continuous collaboration basis. I think this is very important, and also if we do this, we might be able to go to carry out the experiment in the near future. Usually the international cooperation will start, as I said before, by drinking beer tonight, by chatting at a club. So, starting from exchange of scientists and engineers, we can go to the experiment. At that time, what we can do from now on, at the beginning, we should start from a simple beet, that means sounding rocket and sounding satellite, I think. This is what I mention here, balloon and sounding satellite. In terms of environment study, even with the sounding rocket and the balloon, we can do many science. I would just like to show you one example which we carried out in 1990, what we called Dynamics Adopted Network for Atmosphere. This was first proposed by Professor at that time, and he proposed to study all global meteorological phenomena and also the effect of meteorology on the ionosphere. This is the group which joined this DYANA campaign, and the total number of countries was 31 countries, and 70 people joined this campaign. This is in Indonesia. We could not launch the meteorological rocket from Indonesia. Instead of that, we used the radiosonde to measure the atmospheric temperature, wind velocity and something like that, and we carried it out between February and March in 1990. The temperature is shown in the 300 K. That means nearly 23 degrees, which is a very, very comfortable place I found in India. And this is for the lower atmosphere, and if we go to the equatorial region very often we see this kind of phenomenon. If we go to the atmosphere, ionosphere, this is a V, B, S, B, and you can see this is what we called scintillation. The radiosonde is disturbed by what we call plasmas. Sometimes starting from 8:00 o'clock in the afternoon, the ionosphere becomes empty. Then in this depleted (density region the plasma is very much disturbed, and the radio waves transmitted through that region, is very much disturbed like that. I think to study this phenomenon is important from the communications point of view. So, by using sounding rockets or a balloon, we can do many things. That is what I want to say. Finally, I would like to comment about the educational program. This is also I think very important because from space science we realize that this is only one place on which we live in the solar system. I am afraid that the earth is only one planet in the universe, so also we realize that from space science our earth is now being destroyed like the depletion of ozone, etc. So we should help. These are the facts to the people who are going to follow us, so I think that education of the people is very important. In this sense, ISAS is now producing television. We already made some materials, we are also going to continue this work for the children who will follow us. Thank you very much.

Chairman: Thank you very much, Dr. Oyama. With regard to the space science, you are always welcome to visit with us or place inquiries to us at the ISAS. I hope many of you will visit with us at our institution. Now, let's leave the topic of space science and go on to the last part, the next question or introduction part, should I say.

Chairman: Thank you very much, Dr. Oyama. With regard to the space science, you are always welcome to visit with us or place inquiries to us at the ISAS. I hope many of you will visit with us at our institution. Now, let's leave the topic of space science and go on to the last part, the next question or introduction part, should I say. First is about the space experiment. Is there anything that we can do in common in a cooperative way? The other one is the launching of satellite. In this area of Asia and Pacific, is there anything that we can do in common? Third is about the joint development of a small-scale engineering satellite which is similar to satellites done in Korea. I would like to hear from Japan whether they have certain suggestions on these topics or not. May I give the floor to NASDA, please.

Mr. Nakamura (Japan): Thank you very much. First of all, I would like to talk about microgravity experiment using small size rockets. I will limit the topic of experiment to this field. About 500 kilometers of payload can be exposed to non-gravity for about six minutes. Starting from 1993 one unit a year has been launched, and then there is the J-1 rocket which is being under development. Several hundreds of payload can be launched to the orbit. In these experiments using small size rockets, we would like to welcome participation of Asia-Pacific countries. Of course, joint development is another possibility, and we are interested in jointly performing experiments using small sized rockets. Another point is about the utilization of satellites. One is the utilization of extra room in nose fairing, then this extra space is surely utilized, efficiently utilized, and perhaps the observation sensor can actually conduct observation and certain experiments may be conducted using the extra space. There are five engineering tests satellite being launched by NASDA, and there is going to be another one, ETS-VI, and we hope that this could contribute to the development. Another point is piggyback. As I said earlier, development of J-1 and next year, or by the end of this year, launching of H-2 rocket is being scheduled. There is also extra room in this rocket. This extra payload may be utilized by the Asia-Pacific countries, and we are considering launching of satellites using piggyback rockets, and in that case launch operation and track operation could be reported, and NASDA is considering what we can do, and NASA is planning data transfer satellite. This is a plan for the future. Once the system is completed, I think this could be utilized to transmit data for earth observation, so this is one of the proposals that we would like to put to this forum.

Chairman: I think similar suggestions are being considered by Russia or China. I would like to ask if the delegates from these countries could also take the floor. I think a similar comment was referred to earlier.

