ASIA-PACIFIC

SPACE OUTLOOK

No.5 SPECIAL ISSUE JULY 2005

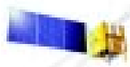
China Academy of Space Technology

CAST Overview

CEO & President Yuan Jiajun

CAST is the largest spacecraft and ground equipment supplier in Asia. CAST provides the integrated resolution of space systems for the customer, manufacture spacecrafts and ground application equipment in accordance with the customer's requirements, conducts long-term operation management for space segments, and provides various space services.

CAST has over 30-year experiences in spacecraft and ground equipment development, and has strong research and manufacture capability. CAST has established a world leading AIT center, and has shaped a comprehensive spacecraft development system which including spacecraft system design, subsystem development and manufacturing, AIT, environment test, ground equipment manufacturing. CAST owns international level test facilities that can provide self-contained test environment and test services. CAST has corresponding business training system that can provide satellite technology and engineering management training.



Contact

International Market and Cooperation Div.
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Email:market@cast.cn

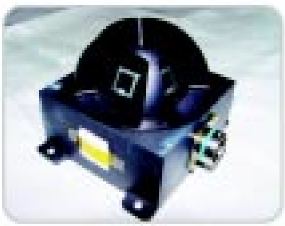
Space Segment

Platform

CAST is capable of developing various satellite series and manned spacecrafts, and have manufactured and operated one manned spacecraft series and six satellite series, including communications satellites, recoverable satellites, meteorological satellites, navigation satellites, earth resource satellites and scientific & technological test satellites. In the future 5 years, more than 100 satellites and manned spacecrafts will be manufactured. CAST is capable of designing and manufacturing satellites according to the requirements of customers, providing delivery in orbit and long-term operation management service of space segments.

According to customer's requirements, CAST can provide satellite products of various levels, including satellite platforms, payloads, subsystems, equipment and components, and related test equipment.

Components



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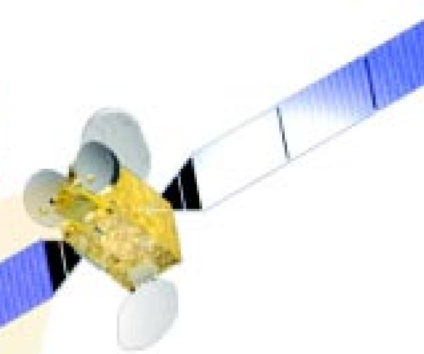
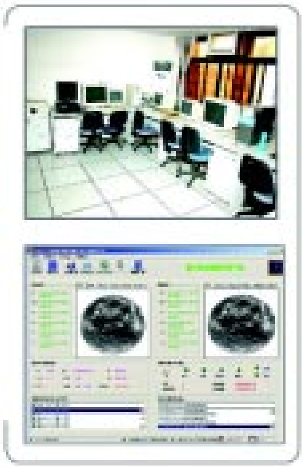
Ground Segment



CAST is capable of building ground infrastructure, manufacturing ground equipment and operating ground application system. CAST can design and develop satellite ground engineering of various scales for customers, and provide satellite communication transmitting and receiving equipment, remote sensing data receiving and processing equipment, satellite navigation data receiving terminal. CAST can undertake integration of various satellite ground application systems and provide operation service of ground systems.



Satellite Remote Sensing Image Processing Lab

Satellite Television Broadcasting Operating and Service

Ground Application System Integration

Onboard Navigation Positioning Terminal

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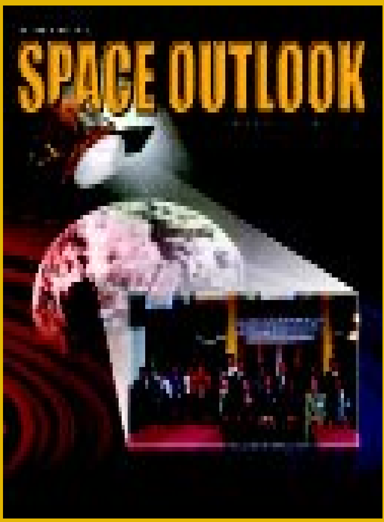

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It will introduce the latest progress of space science, technology and its application in Asia-Pacific region and worldwide.

CONTENTS

Secretariat's Delegation Visited Mongolia

At the invitation of the Information and Communications Technology Authority (ICTA) of the Government of Mongolia, Deputy Secretary-General Wang Keran and Professor Yang Weiyuan, Chief Expert on Space Systems Engineering from the Secretariat of AP-MCSTA, visited Mongolia in March 2005. They met members of the Mongolian Parliament and governmental advisors, and visited the Ministry of Finance, Ministry of Foreign Affairs, the National Disaster Management Agency and the National Remote-Sensing Center, etc., clarifying important aspects of the APSCO Convention, as well as briefing officials on the latest progress and future plans for Asia-Pacific Multilateral Space Cooperation. The Secretariat of AP-MCSTA signed the cooperation MOU with ICTA on further promoting the signing of the Convention by the Government of Mongolia, Remote Sensing Applications and Education Training Cooperation.

Mr. Wang Keran Visited Indonesia

On April 15, 2005, Mr. Wang Keran, the Deputy Secretary-General of the Secretariat of Asia-Pacific Multilateral Cooperation in Space Technology and Applications (AP-MCSTA), visited the National Institute of Aeronautics and Space (LAPAN) in Jakarta, Indonesia, where he held a meeting with officials and experts concerned.

The First Experts Group Meeting on APSCO Future Plans Held in Bangkok

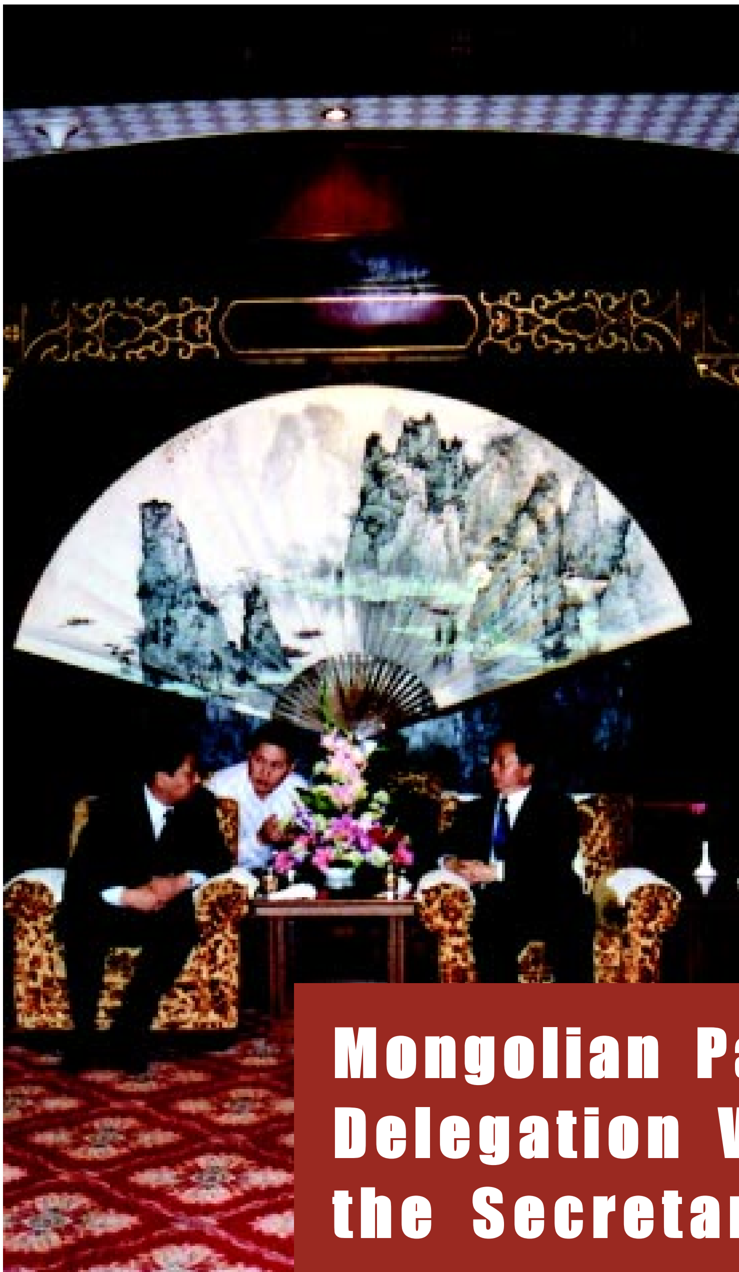
In order to provide Asia-Pacific countries with a clear view of APSCO's future endeavours for the 5-to-10-year period starting from the year 2007, when the activities of APSCO will formally commence, the Secretariat of AP-MCSTA invited scientific and technological experts from countries in the region to participate in the 1st Experts Group Meeting on Future Plans (EGMFP-1) for Space Activity and Development relating to APSCO. The meeting was jointly organized by Thailand's Ministry of Information and Communication Technology (MICT), and the Secretariat of AP-MCSTA, and held in Bangkok, Thailand, from April 26-28, 2005. The meeting was attended by delegates from Bangladesh, China, Indonesia, Republic of Korea, Malaysia, Mongolia, Pakistan, Peru, the Philippines, Thailand and the Ukraine, and included observers from UNESCAP and the Secretariat of AP-MCSTA.

High-level Expert Group Meeting held in Thailand

A High-level Expert Group Meeting on Technical Options for Disaster Management Systems: Tsunamis and Others', organized by the UNESCAP, was held in Bangkok, Thailand during June 22-24, 2005 to promote regional cooperation and networking for natural disasters management in the region and to improve national capacities in disaster prevention, monitoring, mitigation and overall preparedness and response. The OCHA, TSB/ITU and AP-MCSTA co-sponsored this meeting. A total of 78 participants representing governments, inter-governmental organizations, UN agencies, academic institutions and equipment manufacturers gathered for 3 days in Bangkok and discussed various issues and options for disaster management and mitigation efforts in the Asia and Pacific region. Mr. Wang Keran, Deputy Secretary-General of AP-MCSTA Secretariat was elected as Vice Chairman of this meeting and made a statement on the Asia-Pacific Space Cooperation Organization (APSCO).

Training Courses for Mongolian and Indonesian Participants on Earth-Observation Ground System Technology and Applications

The Secretariat of Asia-Pacific Multilateral Cooperation in Space Technology and Applications (AP-MCSTA) along with the Academy of Opto-Electronics (AOE), of the Chinese Academy of Sciences (CAS), jointly organized two separate training courses on Earth-Observation Ground System Technology and Applications, for Mongolian and Indonesian participants, in Beijing in May 2005. The courses provided participants with basic training in the ground system technology of space engineering as well as in remote-sensing applications. Through this training course, participants gained familiarity with both the theoretical aspects and practical uses of ground system technology for space engineering, which should enable them to integrate these subjects into their daily work.



Mongolian Parliamentary Delegation Visited the Secretariat of AP-MCSTA

At the invitation of Professor Luo Ge, Secretary-General of the Secretariat of the AP-MCSTA, the Mongolian Parliamentary Delegation headed by Mr. Zorigt, Head of the Mongolian-Chinese Parliamentary Group, visited the Secretariat of AP-MCSTA from May 23~28, 2005. During their stay in Beijing, the delegation also visited some space facilities, including China Space City, Beihang University, the Remote-Sensing Satellite Ground Station of the Chinese Academy of Sciences, and the China Centre for Resource Satellite Data and Applications. Delegates said this visit helped them realize the necessity and importance of the establishment of the Asia-Pacific Space Cooperation Organization (APSCO).

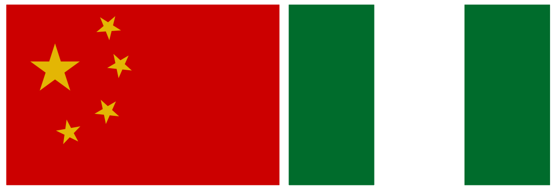
President of the Pathumwan Institute of Technology of Thailand Visited the Secretariat of AP-MCSTA

Dr. Suthi Aksornkitti, President of the Pathumwan Institute of Technology, heading a delegation from Thailand, visited the Secretariat of AP-MCSTA, the China Space Museum and the Chinese Academy of Sciences' Remote-Sensing Satellite Ground Station on June 2~ 3, 2005.

Delegation from the Secretariat of AP-MCSTA Visited SPARRSO

On April 20, 2005, The delegation from the Secretariat of AP-MCSTA headed by Mr. Wang Keran, the Deputy Secretary-General of the Secretariat of AP-MCSTA, visited a Ground Station of the Bangladesh Space Research and Remote-Sensing Organization (SPARRSO) in Dakar, Bangladesh , accompanied by Mr. Abdul Halim Ahmed, Chairman of SPARRSO(right).

China to Export First Chinese Satellite



China will sell a communications satellite to Nigeria, the first overseas buyer of a satellite made by the China Aerospace Science and Technology Corporation (CASC).

According to the deal signed on December 15, 2004 between Nigeria's Space Administration and the China Great Wall Industrial Corporation, the satellite is called the Dongfanghong (DFH) No.4.

The satellite, which has 28 transponders, will be sent into orbit by a Long March (LM) 3B rocket at the Xichang Satellite Launching Center, in southwest China's Sichuan Province.

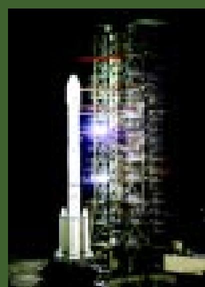
As part of the deal, China will also launch the satellite atop its Chinese-made Long March launch vehicle.

The satellite will be monitored and tracked by a ground station in Abuja, the capital of Nigeria, and a ground station in Kashi in northwest Xinjiang Uygur Autonomous Region.

Since 1985, China has launched more than 20 commercial satellites and sent 30 foreign satellites into space using Long March launch vehicle.

China announced in 1985 its decision to enter the international commercial launch market, and successfully launched the US-made satellite AsiaSat-1 in 1990.

China Launched APstar 6



China launched the APstar 6 at the Xichang Satellite Launching Center, in the southwestern province of Sichuan on April 12, 2005. It was the country's first commercial launching of a telecommunications satellite since 1999.

The Long March 3B is the most powerful in the Long March family rockets, able to deliver a load of as much as 5,100 kg into orbit, and is set to meet a wide range demands in the world market for commercial launchings.

It has been the 84th launch of the Long March series, and the 42nd successful application of Long March rockets since October 1996.

The APstar 6 is manufactured by the French company Alcatel for the owner-operator APT Satellite Company Ltd., Hong Kong. The China Great Wall Industry Company is the general contractor for the project.

The company will also launch the APstar 6B with a Long March 3B, according to sources in the Great Wall Company.

The APstar 6 is 4,600 kg in weight and has 38 C channel transmitters as well as Ku channel transmitters.

China has signed contracts for more than 20 commercial launches of overseas satellites for a dozen foreign countries and regions. The APstar 6 is the 30th overseas satellite launched by Chinese rocket carriers.

Indonesia launched First Self-Made Rocket

Indonesia launched its first self-made rocket from the West Java-based rocket launching pad on June 1. The rocket was built by the National Institute of Aeronautics and Space (LAPAN), which had planned to launch nine rockets on June 1 and June 2. It was not clear whether the rocket development was part of the Indonesian military's initial program to produce its own missiles intended for the navy.

The launching was attended by West Java territorial military commander Mayor Gen. Sriyanto and West Java vice governor Nu'man Hakim.

Earlier, the Indonesian navy had said that it would develop its own missiles in cooperation with the LAPAN.

TC-2 (Exploration-2) handed over

On April 18, 2005, the TC-2 hand-over ceremony was held in Beijing.

As a result of the continuous untiring efforts of all concerned technicians, and after the smooth completion of its research work, manufacture, launch, in-orbit testing and trial operation, the TC-2 was formally handed over to the users.

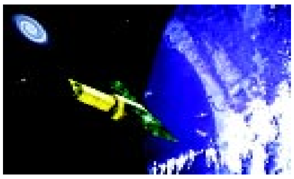
From the time the TC-2 was launched in July 2004, it has achieved many innovative observation and analysis results. Through implementing the Double Star Project, China's technological level in space exploration has improved rapidly. As an important part of the international space exploration program, the Double Star Project was carried out in close coordination with the Cluster II mission of the European Space Agency(ESA), achieving for the first time in the human history three-dimensional Earth observations from six different positions, and securing substantial advanced scientific data from multi-space layers and multi-space scales, and related ground observation data. These achievements have greatly improved the status, influence and strength of China in the international space community.

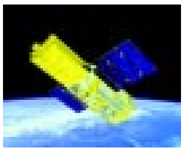
The Administrator of the Chinese National Space Administration (CNSA) Dr. Sun Laiyan, Vice-President of the Chinese Academy of Sciences (CAS) Dr. Cao Jianlin, representative of ESA Ooster Linck, along with the chief engineers of the Double Star Project Engineering, all attended the hand-over ceremony.