Mr. Medvedchikov (Russia): I can enumerate some of the districts where we are interested. The first one is the study of Mars Project, astrophysical studies, including the solar terrestrial relations, and at present these projects are undertaken with a broad international cooperation. But, unfortunately, none of the countries present here are taking part in these projects. Various types of instrumentations for space meteorology, biology, medicine, these studies are carried out as on the manned space stations or as on the automatic spacecraft BYON, and we can incorporate additional instrumentations or experiments on these spacecraft. There is also the direction of processing materials in space. These experiments are also carried out on the manned space stations and on the specialized automatic satellite PHOTON. For the PHOTON and the BYON satellites, we have contracts with some countries so that they can place instrumentation on board the satellite, which is then brought back to earth and all the instrumentation and data is forwarded to the experiment. These are automatic spacecraft with descent capsules included. So this, in brief, are the major directions of development in this field, and we are ready to discuss any proposals of the countries present.

Chairman: Thank you very much. More concrete suggestions and requests for cooperation should have been discussed, I know, but since we do not have time to reflect ourselves, we cannot have a discussion that much, but three countries suggested about the possible areas where cooperation can be undertaken. It is unfortunate that countries who would like to ask for cooperation, their statements were not reflected today, but we are to have a half hour coffee break at this time, and perhaps over coffee you can continue your discussion on a personal level.

Chairman: Thank you very much. More concrete suggestions and requests for cooperation should have been discussed, I know, but since we do not have time to reflect ourselves, we cannot have a discussion that much, but three countries suggested about the possible areas where cooperation can be undertaken. It is unfortunate that countries who would like to ask for cooperation, their statements were not reflected today, but we are to have a half hour coffee break at this time, and perhaps over coffee you can continue your discussion on a personal level.

I am sorry that I was not the best chairman of the session and I am sorry that I could not meet the end of this session, but thank you for your cooperation.
Conclusion of Discussion

Mr. Fujita (Japan): We have just had a free discussion, and may I at this time present to you the summary, and may I ask Dr. Akih to do that.

Chairman (Dr. Akih (Japan)): Ever since yesterday we had heard from the representatives to this session the country presentations as well as free discussion and views, and we were able to see for ourselves clearly what are the expectations that Asia and Pacific countries have vis-a-vis space development and the need for strengthening cooperation and the problems which were also identified.

This session had been comprised of various majority of countries located in Asia and the Pacific which have interest in space development, and very valuable exchanges of view were held this time. I hope that in a continuous manner we can enjoy a forum like this in exchange views with one another, and I think this is a very important point.

Last year the Pre Asia-Pacific IST Conference and Asia-Pacific IST Conference were held. Many of the countries participated and many of the views were being represented. Presentations and discussions were made as to the possibility of international cooperation projects.

By having cooperation in Asia and the Pacific, we are to make further efforts so that projects can be realized, so may I suggest that this forum will be held regularly.

The second session of this forum is going to be held in Japan. I hope this is a proposal that I can make at this point in time. Any objections from any of you, or any views? Do you agree with me in holding the second session once again next year in Japan? I see none of you are nodding, so I assume you agree with me, so I take that unanimous agreement has been expressed.

(APPLAUSE)

Since we have gained your consensus, we would like to hold the second session in the coming year in Japan, and we would like to reflect on the results that we have attained this time so that they can be reflected on our second session and onwards.

Now, the summary of today’s session has been formulated by the Secretariat, and the Secretariat would like to make some explanations.

Mr. Fujita (Japan): I believe the Summary of the First Session of the Asia-Pacific Regional Space Agency Forum has been distributed to you. This is the draft version, may I remind you. As for the results of the free discussion that we had, Items No. 2 and onwards, that is to say pages 3, 4, and 5, represent the discussion part as well. Based on the views of the participants we have prepared a summary. This is the first draft which was made over a short period of time, so your views may not have been fully reflected here.

By the end of September if you can submit to us suggestions for modifications or comments, then you are welcome to do so, and we can incorporate that into a future draft.

The Concept of the Asia-Pacific Regional Space Agency Forum is another draft that we have distributed to you, I believe. This is something that the organizers have made, and you have all agreed to the holding of a second session of the same forum next year, and we have taken the liberty of formulating the views pertaining to that. The objective is stated there that in Asia and the Pacific space agencies and international organizations located there will take part together to hold a forum where space development can be utilized for the development of the regions concerned. The exchange of views and information will be made and also future possibility for cooperation, meeting the interest of the countries concerned, will be discussed. At the second page toward the very last, it was mentioned that the results or conclusions drawn thereof are non-binding. That is to say, that was just a conclusion or summary or possibility drawn from the free discussion held by the representatives of the space agencies of this region.

So as for the concrete forms of cooperation, the countries who are interested in it can get together and pursue further the exact possibility of cooperation, but, anyhow, for this draft, too, you are welcome to submit your suggestions or proposals for modifications by the end of September. Thank you.