Scientific Satellite 'ASTRO-EII'

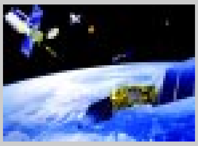
The ASTRO-EII satellite is in its final phase before its launch from the Uchinoura Space Center, located in the Osumi Peninsula in east Kagoshima, Japan. In mid-May, the satellite left Sagamihara campus, where it was developed, made a stop at the Tsukuba Space Center, and is expected to arrive at the Uchinoura Space Center on May 26. The satellite team is gradually making their way to Uchinoura with the satellite, in order to carry out launch site operations for the launch scheduled on June 26.

The ASTRO-EII is an astronomical satellite for studying X-ray sources in space. It will observe various celestial objects including black holes, galaxies, novi and supernova remnants. The ASTRO-EII project is an international mission led by JAXA's Institute of Space and Astronautical Science. After its launch, the satellite will be operated as an in-orbit observatory, which will be available to various countries. The project is the result of cooperation among researchers mainly from universities in Japan and the US, among other countries. As the ASTRO-EII has the capacity to interpret radiation sources from X-rays, it is expected to herald a range of scientific achieve-ments.





China & EU to Sign 7 Contracts in Galileo Program



The cooperation between China and the European Union (EU) on satellite navigation is 'vitally important' ,which predicts a very bright future.

The seven projects in the areas of space, ground and applications will be contracted to Chinese companies and organizations by the end of July.

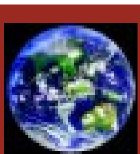
The first test satellite for the program will be launched by the end of this year, and China will send experts to attend the launching ceremony.

The EU and the European Space Agency launched the Galileo Program in March 2002 to develop a satellite-navigation system independent of the Global Positioning System (GPS).

With an investment of roughly 3.5 billion Euros, the program will launch 30 navigation satellites to provide remote-sensing data with a resolution of up to 1 meter. The EU estimates that by 2020, the Galileo Project will bring Europe tens of billions of euros in revenue, as well as tens of thousands of job opportunities.

According to the cooperation agreement, China has pledged investment in research and development on space technology, ground equipment and application systems for the Galileo Program.

As the first non-EU partner in the program, China has agreed to invest 200 million Euros, including 70 million euros in the first phase of cooperation.



Satellite Put into Service Combating Floods

A Chinese satellite was recently put into service to send top-quality photos to help monitor the country's approaching main flood season, according to the country's weather watchdog.

The Fengyun-2C, a synchronous meteorological satellite, exclusively designed, manufactured and launched by China, commenced operation on June 1, playing a significant role in monitoring the cloud and ground situation in flood areas in southern China.

It is said that it is capable of sending back clear nephograms and high-quality data results, which will help provide effective meteorological services during the main flood seasons.

The Fengyun-2C has monitored heavy rainstorms and the ensuing floods in southern China.

The Fengyun-2C is scheduled to begin collecting and sending back information related to rainfall, wind and clouds continuously after June 15, and will focus on the monitoring of elements including typhoons, precipitation, fire, drought, fog, snow and hail.

The Joint Development of SMMS

Following talks in November 2004, then January and February 2005 in Xi'an, Beijing and Bangkok, between Chinese and Thai delegations (see pp.10 & 20 in Special issue No. 4 of Space Outlook), both sides had further discussions on the joint development of Ka-Band Experiment Sub-system (KABES). It has been decided to build up KABES through joint efforts, in order to speed up its development process and assure its success.

The discussions focused on documentation, including specifications and statements of work (SOW) for facilities onboard the spacecraft as well as on the ground.

Kasetsart University (KU) of Thailand will jointly develop KABES onboard and ground equipment with the Xi'an Space Radio Institute of Chinese Academy of Space Technology (CAST). KU will send group experts and technicians to Xi'an for joint design work, and then to Beijing for participation in Small Multi-Mission Satellite (SMMS) assembly, integration and tests (AIT). Through this process, the group will formulate a better understanding of SMMS development.

On April 28, 2005, the documents for KABES joint development were signed at Kasetsart University. At the signing ceremony, Professor Zhang Wei, Deputy Director-General, Department of System Engineering of the CNSA, and Dr. Sandi Wiriyawit, Vice-President of KU, both spoke, reiterating that they will fully support joint development. The Pre-CDR will be held in Xi'an soon, with the arrival of the first group of KU experts.

Joint development will promote closer cooperation in space technology development and its applications between the two countries, as well as benefit Asia-Pacific countries with the SMMS applications in orbit.

On April 22, 2005, delegates from the Iran Space Agency (ISA), headed by its Deputy President, Mr. Ahmad Talebzadeh, visited CAST. Both sides exchanged further ideas on SMMS cooperation.

Research and Development of China's Space Industry:

Strategy, Policy and China-EU Cooperation

By Zhang Qingwei,
President of China Aerospace
Science and Technology
Corporation (CASC)

Strategy and Policy

Since its creation in 1956, China's space industry has always been committed to independence, exploring a path of development with distinctive features suitable to its national conditions, while making many significant achievements. With the rapid development of the country's economy, China's space industry has begun to fully integrate itself into the broader economic and social development, scientific and technological progress and related industrial sectors, developing into a strategic industry with the capacity to increase overall national strength on a grand scale.

The main global trend in space exploration in the 21st century is development and cooperation. In order to seize the strategic opportunities presented by this, the Chinese government has carried out a number of major programs and projects for promoting space development and achieved new leaps in space technology, out of which an industrialization development structure has gradually taken shape. Meanwhile, the Chinese government has encouraged enterprises to develop their international exchange and cooperation based on independence and self-reliance, and to follow the principles of equality, mutual benefit and co-development.

The CASC is a large group of enterprises that combine together research and development (R&D), manufacturing, operations and services, and involve many types of industries. Guided by industry-based science and technology, the CASC has built up and continuously strengthened its core competence and sustainability through scientific and technical innovation, establishing and continuously elevating the principal status of innovation and market forces. With the goal of advanced industrialization, the CASC has actively promoted the transfer of space science and technology results to different areas of application. Attaching due importance to the driving and illuminating role of space high technology, the CASC has effectively fostered the emergency of distinctive industry while continuously expanding into the industrial and service sectors.

The CASC has demonstrated its willingness to adopt an open and practical attitude towards participation in large international space programs as well as industry R&D, and to establish diversified commercial partnerships with results-sharing and risks-sharing, which can help realize a win-win situation, subject to the relevant legal frameworks as well as mutual respect for intellectual property.

Historical and Contemporary Conditions for International Cooperation

Alongside China's reforms and opening to the outside world, China's space industry has entered the international market.

International satellite launch service

From the time the Long March launch vehicles entered the international commercial satellite launch market in October 1985, the CASC has successfully developed its LM-2E and LM-3A/B/C launch vehicles, launching 28 foreign-made satellites and becoming an important addition to the international commercial satellite launch market.

China-Brazil cooperation

Following the first and second China-Brazil Earth Resource Satellite (CBERS) satellites, China and Brazil signed an agreement on CBERS-3 and 4, and are continuing their joint efforts to further develop the CBERS satellite series.

Nigerian Communications Satellite

In December 2004, an in-orbit delivery contract for a telecommunication satellite (NIGCOMSAT-1) was signed with Nigeria - a milestone for China's space industry in it's to entry into the international market.

China-EU cooperation

Since 1980s, China-EU cooperation in space industry has been maintaining a positive momentum in development while obtaining significant and fruitful results.

- In the 1980s, China provided piggyback services for French-controlled life-support systems and microgravity measuring instruments with its recoverable scientific test satellite for scientific experiments, producing some inspiring results.
- Projects such as the DFH-3 and SinoSat-1 satellites are successful examples of China-EU cooperation.
- The TC-1 and TC-2 satellites under the China-EU 'Double Star Program' were successfully launched in December 2003 and July 2004, respectively, starting a new chapter in China-EU cooperation for space science research.
- Within a governmental cooperation framework, the CASC has been partici-

pating in the European Galileo program in space segment and application fields, thus further expanding the scope of cooperation.

- In April 2005, the CASC successfully launched the French-made Alcatel APStar 6 communication satellite with its LM-3B launch vehicle, marking a solid step forward in six years for China's international space launch program.
- The CASC and the French Thales have established their joint venture, AeroThales Technology Co. Ltd., to provide ground-vehicle navigation and operation services, making substantial progress in cooperative development of their satellite navigation application industries.
- The CASC-EADS space joint venture EurasSpace is another example of successful cooperation in manufacturing satellites and related test equipment.
- The CASC set up its representative office in Europe in February 2003. Through this office, CASC-European cooperation will increase and strengthen.