Chairman: Lastly, may I say that I am thankful to all of you for taking part actively in this free discussion period. With this, we would like to conclude the discussion part. Thank you.

Mr. Fujita (Japan): Thank you very much. Now, the discussion is over. The representative from China, please.

Mr. Cheng (China): Thank you, Mr. Chairman. I would like to have some questions about the draft just given us 10 minutes ago. I would like to know what kind of documents we just received, and how we should proceed forward for these two documents. Thank you, Mr. Chairman.

Mr. Fujita (Japan): I would like to respond. First of all, the first draft regarding the Summary of the First Session, this is the summary which summarizes the agenda discussed at this forum. This was something which was prepared by the Secretariat.

We have just finished our discussion, which means that the contents of this draft need to be brushed up and polished further and refined further to reflect the accurate information, so if you have any suggestions as to the deletion or the modification or whatever in the draft, you are welcome to submit your views by the end of September to the Secretariat.

The second draft about the Concept will be treated the same. That is to say, it was decided that the second session will be held next year in Japan, so the Secretariat has taken the liberty of formulating the concept of this Space Agency Forum in Asia and the Pacific. This is a sort of presentation that the Secretariat is making to you. This is only a draft, so if you have any suggestions then please submit your views by the end of September to the Secretariat, and based on these views we will make modifications to these texts accordingly.

Does that suffice your question? I hope you understand our intent.

May I add that the summary draft is the summary of the discussion that we had this time and, of course, the country report presented by each of the representatives, which have been submitted to us by way of a report, will be attached to this report, and that set will constitute a finalized version of the materials for this session.

Anything else on these drafts? ESCAP, please.

Mr. He (ESCAP): Thank you. Mr. Chairman, ESCAP notes with great interest this regional initiative. I would like just to point out that from the time planning point of view, there are serious activities which I mentioned earlier because there is a big Ministerial Level Meeting or conference going on in September 16-24, 1994. Before that, we have serious preparatory activities. In May we have a Directors Meeting, in March we have Senior Officers Meeting so, knowing that, quite possibly there are quite a few developing countries would have the same faces to go to this meeting, we would like to take into consideration this schedule so that you can plan your meeting in a way that either this becomes a complementary or a further preparatory meeting, or become a kind of a meeting to follow up the Ministerial Level Meeting, rather than conflicting the time arrangement in order to have a good participation also to our Ministerial Level Conference. Thank you, Mr. Chairman.

Mr. Fujita (Japan): Thank you for your point out. We would like to take that into our consideration and contact the Space Agency Forum of this region and ESCAP so that we can settle on the best dates and schedule.

This was only the first session so we have undergone trial and error, so with regard to the schedules and agenda we would like to finalize them as we go consulting with you on a continuous basis. I hope this is agreeable with you.

Mr. Cheng (China): Thank you. I think that besides the forum there are also some other activities in our Asia-Pacific region, such as what Mr. He said, the Ministerial Conference to be held next September, and also there will be a conference on the Asia-Pacific Multilateral Cooperation in Space Technology and Applications which is to be held on January 14-18, 1994 in Bangkok, so we think these activities in our region should be coordinated with each other.

So I think the timetable for the forum or other conferences should be coordinated, and also the object and the topics of the conference or forum also should be coordinated. That could be all the activities in our region could be coordinated and support each other to promote the space technology and applications in our region to be forward. That is our opinion. Thank you, Mr. Chairman.

Chairman: Thank you very much for the view expressed by the delegate from China. I think it follows what the representative of ESCAP said. From the members of various space-related agencies, we would like to consult them and formulate the timetable and also consider the agenda and topics. Thank you very much.
Closing Remarks

Toshibiro Ishii
Director-General
Research and Development Bureau
Science and Technology Agency (STA)
JAPAN

Mr. Ishii (Japan): We are about to conclude this first session of the Asia-Pacific Regional Space Agency Forum today with the participation of more than 60 people, including 20 from the 14 countries in Asia and the Pacific Region and one international organization.

Through these two-day conference, we heard the reports from various countries regarding their national space development programs, and based upon such report very active exchange of views and significant discussion was held.

As I have mentioned in my opening remarks, we would like to do our best so that the valuable views and proposals expressed from you during this conference could be reflected in the future policy of Japan.

As requested from the countries who participated at this conference, I myself also earnestly hope and wish that this conference would continue and we have decided to have this meeting once a year so that various countries in Asia and the Pacific Region can convene together and to exchange information and views and to further strengthen the collaborative relationship in this space area in this region and strengthen our solidarity and, by doing so, contribute to the preservation of the global environment and also to develop the society and economies of various countries in this region, and we think that this is, indeed, very significant.

I would like to conclude this first session of the Asia-Pacific Regional Space Agency Forum by earnestly hoping and wishing that the space development will further be promoted in various countries and that all of you have the same aspirations as we are being involved in the same field, that is space.