The CASC has regarded Europe as its most important strategic partner and conducted broad and comprehensive cooperation in many areas with aerospace companies and other enterprises from EU countries such as France, Germany, Britain, Italy, Spain, Belgium and the Netherlands, obtaining successful results while laying a solid foundation for the future.

Proposals for China-EU Cooperation

With the new century, China's space industry has entered an innovative high tide in development. The CASC will be more active in R&D activity in such areas as space transportation, satellite manufacturing and applications, deep-space exploration, manned space flight, and space science research, as well as creating more opportunity for further bilateral and multilateral cooperation between China and Europe in space.

Towards a further strengthening of China-EU cooperation, we propose:

- To establish an intergovernmental mutual trust and communication mechanism, taking as entry points major programs such as manned space flight, lunar exploration programs, space science and launch services, thus promoting China-EU cooperation in the space industry in order to achieve breakthroughs at even higher levels.

- To strengthen mutual exchange and understanding between Chinese and European space enterprises, so as to promote the building of inter-enterprise cooperation through organizing and establishing long-term cooperative mechanisms with an emphasis on strengthening cooperation in related industry areas, such as complete satellite or components manufacturing and commercialization, along with integrated space information applications.

- To jointly explore and practice patterns of cooperation, toward strengthening inter-enterprise cooperation in areas such as operation and management, cultivation of talent, technical innovations, market development and data resource sharing, through joint manufacturing, joint venture development and the joint construction of an industry R&D base.

Conclusion

The strengthening of cooperation in industry R&D would definitely be an important step in China-EU scientific, technological and economic cooperation. The CASC welcomes enterprises and research institutions from the European science and technology and education fields, as well as those in the space sector, to make regular visits to China, so as to pursue common opportunities and interests, thereby seizing a historic opportunity for space industry development, and to make due contributions to Chinese and European as well as international economic, scientific, technological and social development, leading to the overall progress of human civilization.

China’s Space Policy

ByYin Wenjuana, Secretariat of AP-MCSTA

As a developing country, China's fundamental task is to develop its economy and continue to advance its modernization drive. The Chinese government has all along regarded the space industry as an integral part of the State’s overall development strategy, and believes that the exploration and utilization of outer space should be for peaceful purposes so as to benefit all of humankind.

China has an unwavering commitment toward supporting activities in the field of the peaceful use of outer space, and maintains that international space cooperation should be conducted on the basis of equality and mutual benefit, complementary and common development, and the generally accepted principles of international law.

China’s participation in international space cooperation started in the mid-1970s. Over the last three decades, China has joined in bilateral, regional, multilateral and international space cooperation in different forms, such as its commercial launching service, which has yielded extensive success.

The Chinese government attaches great importance to regional space cooperation, especially in the Asia-Pacific region. In 1992, China, Thailand and Pakistan jointly sponsored the Asia-Pacific Multilateral Cooperation in Space

Technology and Applications (AP-MCASTA) initiative. Subsequently, China has provided extensive support toward the institutionalization of this initiative. In November 2003, the Convention of the Asia-Pacific Space Cooperation Organization (APSCO) was adopted at the 2nd Meeting of the Drafting Group, and was open for signature. China decided to sign the Convention. Moreover, according to the Convention, the Headquarters of APSCO are to be located in China.

China has also supported space cooperation in other regions of the world. The CBERS (Earth Resources Satellite) series developed jointly by China and Brazil demonstrates China's determination to enhance and expand its space cooperation with both developed and developing countries, setting a positive example of South-South cooperation in the peaceful use of outer space.

On the implementation of space law, especially the United Nations treaties and principles governing outer space, China has demonstrated its serious commitment by acceding to the four UN treaties on space law in 1983 and 1988: the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, on December 30, 1983; the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, on December 14, 1988; the Convention on International Liability for Damage Caused by Space Objects, on December 12, 1988; and the Convention on Registration of Objects Launched into Outer Space, on December 12,1988.

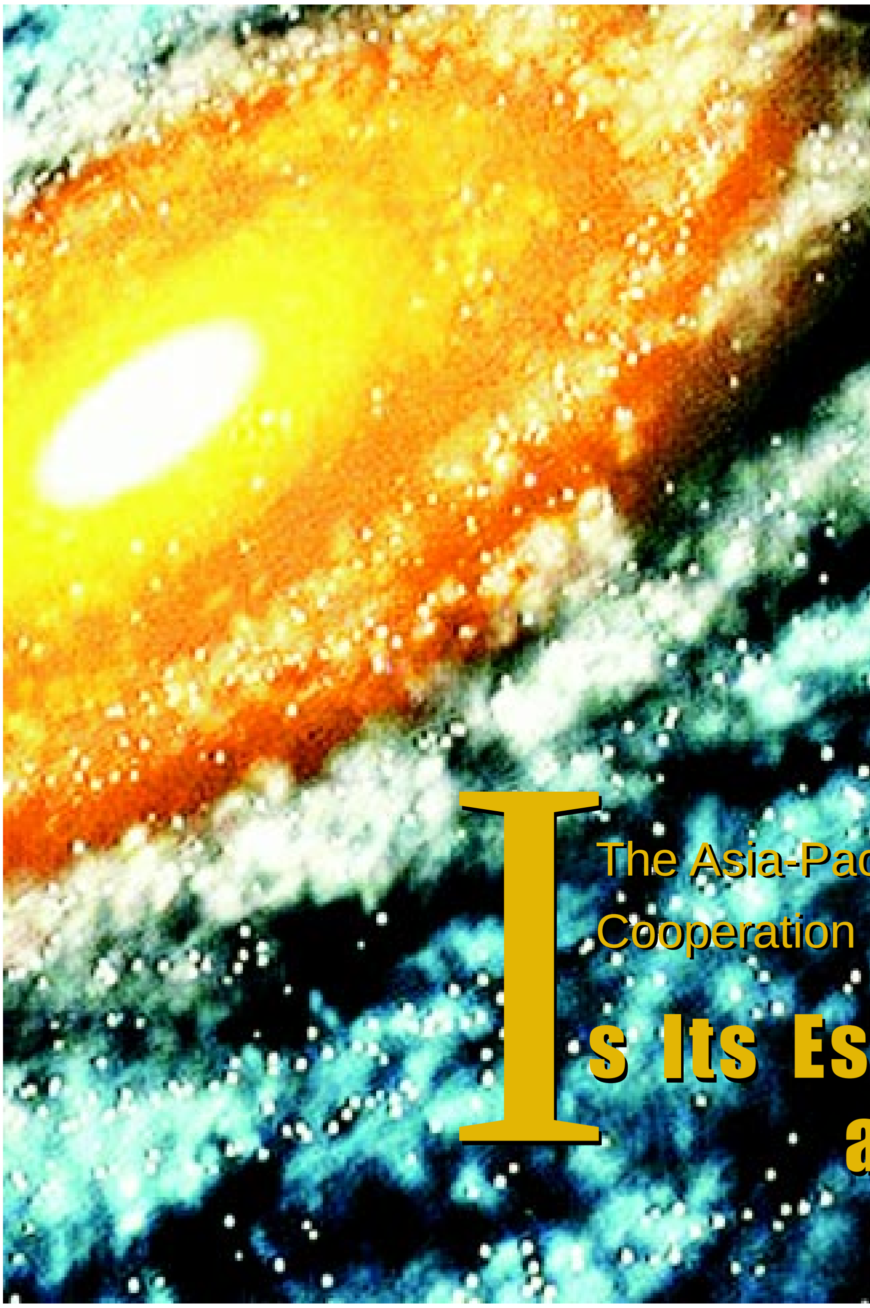
In terms of domestic space legislation, efforts toward this commenced around 1994. Nevertheless, further comprehensive work on China's space legislation went ahead only after 1998, when the Chinese government carried out reforms of the administrative system of industries. The China National Space Administration (CNSA), as the competent authority for the national space industry, is responsible for preparing space legislation, formulating policies for space industry and technology, designing plans for space development, and setting standards in this field.

In order to implement the treaties on space law to which China has become a party, as well as to promote its national space efforts, the CNSA, joined by other relevant government agencies, undertook studies on space law legislation in China, through which a general regulatory framework and sound legal regime is to be set up. A special task force has been established for this purpose, drawing on expertise from space law scholars and expert officials from related government agencies, as well as people from space-related industries. In the meantime, some institutional regulations have been developed. On February 8, 2001, the 'Provisions and Procedures for the Registration of Space Objects' was officially proclaimed in the form of institutional regulations, entering into force on that same day. On the 'licensing of space launching projects, China adopted the Interim Provisions on Licenses for Civil Space Launching Projects' on November 21, 2002.

Academic Paper

The Asia-Pacific Space Cooperation Organization (APSCO)

Is Its Establishment a Necessity?



By M. Nasim Shah,
Senior Advisor, AP-MCSTA Secretariat

Any country of the world, be it developed or developing, cannot deny the immense influence of space technology on every day life. Even the least developed countries are now contemplating to step into the space arena, albeit with their meager resources, starting with the remote sensing applications for their resources survey and their management. In the beginning of space era, the big powers initiated a race to achieve their superiority in space which resulted into enormous developments in the multifarious fields of space science and technology; and now the world is enjoying advantages from spin-off benefits accrued from the developments taken place in space. However, with the passage of time, it was evident that the space exploration was a 'billion dollar business' and no single entity▯ªhowsoever rich or big and desirous of its presence in this 'business'▯ª could continue its space activities without the collaboration of others. Even the space-faring nations are finding it quite difficult, or rather impossible, to go alone in space arena and they have already embarked upon bilateral and multilateral cooperative programs in this vital area. This has resulted in the formulation of the various 'regional groupings', such as the Arab Satellite Communications Organization (ARABSAT) which is the leading provider of satellite communications to the Arab World, with 15 member States; the European Space Agency (ESA), which is called Europe's gateway to space, with 16 member States (Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe. By coordinating the financial and intellectual resources of its members, it can undertake programs and activities far beyond the scope of any single European country); and the International Space Station (ISS). The International Space Station is the largest and most complex international scientific project in history and, after completion, will represent a move of unprecedented scale off the home planet. Led by the United States, the ISS draws upon the scientific and technological resources of 16 nations: Canada, Japan, Russia, 11 nations of the European Space Agency and Brazil. These collaborations are manifest of the significance of the multilateral cooperation to ward off the exorbitant costs involved in pursuit of the projects for exploration of space.

Take, for example, the case of ESA. Before taking the shape of ESA, an European Launch Development Organization (ELDO) was established in 1964 with only five member countries from Europe, France and Germany being the major ones. With the enhancement in the cooperative activities in space technology and its applications, ELDO was subsequently transformed into the European Space Research Organization (ESRO). In May 1975, the Convention of the European Space Agency was approved by the Conference of Plenipotentiaries and was signed by all member States of ESRO. Now the membership of ESA stands at 16. Under the umbrella of ESA, the developmental activities and the technological potential of Europe have evolved into the design, development and launching of the European Satellite Launch Vehicle: ARIANESPACE, as well as several satellites for telecommunications, remote sensing and environmental monitoring. Of late, ESA has embarked upon the development of a global navigation satellites system, in which China and India are also stake holders.

Similar is the case of ISS. The nations involved in these cooperative pro-

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grams are reaping immense scientific and technological benefits, including the greater achievements in almost every relevant field of space technology, which has led to gaining technological superiority over the rest of the world. Although in Asia, there exist few economic cooperation groupings, such as APEC ((Asia-Pacific Economic Cooperation), ASEAN (Association of South East Asian Nations), and SAARC (South Asian Association for Cooperation), no multilateral cooperation exists among Asian countries in space technology. The countries in the Asia-Pacific region are of great variety in political and social systems, national and religious origins, historical and cultural background, and economic and technological development levels. With the steadily growing investment in space technology, some Asian countries (China, India, Japan and Republic of Korea) have obtained certain space technologies of international level, bringing themselves in the forefront globally in those technologies. Other Asian countries (such as Pakistan, Indonesia, Iran, Malaysia and Thailand) have developed strong capabilities in applications of space technology, in particular in remoter sensing and satellite communications.

The Asia-Pacific is a very peculiar region with abundant natural resources, the largest population and great development potential. The establishment of an Asia-Pacific Space Cooperation Organization (APSCO), with space activity as its mainstay field of cooperation, will bring immense social and economic benefits to the countries involved, as elaborated in the succeeding paragraphs.

Benefits

The establishment of such a cooperation Organization will bring about important benefits under more managed and controlled national efforts. One of the most significant areas of benefits is the net increase in capabilities accrues to the participating partners (member States) by coordinating and combining their efforts for which APSCO would provide a most suitable platform. Some of the outstanding advantages may be summarized as follows:

- Exploitation of unique national capabilities of member States;
- Utilization of capabilities of partners which may not be unique but in which the partners have a competitive advantage;
- Increasing capabilities of member States to influence and expand their relationships through the mechanism of this Organization;
- Cross-pollination of expertise and sharing of resources in the development of new international capabilities;
- Effective contribution to the development methodologies for natural resources survey and environmental monitoring / protection to scale down losses caused by natural disasters in the region;
- Reduction in the risk and time for independent development of technology by individual member States;
- Exploiting space market potential, thus creating enhanced opportunities for development of the related national industries in the member States for sustainable economic development;
- Establishment of the stronger space programs and increased multilateral understanding, resulting in strengthened national economies and firmer foundation for future economic and political cooperation among the member States;
- Improvement in education to help alleviate poverty in the region;

ꢀBringing about peace among the member States, easing out tensions and strengthening dialogue to promote regional harmony and cooperation;

ꢀAcquisition of a vantage position for playing an effective international role among the comity of nations.

Another significant area of the benefits is the ‘stimulation and expansion of space activities’, with resulting political and economic benefits on both national and multilateral levels. Cooperation increases the capability of nations to influence and expand their relationships through a positive and supportive mechanism. As such, it will be seen by the governments and people of the world as a region worthy of expanded investment with bustling economic activity.

Still another area of the benefits that arises from multilateral cooperation is the ‘creation of multilateral compatibility among space systems’ which can provide an enhanced capability in many space application areas, such as remote sensing, satellite communications, environmental monitoring, emergency search and rescue, etc. as well as redundancy which can increase system resilience and allow rapid response to system failures.

Furthermore, a significant aspect in this respect is the Ôspace market potentialÕ. The space market in Asia-Pacific region has tremendous demand and immense potential. The technology market refers to technology transfer while the applications market touches on such areas as remote sensing, satellite communications, navigation and positioning. Due to a generally low level of space technology and uneven development, most countries of this region do not have substantial space cooperative activities among them and are not strong enough to develop regional space market to meet local demands for space technology and its applications. The establishment of APSCO will help pooling in the advantages in space resources of developing countries of the Asia-Pacific region, raise the competitiveness of the region in space market, assist in expanding the regional space market to other regions in the common interest of the member States.

The ultimate benefit of such multilateral cooperation in space activities include not only stronger space programs but also increased multilateral understanding, strengthened national economies and a firmer foundation for future economic, political and technological cooperation among the countries of the Asia-Pacific region.

Progress on the Development of Documents for APSCO

Rules of Procedure

The Rules have been drafted by the Secretariat which would be adopted by the APSCO Council in its first meeting after the signing of the Convention.

Provisions for Financial Arrangements

These Draft Provisions, outlining the various principles relating to Budget Estimates for income, expenditure and other relevant matters, have been finalized by the Secretariat. This document will serve as the Attachment to the APSCO Convention.