Thank you very much.
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アジア太平洋地域宇宙機関会議のコンセプト（仮訳）

I．背景

1992年は、国際宇宙年(ISY)であった。ISYの目的は、宇宙
活動の結晶から得られる利益について社会の多くの人々に認識
してもらうこと及び宇宙開発の進歩に関係する国際協力の強化をすること
であった。

これらの目的に従って、プレ・アジア太平洋AIPC会議
(Pre-AIPC)及びアジア太平洋国際宇宙年会議(AIPC)はそれぞれ
1992年の3月及び11月に開催された。これらの会議を通じて、アジア
太平洋地域の諸国は、社会・経済的発展を促進する
ために各々の宇宙開発の進歩を加速させていること及び
この地域の宇宙開発の科学者及び技術者間の協力が大変
重要であることが指摘された。そのため、国際宇宙年会議の趣意
文において、1992年の国際宇宙年以降でのこのような協力努力を
目的とした会議を存続するため、日本は一国開催の「アジア
太平洋地域宇宙機関会議」を組織することを提案した。

アジア太平洋地域では、多くの国が多様なスペー
ス・プログラム、特に地域開発の分野におけるプログラムに関
わってきている。しかし、これらの国の政府高官が各々の国のス
ペース・プログラムについて意見及び情報を取り交換するため定期
的に会することはなかった。

このような背景において、第1回アジア太平洋地域宇宙机
関会議は、1993年9月9日から11日の日程で東京において、科学
技術庁(STA)、宇宙科学研究所(ISA)及び宇宙開発事業団
(NASDA)の共催で開催された。この会議には、アジア太平洋地
域の宇宙機関より出席があり、スペースプログラムに関する
発表や意見交換があった。

II．目的

APRSAFは、以下の観点を提供する。

2.1 アジア太平洋地域の宇宙機関及び国際機関の代表が集
まる場となること

2.2 宇宙技術及びその応用によってアジア太平洋地域の社
会・経済への貢献及び地球環境の保全のための方法を探
ること

2.3 国家のスペース・プログラム及び宇宙関連資源に基づく意
見及び情報を交換すること

2.4 アジア太平洋地域における宇宙機関等における宇宙
技術の現状及びその課題に関する情報共有を実現し、
共通の指針を設定及びその中における優先度を
決定すること

2.5 アジア太平洋地域における協力枠組みにおける連携
状況及びさらなる協力のためのプログラムに関する開
発・評価を行うこと

2.6 APRSAFの目的に対し支援をもたらすアジア太平洋地域
外の宇宙機関及び国際機関との協力の重要性を考慮、認識す
ること
第一回アジア太平洋地域宇宙機関会議のサマリー（仮訳）
(APRAS-1)
1993年9月9日～10日 東京

会議日程

日 時: 平成5年9月9日（木）～9月10日（金）
場 所: 芝パーキャン（東京）（会議場: 本館階「牡丹の間」、レセプション会場: 別館3階「アイビー」）
主 講: 科学技術庁、文部省宇宙科学研究所、宇宙開発事業団
協 力: （財）リモートセンシング技術センター

日 时: 9月9日（木）
9:30～10:20 レジストレーション
10:20～10:30 開会挨拶: 科学技術庁研究開發局長 石井 敏弘
10:30～10:45 基調講演: 宇宙開発事業団理事長 山野 章浩
10:45～11:00 申請報告: 科学技術庁研究開発局宇宙開発室室長 藤田 明
11:00～12:30 ナショナルスペースプログラム（オーストラリア、パングラデシュ、カナダ、中国（STSCC、CNSA））
12:30～14:00 午食
14:00～15:30 ナショナルスペースプログラム（ESCAP、インドネシア、日本（ISAS、NASDA））
15:30～16:00 コーヒーブレイク
16:00～17:30 ナショナルスペースプログラム（韓国（KARI、KAIST）、マレーシア、モンゴル）
17:30～20:00 レセプション

9月10日（金）
10:00～11:45 ナショナルスペースプログラム（パキスタン、フィリピン、ロシア、シンガポール、タイ）
11:45～13:30 午食
13:30～16:00 ディスカッション「アジア太平洋地域における宇宙開発に関する国際協力」
議長: 文部省宇宙科学研究所所長 秋葉 翔二郎
16:00～16:30 コーヒーブレイク
16:30～16:40 ディスカッションのまとめ: 文部省宇宙科学研究所所長 秋葉 翔二郎
16:40～16:50 閉会挨拶: 科学技術庁研究開発局長 石井 敏弘