Financial Rules of APSCO

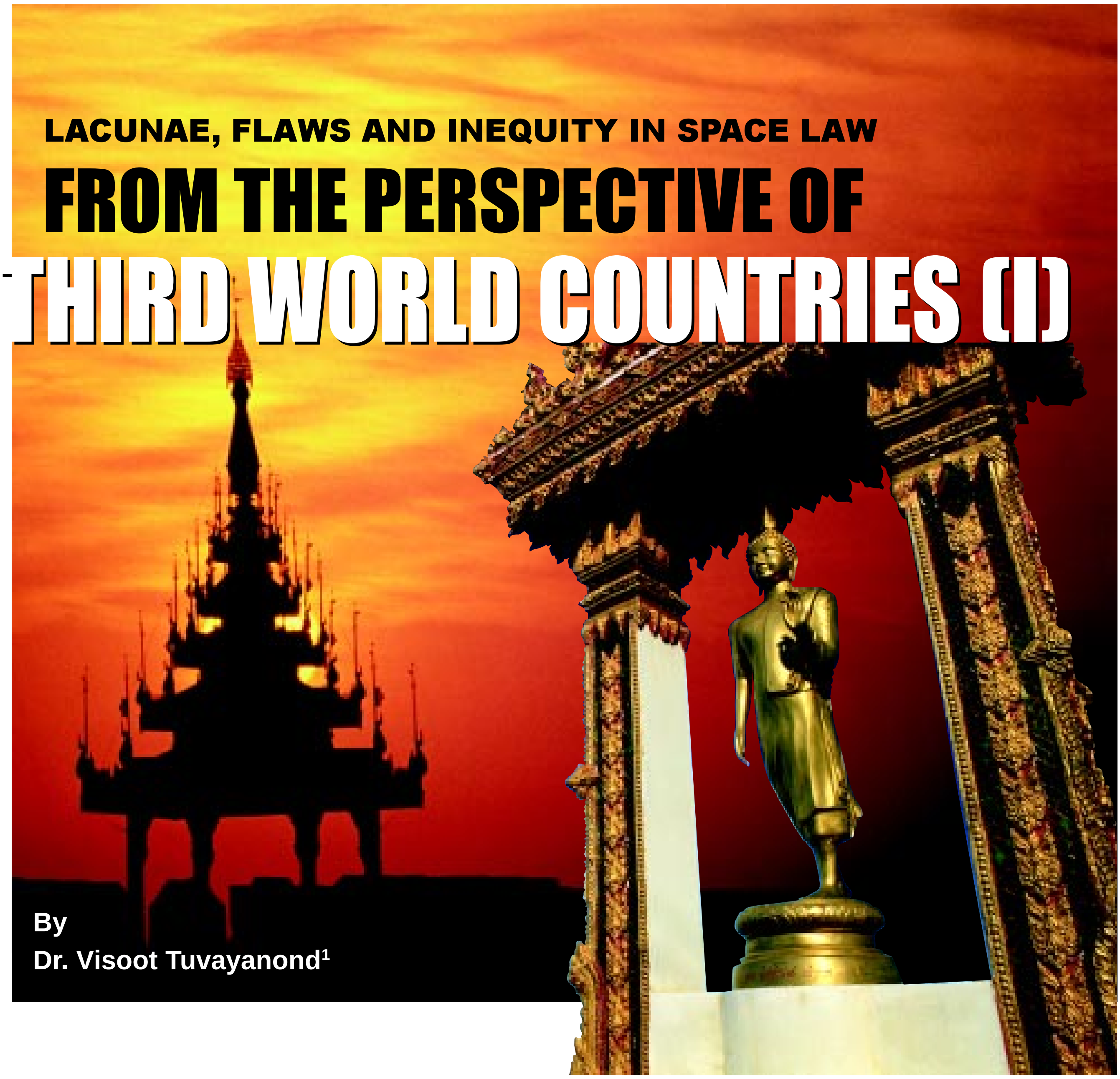
These Draft Rules, containing 12 Chapters elaborating the general system of financial management and control; procedures for making budget estimates; classification of budget heads; contingencies; procurement of stores; construction of works; Service Funds; and other miscellaneous subjects, have been finalized by the Secretariat. This document will serve as the Attachment to the APSCO Convention.

Appendices and Forms for Financial Rules of APSCO

Work on preparation of Appendices and Standard Forms relating to the Financial Rules of APSCO is in progress.

LACUNAE, FLAWS AND INEQUITY IN SPACE LAW

FROM THE PERSPECTIVE OF THIRD WORLD COUNTRIES (I)



By
Dr. Visoot Tuvayanond[1]

Introduction

Outer Space, the final frontier of Mankind, is governed by a corpus of international Space Law, both in conventional and customary forms, which is a relatively new branch of international law, that is unsurprisingly still honeycombed with lacunae, gray areas, flaws and inequity for Non-Space Powers, stemming from its quasi-ignorance by a staggering number of Third World countries, which have erroneously regarded Space Law and Outer Space activities as by far too remote from their daily concerns to be taken seriously: an indeed regrettable fallacy, which has accounted for their retard in Space technology and meager contribution, if any at all, to the development and orientation of Space Law. Hence, its numerous consequential shortcomings, which have in many instances been frustrating and detrimental to Third World countries and hindered their fructuous participa-

Abstract

This paper is divided into 2 parts. The first one is an overview of how the uses of Outer Space can prosper and vest Space Powers with economic, political and military supremacies and how satellites have become an essential component in our daily life. Its second part, which is also divided into 2 portions, identifies, in the first one, some of the lacunae, gray areas and flaws in the existing international Space Law, e.g. lack of authoritative criterion for the determination of where airspace ends and Outer Space begins; lack of comprehensive corpus of lex lata dealing with the rapidly accumulating multitudes of demised satellites and Space debris that jeopardize the security of the astronauts' life and Man's activities in Outer Space. Its second portion singles out and comments on the inequity for Third World countries in Space Law and State practices, e.g. defective regime and inequity for Third World countries in the allocation of orbital slots and physical access to geo-stationary orbit; the unethical and abusive exploitation of data on other countries secured via remote-sensing; and the restriction of opportunity for Third World countries to directly participate in the elaboration of Space Law coupled with recommendations on their remedial measures and rectifications.

tion in Space activities, that this paper primarily aims to identify with a view to recommending their remedial measures and rectifications.

The Boundless Economic and Military Potentials of Space Activities

Utilization and exploitation of Outer Space could be fabulously lucrative and could vest Space Powers with tremendous economic, political and even unrivalled military might. The discovery of the geostationary[2] or geosynchronous orbit, or 'Clarke Belt'[3] and of the colossal profits generating potential of the telecommunications via satellites have had more repercussions and impacts on the World economy and the people's way of life than the '18th - 19th Century Industrial Revolution'. It

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[1] *Lecturer of International Law at the University of the Thai Chamber of Commerce Law School, Bangkok, Thailand.*

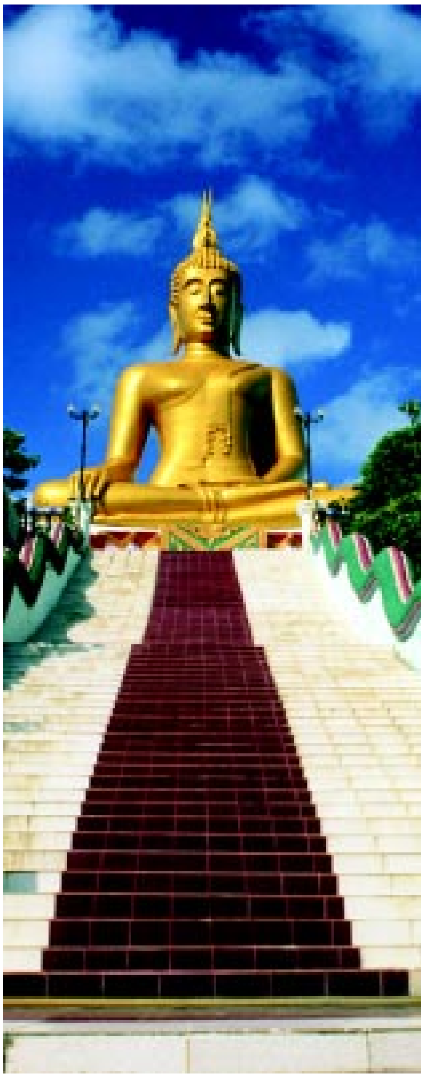
[2] *Orbit where a satellite is always over the same place on earth at all times.*

[3] *Or'Clarke Orbit'. This orbit was named after C. Clarke, the author of 'A Space Odyssey', who first described the principles of geosynchronous communications satellites in the 1940s.*

[4] *Because the geosynchronous orbit is only a ring around the Earth at the equator with a radius of approximately 45,000 kilometers altitude, and a thickness and height of about 100 kilometers or so.*

has triggered off the gold-rush phenomenon toward the commercial exploitation of the Outer Space that has entailed countless practical as well as legal complications and made the geostationary orbital slots and segments the most precious limited[4] resources that every country craves to possess, because satellite communications can generate billions of dollars annually in sales of products and services.