(i) 1回目のアジア太平洋地域宇宙機関会議（APRAS-1）は、1993年9月9日から10日の日程で東京において開催された。この会議は、科学技術庁（STA）、宇宙科学研究所（ISAS）及び宇宙開発事業団（NASDA）により組織され、リモートセンシング技術センター（RESTEC）から協力を受けた。
(ii) オーストラリア、パングラデシュ、カナダ、中国、ESCAP、インドネシア、日本、キリバス、韓国、マレーシア、モンゴル、パキスタン、フィリピン、ロシア、シンガポール及びタイからの参加者が出た。
(iii) この会議の目的は、次のように分けてある。

(i) アジア太平洋地域における宇宙機関の代表者、一堂に会すること
(ii) チャレンジ・スペース・プログラムに関する発表を交換すること
(iii) この地域の国々の相互利益を求めるための協力の可能性を議論すること

4. 開会に先立ち、科学技術庁研究開発局石井敏弘局長は、全参加者に対して挨拶の意味を示し、これにこの会議の目的を説明した。宇宙開発事業団秋葉翔二郎会長は、基調講演を行い、アジア太平洋地域における国際協力の現状と将来の見通しを示した。科学技術庁研究開発局宇宙開発室室長藤田明氏は、アジア太平洋地域宇宙開発に関する国際協力の現状と将来の見通しを示した。

6. フリーセッションは、9月10日の午後に行われた。ディスカッションでは、宇宙科学研究所（ISAS）の秋葉翔二郎会長が議長を務め、以下の項目がその範囲となった。

(i) リモートセンシングの応用
(ii) 開発途上国における宇宙開発に関する国際協力
(iii) 太平洋地域における宇宙開発に関する国際協力
(iv) 欧州における宇宙開発に関する国際協力
(v) 他の地域における宇宙開発に関する国際協力

5. 各国のスペース・プログラムの発表において、特に次の事項を以下にある。

(i) 多数の国が、宇宙技術をその応用により利益を求めるためだけでなく、国の統合及び社会システムの改革のために大切であると考えた。
(ii) アジア太平洋地域での宇宙機関は、独自のリモートセンシング技術を持つべきである。
(iii) 一部の国は、その国の発展に寄与した分野でリモートセンシング技術を適用することにより、新しい観点を示した。
(iv) しかし、宇宙開発局としては、開発途上国におけるリモートセンシング技術の発展を促すことが重要であると、開発途上国から要求されている。
(v) 独立した国々によってリモートセンシング・データを受信し、一定の国々は、データを交換することでアジア太平洋地域の統一構想を進めることが可能である。
(vi) 中国、ロシア及び日本は、多様なリモートセンシングデータ開発計画を有しており、将来発展計画がある。カナダは、将来のリモートセンシング計画を有している。
(vii) これらの国の代表者、その国の広大な地帯を統一目的とする衛星計画の進捗について述べた。
(viii) 一部の国は、現在、発表及び小型関連及び実用化ロケット計画を進めて実施している。

(i) 一部の国は、この会議への参加を延期しているとの話がある。

6. フリーセッションは、9月10日の午後に行われた。ディスカッションでは、宇宙科学研究所（ISAS）の秋葉翔二郎会長が議長を務め、以下の項目がその範囲となった。

(i) リモートセンシングの応用
(ii) 開発途上国における宇宙機関の開発に関する国際協力
(iii) 太平洋地域における宇宙開発に関する国際協力
(iv) 欧州における宇宙開発に関する国際協力
(v) 他の地域における宇宙開発に関する国際協力

(2) 以下のような結果が達成された。

(i) 開発途上国に対するリモートセンシング技術の普及を図ること
(ii) 三国の国々は、その国の広大な地帯を統一目的とする衛星計画の進捗について述べた。
(iii) 一部の国は、現在、発表及び小型関連及び実用化ロケット計画を進めて実施している。
現在の協力プロジェクトについて述べた後, 小山副教授は
現状報告されている国際協力プロジェクト等を挙げ,
a) 日中 継続
b) サイエンス・テクノロジー 地上における観測
c) 対米国 緊急な科学プロジェクト
対ソ連 RAPP, ラジオ音信科学
対カナダ 動植物の実験
f) フィリピン サンプル箇所

将来の協力プロジェクトに関して, 宇宙科学における目的
の一部が小山副教授により発表された。

a) 日米の研究者のための国際科学プロジェクトを通じての
協力
b) 火災防止における協力
Ⅰ 火災防護学
Ⅱ 太陽物理学
Ⅲ 太陽風学
Ⅳ 宇宙物理学, 宇宙天文学
Ⅴ 生物学