In the Space and Digitization Age, satellites have become an essential component in our daily life. Without satellites we would not be able to inter alia thoroughly scan the surface of the Earth and to know about the meteorological and atmospheric conditions[5], we would not have trans-boundary or world TV[6], we would not be able to communicate across the globe, we would not be able to use cellular phones where ever we are and we would not have wireless Internet[7] and its correlated services, like e-mail, e-learning, e-commerce, and distance education, etc. So many communications satellites provide telecommunications to billions of people[8]. Globally 37 trillions of e-mails are sent[9]. In the US alone about 7 million e-mail messages are sent per day[10] and each day 2,000 millions of telephone communications are made via mobile phones. With the help of the advanced technology of Teledesic Computer Satellites working on a system of broadband, the time it takes for a person to access the Internet from a personal computer will be speeded up and delays in Internet use will be enormously reduced. The uncanny accuracy and precision, with which US satellite guided-missiles can hit their remotest targets miles and miles away by using the PPS (Precise Positioning Service) provided by the P-Code[11] of the GPS (Global Positioning System)[12], that has given the US military interventions in the Middle East the code name of the 'Shock and Awe' Operation, is the living proof of how lethal the Star War type military might deriving from military use of Outer Space could be. Utilization of Reconnaissance Satellites alone can already provide Space Powers with an infinite strategic advantage over Non-Space Powers. (to



[5] *With the new technologies such as Doppler radar satellites people are able to prepare themselves for natural disasters*

[6] *The fast growing satellite television industry is a boom market which has proved to be a stable investment.*

[7] *In the ever growing computer industry satellites are being used to speed up Internet access and increase the effectiveness of Internet use.*

[8] *The Indonesian Garuda-1 satellite's ACeS (ASIA Cellular Satellite System) alone has already provided communication services to Asia's three billion people.*

[9] *'clickonline.com', BBC, Oct. 4th, 2004*

[10] *TV5 7.45 p.m. Nov.1st, 2000.*

[11] *Precision Code*

[12] *A military space system operated by the US Air Force. The space segment of the GPS consists of a constellation of 24 satellites that broadcast precise time signals that aid position-location, navigation and precision-timing. The GPS has also spawned a substantial commercial industry with rapidly growing markets for related services. It is now a worldwide information resource supporting a wide range of civil, scientific and commercial functions, from air traffic control to the Internet. Its Coarse Acquisition Code or C/A Code is designed for non-military use and provides the Standard Positioning Service (SPS, which is used by most commercial operations.*

BUAA Overseas Students Education: Overview and Prospects

By Liu Wei, Yuan Li,
Beihang University

Beihang University (BUAA), formerly named Beijing University of Aeronautics and Astronautics, is one of China's key universities, comprising 26 schools and departments. The BUAA is an advanced multidisciplinary and research-oriented university for engineering science and technology with aerospace features, combining disciplines in science, engineering, liberal arts, law, economics, management, philosophy and education, while maintaining the leading role of technology.

In the last ten years, overseas student education has attained greater social value and international recognition, pushing forward progress in the internationalization of Chinese universities, and enhancing BUAA's reputation both within and outside China. After many years of continuous effort, the BUAA has developed a staff with experience in overseas student education, academic achievement and scientific research capability, as well as a high level of English proficiency.

History and Scale of Overseas Student Education

From the beginning of the1990s, the BUAA began to admit overseas students into 34 majors, under the requirements of the internationalization of higher education. In April 1993, the first 8 overseas graduate degree candidates were enrolled in the BUAA. In 1997, the BUAA was elected as a member of the board of directors of the National Overseas Student Management Association and the Beijing Overseas Student Management Association. In 1999, the BUAA became one of the eligible universities for Chinese Government Scholarships. Since that time, the number of BUAA overseas students has been increasing rapidly, while at the same time the channels for recruitment have been expanding. From 1993 to 2002, the number of overseas students graduating or completing courses reached 2,324 (see Table 1).

Table 1. The Number of Overseas Students Graduating or Completing Courses (1993-2002)

Program	Number
Postgraduate	16
Graduate	124
Undergraduate	2
Long-term Chinese Language Program	1,200
Short-term Chinese Language Program	1,000
Total	2,324

Diploma/Degree Education and Short-term Training Programs

The BUAA has been devoted for many years to providing aeronautics and astronautics and engineering technology applications diploma and degree education, as well as short-term and long-term training programs. Overseas students have come from the United States, Canada, Japan, Australia, South Korea, France, Brazil, Syria, Egypt, and other countries. By the year 2002, BUAA was providing scholarships sponsored by the Ministry of Education, the Ministry of Commerce, and China Aviation Technology Inc. In 2002, 380 overseas students enrolled in BUAA, of which 114 students were postgraduate and graduate degree candidates and 10 were undergraduates (see Chart 1,Chart 2). The total number of overseas students' ranked higher than the average among universities in China, and the number of Doctoral and Masters degree candidates is among the highest. According to statistics from the Ministry of Education, China enrolled 2,442 overseas students in 2002, with undergraduates accounting for 80% of the total.

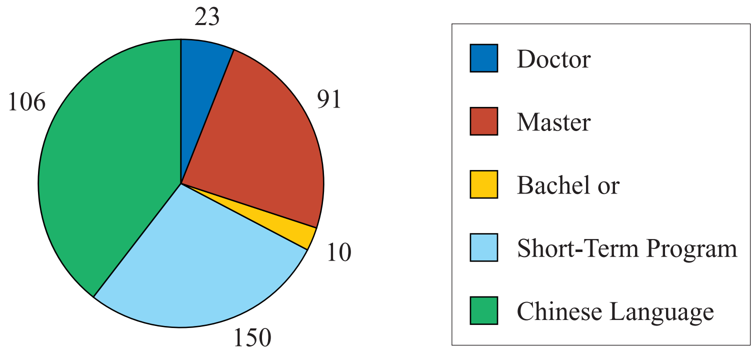


Chart 1.Overseas Students Enrolled in BUAA

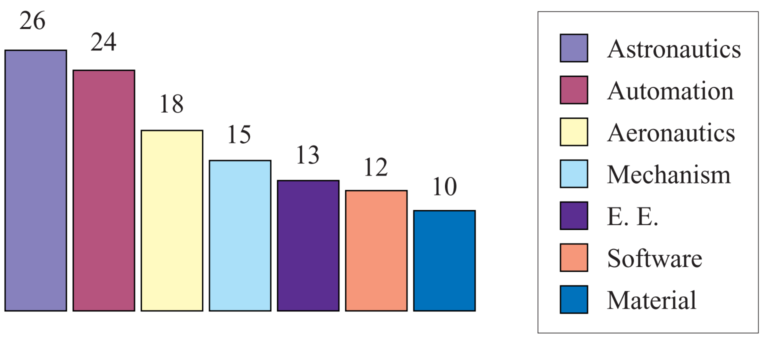
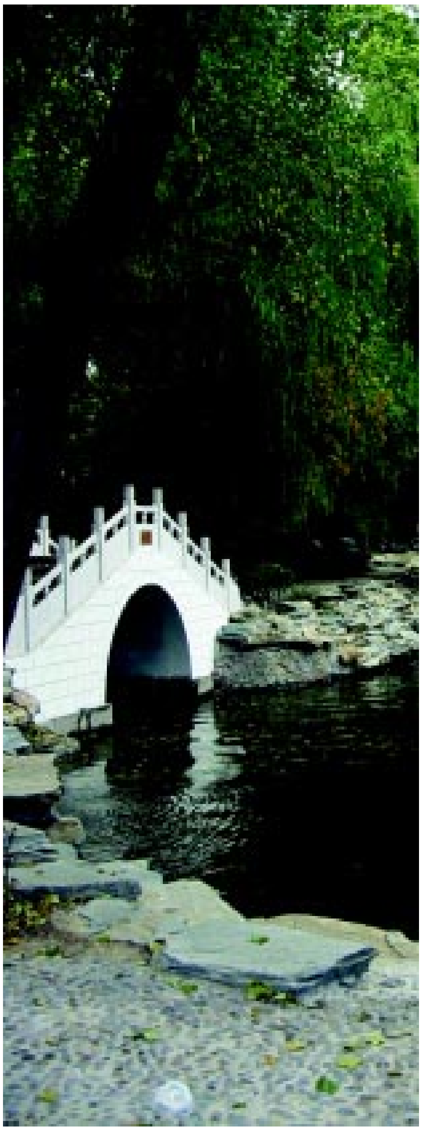


Chart 2. Discipline that Have More than 10 Overseas Students in 2002

With Support of the Secretariat of Asia-Pacific Multilateral Cooperation in Space Technology and Applications (AP-MCSTA), the BUAA undertook five short-term training programs in space technology and applications, sponsored by the China National Space Administration (CNSA) and the Secretariat of AP-MCSTA. By the end of 2004, more than 100 students from over 20 Asia-Pacific countries and regions had been issued certificates of completion for the short-term training programs of AP-MCSTA.

Overseas students attending the short-term programs are mainly from the government astronautical project management and remote-sensing applications sectors. The programs focus on the application of space technology to the Asia-Pacific



region as well as disaster detection. Courses in the program include: introduction to remote-sensing satellite system design, principles of remote-sensors and design, remote-sensing image-receiving systems, principles and practice of image manipulation, and case studies of space technology application in disaster management, city planning and resources investigation. The BUAA also arranges tours for overseas students to visit research centres and facilities for space technology applications.

Development Strategy and Objectives of Overseas Student Education

According to its development strategy, by the year 2010 the BUAA should become a multidisciplinary and research-oriented university for engineering, science and technology featuring aerospace, combining disciplines in science, engineering, liberal arts and management, while maintaining the leading role of technology. We shall endeavour to make BUAA a top-ranking university in China and a well-reputed institution throughout the world.