その他の

牧野部長は, リモートセンシング観測, 南極観測, 宇宙科学等を目的として, 宇宙技術研究開発局の観測技術に関与するとともに, その他の協力可能性を検討することが必要であると提案した。

a) 宇宙実験

中村部長は, アジア太平洋地域の共同の助成による
発表論文実験でNSTAのF1と2の分野を利用可能となる
可能性について発表した。

b) 鉄道へのスペース - クラフトの打ち上げ

中村部長は, 世界のスケールを大きくすることを目指す
支援を求めることが提案した。

c) 実験衛星の共同開発

中村部長は, 世界のスケールを大きくすることを目指す
支援を求めることが提案した。

d) 実験衛星の共同開発

中村部長は, 世界のスケールを大きくすることを目指す
支援を求めることが提案した。

拡　会　演　講

7. 科学技術研究開発局の研究開発

実用化着目で, 宇宙開発全局, 石井 株弘

科学技術研究開発局長

参加

開会挨拶

科学技術研究開発局長 石井 株弘

開会挨拶

宇宙開発事業団理事長 山野 正宣

アジア太平洋地域宇宙開発会議にお集まりの皆様、
各拠点の方々のご理解, ご指導, ご協力のほど, 強力に
お願い申し上げます。
基調報告

これから、昨年3月の『アジア太平洋海洋科学会議』及び1月のアジア太平洋海洋科学会議の結果報告をいたします。

アジア太平洋科学会議及びアンサンプルが、昨年は日本で開催されたことがあり、今年も中国で開催されることとなっています。

アジア太平洋科学会議のよって、アンサンプルは海洋科学の発展に寄与することができるより、海洋科学の発展に寄与することができると考えています。

これにより、アジア太平洋科学会議及びアンサンプルは、海洋科学の発展に寄与することができるより、海洋科学の発展に寄与することができると考えています。

また、海洋科学の発展に寄与することができるより、海洋科学の発展に寄与することができると考えています。

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これにより、海洋科学の発展に寄与することができるより、海洋科学の発展に寄与することができると考えています。
一般公衆の宇宙活動に関する理解及び支援拡大では、宇宙開発機関は、宇宙通信とミッションを実施できます。多くの宇宙
機関は、宇宙技術、特にリモートセンシングによる一般公衆の
意識を高めている。また、宇宙技術を活かすこと
に、多くの国が多様な相互依存を持っています。

以上が、アジア太平洋地域宇宙開発協議会の報告です。

次に、昨年11月に開催されアジア太平洋地域宇宙
機関についてご報告いたします。この協議会は、我々が国を含め32
ヶ国、35機関機関より、90名に加わる参加者を、3日間開催さ
れました。会議の議題をここに掲載することは、時間的制
約上不可能であるので、今後の会議に伴う情報がある場合
「アジア太平洋地域における宇宙開発」で行われたパネル
ディスカッションについて簡単にご報告いたします。

このディスカッションにはアジア太平洋地域に加えて、
（オーストラリア、オランダでアーサー、中国、インド、インド
ネシア、日本、韓国、フランス、フィリピン、シンガポー
ル）が参加し、活発な意見交換が行われました。

美しくして限りのある地球を次の世代に残すために、
地球環境の保全と経済成長の関係の重要な役をアジア
太平洋地域が果たし続けることが求められています。こ
のため、宇宙技術が果たす役割が非常に大きいことが認識され
ました。

アジア太平洋地域において重要な宇宙技術はリモートセンシング、通信、科学観測の分野です。特に、リモートセンシングの技術は地球観測の分野で、国際的な観察対策多
数の社会経済的観測の分野でも重要な役割を果たしています。これらの
課題はアジア太平洋地域の持つ国固有の課題を含み、重要な
課題であります。このため、各国の政府は一
体となって、関係機関での検討を進めてみつつ、アジア太平洋地
域の宇宙開発計画と国際協力の推進について議論し、共通
の理解と具体的な行動計画を作っていくことが重要と考える
ので一歩進みました。そして、そこで得た動機に基づき、この第1
回アジア太平洋地域宇宙開発協議会が開催されることとなりま
す。

次に、宇宙技術について少し逐次的にいくつかの問題
が更に進められます。その中は、地球観測データに対するアクセス
の問題です。地球観測の国際安全対策の問題と宇宙観察国
の関係の建設という観点を踏まえて、どのようなリーチ
で観測を横断的に行うかが重要であると考えた。

特に、地球観測の重要性である観測、オプション等の
観測技術の課題につき、現在計画されている地球観測のため
の観測を行う計画を進めていくことが必要であると提案
され、また、特に、アジア太平洋地域の諸国からは、災害の監
視、灾害の観察等、地域のニーズに対応した観測の打ち上げ
の重要性が要求されました。

第3は、衛星通信、地球観測等に基づき認識として宇宙観察
国と国際観光との要件の技術環境の構築課題があります。それぞれ
の国々のニーズに配慮し、かつ、それぞれの国々の技術レ
ベルに即した議論等について議論することが必要と指摘され
ました。このため、各国で地域ルールの検討が進められる
とその重要性であり、また、具体的な技術移転として、専門家
レベルでの技術移転を専門家研修に、さらにこれを共同作業と
いったことが技術的に実施されることが必要との認識が表明さ
れました。

更に、各国間の議論を通じての国際協力への参加、連携
の重要性とともに、CEOS等、宇宙観測領域の技術開発、情報
交換への支援があります。前記のアジア太平洋地域共有のニ
ーズの反映や、CEOS活動へのアジア太平洋地域からの参加と
いったことについて、CEOS等の技術的な調査や報告に、検討
されることが必要性が推進されました。

以上がアジア太平洋地域宇宙開発協議会の報告です。

図1 GMS地上局

As of September 1993
図5-7 韓国宇宙活動組織

<table>
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<tr>
<th>Organization</th>
<th>Mission</th>
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</thead>
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<tr>
<td>Korea Aerospace Research Institute (KARI)</td>
<td>- Development and System Integration of Satellite and Scientific Rocket</td>
</tr>
<tr>
<td></td>
<td>- (Design, Test, Assembling)</td>
</tr>
<tr>
<td>Electronic Telecommunication Research Institute (ETRI)</td>
<td>- Development of Communication Instruments for Satellite and Earth Receiving Instruments</td>
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<tr>
<td>System Engineering Research Institute (SERI)</td>
<td>- Research of Remote Sensing Technologies</td>
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<td>Satellite Technology Research Center (STReC) in Korea Advanced Institute of Science and Technology (KAIST)</td>
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<td></td>
<td>- Operation of KoreaSat</td>
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</tbody>
</table>

図5-8 マレーシア宇宙活動組織

Cabinet

Ministry of Science, Technology & Environment

MACRES (Malaysia Centre for Remote Sensing)
Director: Mr. Nik N. Mahmood

図5-9 パキスタン宇宙活動組織

Space Research Council (SRC)
Headed by Prime Minister

The Executive Committee of the SRC
Headed by the Federal Minister for Finance

SPARCO
(Space & Upper Atmosphere Research Commission)

SPARC
(Space Applications & Research Centre)

図5-10 フィリピン宇宙活動組織

CABINET

NATIONAL COORDINATING COMMITTEE FOR REMOTE SENSING
Members: DENR, DOST, DA, NAMRIA, DND, LUP and PAGASA
(Created until 1994)

Department of Science and Technology (DOST)

Department of Environment and Natural Resources (DENR)

Philippine Council for Industry and Energy Research and Development

National Mapping and Resource Information Authority (NAMRIA)

National Remote Sensing Project

Remote Sensing Department

Coast and Geodetic Survey Department

Information Management Department
ディスカッション「アジア太平洋地域における宇宙開発に関する国際協力」

講演：宇宙科学研究所長 風見 徹二郎

中丸（NASDA）それでは、日本のリモートセンシングにかかわる現状につきまして、あるいはこれに関連して私、宇宙開発事業団の-mouthにかわりまして、私の方から報告させていただきます。

日本のリモートセンシングにかかわる点で、これまで3次元計測を含めますが、日本の地球観測計器計測は1987年にMOS-1が行いました。1990年12月に、このバックアップ機でありますMOS-1Bもありますから、これは1990年に打ち上げられ

ておりますが、海面観測、地表観測、環境観測などに役立つデータを、現在では2機でもお送りしております。引き続き2機を打ち上げる予定であり、NASDAの技術開発、実用化の観点から、地表観測データを用いた国土の現状を確認することを目的としていることに

するようお願いをいただくことといたしまして、大学や研究機関、産業界と連携を図る。この国際協力も含め、地球観測データを用いた地球環境の監視と検証に役立つものと考えております。

さらに、1997年を目途として、日米共同プロジェクトとして準備されているですが、地球観測衛星計器（TRMM）が打ち上げられます。TRMMは、地球観測の計器開発の必要性を含め、地球観測データを用いた地球環境の監視と検証に役立つものと考えております。
論文の内容は、RIS（RAADSTARS International）の略称で、これはバーチャルベースに位置しており、組織として成長を支えています。また、他の国際団体とも連携しており、アジア地域の国々とも協力を行っています。

数値は、詳細なデータを支えます。

国際的な観点においては、RISは、国際団体の一部として、国際的な視点を提供することができます。

論文の目的は、RISが国際的な観点において、国際的な観点を提供するための国際団体の一部として、国際的な観点を提供することができます。

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インドアドレインは、良い陸上を保持しております。しかし、高齢があり、いつも考えているということなので、大変です。テクノロジーの発展が進む中で、これ以上手間を取らないと困るのです。

民主党政権は、他党的対立を強くするため、政策を推進しようとする傾向があります。そのため、反対派の立場からみて、政策の持続性が問われる状況です。

民主党政権が、他党的対立を強くするため、政策を推進しようとする傾向があります。そのため、反対派の立場からみて、政策の持続性が問われる状況です。

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オープン・スクリプト活用が期待されていますが、それを実現するためには科学的な分析技術やコミュニケーション能力が必要であると思います。オープン・スクリプト活用のためには、データベースの構築やアクセス制限の緩和、オープン・スクリプトの活用を推進するための制度・ルールの整備が不可欠であると考えます。
宇智宮の事業をやっておりますので、それについて御質問
させていただければと思います。

PARTNERS㈱という業者ではなく、ETSの名前を用いた公財
宇智宮の事業をやっておりますので、それについて御質問
させていただければと思います。

※PARTNERS㈱の名称変更

PARTNERS㈱は、技術開発と製品化に関する技術開発
関連のための包括的なソリューションや、インターネット
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あらためての衛星計画99号に付言させており、カナダの技術者と協力協力中です。
また、気象観測についてはもう少し詳しく訴えるが、その詳細は後日発表する予定です。
1996年の衛星計画96号では、水素ガスのトレーサーとしての使用を検討しており、これにより水素ガスのトレーサーとしての使用が可能となることでしょう。
水素ガスのトレーサーとしての使用が可能なことは、計画の進捗を促進する重要な要素です。

以下に、地球規模の観測について報告させておきます。この地球規模の観測において、我々は水素ガスのトレーサーとしての使用が可能なことを確認した。

まず、気象観測については昨年より検討しており、これにより水素ガスのトレーサーとしての使用が可能となることでしょう。

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ディスカッションのまとめ

藤原（STA） 先ほどございましたディスカッションのまとめを、秋葉先生のもとにお伺いいたします。

秋葉（ISAS） 本講座にご出席いただきたい代表の方々から、昨日のディスカッションについてご意見をいただきたいと思います。故国の方々にご出席いただきたい点、今後の協力の期待など、ご意見をいただければ幸いです。ご質問でも承りますので、どうぞお越しいただきたいと思います。

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閉会挨拶

科学技術庁研究開発局長 石井 靖弘

第1回アジア太平洋地域宇宙開発会議は、アジア太平洋地域の44ヶ国、100数機関からの200名を含む60名を超える参加を得て、本日、ここに閉会を迎えようとしています。

2日間の会議を通じて、各国からそれぞれの宇宙開発計画の報告があり、それに基づきまして、活発な意見交換が行われ、非常に有意義な議論が行われました。私が、開会の挨拶で述べましたように、この会議の結果得られた成果が、より一層のご提案を今後の我が国の政策に反映すべく、誠意払って参りたいと考えています。

本会議に参加いただきました皆からもご愛戴を賜り下さったように、私という会議が進行的に開催されることを切に願っております。アジア太平洋地域の各国が毎年1回定期的に集い、お互いに情報交換と意見交換を行い、今後の宇宙分野における協力の促進と協力関係の強化することによって、地域間の経済の発展及び地域環境の保全に寄与することは、大変有意義なことだと考えます。

各国の皆様、私どもも共同宇宙開発促進を行う場の存在の一方として、私と同様の期待を持たれていると信じつつ、今後の各国の宇宙開発の一層の発展を祈念致します。第1回アジア太平洋地域宇宙開発会議を終了致します。ありがとうございました。
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<td>Asia Association of Remote Sensing</td>
<td>亚太遥感协会</td>
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<td>2. AEP</td>
<td>Aeronautical Data Bank</td>
<td>航空数据银行</td>
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<td>3. ADG</td>
<td>Advanced Digital Gazetteer</td>
<td>高级数字地图集</td>
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<td>4. AES</td>
<td>Assembly, Integration &amp; Test Center</td>
<td>组装、集成与测试中心</td>
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<td>5. AGO</td>
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<td>6. APMSIA</td>
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<td>亚太卫星应用论坛</td>
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<td>8. AP</td>
<td>Australian Pacific Space Conference</td>
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<td>9. APPG</td>
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<td>10. BNS</td>
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<td>Chinese Earth Observation Satellite</td>
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<td>China International Exchange Centre for Space Science and Technology</td>
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<td>Centre National d'Etudes Spatiales, France</td>
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<td>16. CSIR</td>
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<td>24. EPS</td>
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<td>地球资源观测系统</td>
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<td>European Project for Space Studies</td>
<td>欧洲空间研究项目</td>
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<td>Financial Panel</td>
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<td>27. FOMES</td>
<td>International Finance Corporation</td>
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<td>28. GEOS</td>
<td>Global Environment Observing System</td>
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<td>29. HIRIS</td>
<td>High Resolution Imaging System</td>
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注：此列表为部分缩写，完整的列表请参考相关资料。