As internationally agreed upon, one prerequisite for a reputed international university is that the number of overseas students should reach 6% to10 % of the total. To advance the development of overseas student education is one of the key strategies of the BUAA, and also a crucial and symbolic step toward achieving internationalization of education. The development of advanced overseas student education (Doctorate and Masters) also promotes the development of teaching staff and management, propelling the BUAA forward toward becoming a research-oriented university.

Objectives

The BUAA has established this proposed 10 year plan for overseas student education: to give priority to the development of graduate and postgraduate education; to fully develop undergraduate education; and to continue to develop its Chinese language program. These are the three objectives to be accomplished within the following ten years:

A First-choice University BUAA to become the University of First Choice for students from the Asia-Pacific region in aeronautics and astronautics and information engineering technology;

A Reputed University BUAA to become a reputed university for overseas students in the space technology and applications field as well as the aeronautics and

astronautics information engineering technology field;

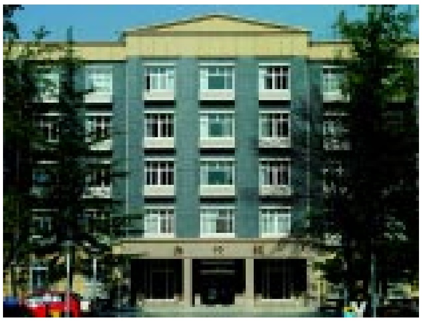
An International University BUAA to become qualified to enroll foreign students in economics, management, liberal arts and law; And become a centre for international cultural exchange and a specialized scientific research and education institute supported by APSCO and United Nations organizations.

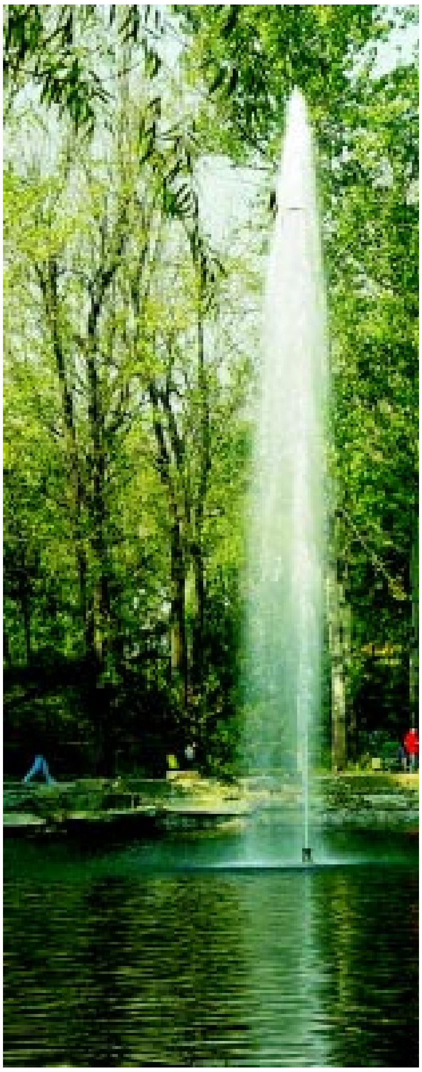
Strategies

The strategies for the development of BUAA overseas student education may be summarized in one key, two directions, and three levels:

One key The key of BUAA overseas student education is to take an active part in US space technology and application activities: to support the US Outer-space Committee: to implement space technology application plans; to promote education cooperation with Asia-Pacific countries in the fields of space technology and applications, as well as aeronautics and astronautics engineering technology.

Two directions First, the overseas student development plan will endeavour to recruit students not only from developing countries but also from developed countries, so as to optimize the range of overseas students. Second, BUAA attaches great importance to Asia-Pacific regional space technology cooperation as well as educational cooperation. BUAA is preparing the Asia-Pacific Space Science and Technology Training Centre as a supporting organization of the United Nations.





Three levels (1) To attract more overseas Doctorate and Masters Candidates and exchange scholars from developing and developed countries, by providing all types of scholarships and international cooperation.

(2) To enlarge the number of overseas undergraduates, especially in the more advanced schools or departments like computer science, electronics, material science, automation, manufacturing and management.

(3)To develop short-term training programs for students from the Asia-Pacific region. Under the overseas-student development plan, the BUAA is committed to expanding its range of overseas students (see Table 2), while at the same time maintaining a high proportion of graduate and postgraduate students (see Table 3).

Table 2. Overseas StudentDevelopment Plan of BUAA

Scale \ Year	2005	2008
Number	600	1,200
Proportion	2.5%	5%

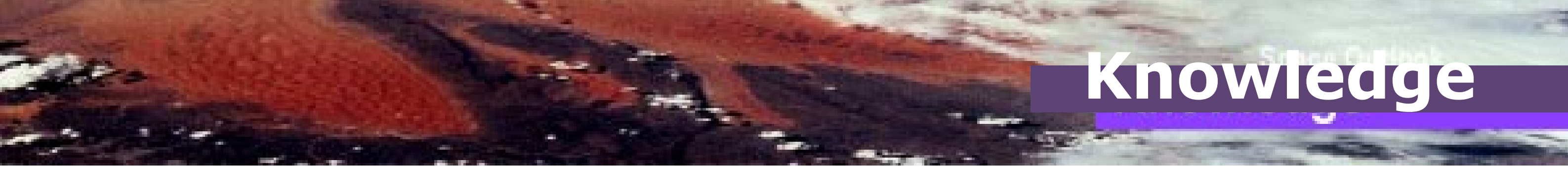
Table 3. Overseas Student Development Plan of BUAA

Type \ Year	2005	2008
Advanced Overseas Students	140	250
Undergraduates	60	300
Chinese-language Students	300	400
Short-term Overseas Students	100	200
Total	600	1,150

Conclusion

Overseas student education is an important aspect of higher-education reforms for China and a symbol of the internationalization of Chinese higher education. With the development of overseas student education, more opportunities for international exchange and cooperation shall emerge, accelerating the development of scientific research, subject development and Chinese higher education.

It is noteworthy that China has successfully launched its first manned spaceship, which symbolizes the high level of space and astronautical technology in China and the capacity for training advanced personnel. BUAA ranks top among dozens of aeronautical and astronautical academic institutions and research centres. The BUAA is committed to making full use of its advantages in space technology and teaching resources, and to devoting itself to the development of space technology and its applications in Asia-Pacific countries.



Space Sciences and Detection

Translated by Prof.Chen Kangwen
Center for Space Science and Applied Research ,Chinese Academy of Sciences (CSSAR)

With the advent of space sciences and space technology in the late 1950s, human beings entered the space age. Natural phenomena found in Earth's outer space and the laws governing space were explored using modern space detectors. Outer space possesses certain unique characteristics that are absent or beyond the scope of the Earth surface, such as conditions of microgravity, highly rarefied vacuum, extreme low temperatures and intense radiation, and the uncontaminated conditions that 'clean rooms' attempt to approximate, as well as unique advantageous satellite orbits far from the Earth. Under these conditions, a vast amount of investigations of the space environment have been conducted along with certain technical experiments, which have extended the potential area for humans to live and also propelled space sciences into vaster and more challenging fields.

Space science is the study of certain natural phenomena associated with outer space. This study covers all physical, astronomical, chemical and biological processes and laws that occur in solar-terrestrial interplanetary space, and even throughout the rest of the universe, with the help of spacecraft technology. Generally, space sciences involve space flight, space exploration and space exploitation. The study of space sciences can reveal the mysteries of the universe and, at the same time, greatly benefit humanity.

Without the help of space detectors, space science is limited. Space detectors may be classified, according to their tasks, into two categories. The first is referred to as unmanned spacecraft, which include artificial satellites, lunar explorers and interplanetary explorers. The second type is the manned detector, involving spaceships, space stations and shuttles. Furthermore, according to their orbit, there are also two types of space detectors. One type orbits around the Earth, including artificial satellites, satellite-like spaceships, space stations and shuttles. The other type probes far beyond the limitation of Earth's gravity, traveling as far as the moon, other planets and interplanetary space, and include lunar spaceships to the moon and a variety of detectors for planets and interplanetary space.

The field of space exploration thus covers not only the detection of Earth's outer space, but also the moon, planets and interplanetary space. The main objective of space exploration to other celestial bodies is to reveal the origins and present conditions of the moon, the solar system, as well as to further uncover knowledge about the formation and evolution of the Earth's environment by way of comparative study of other planets and their satellites. This objective also includes studying the evolution of the solar system, investigating the origin and evolution of life, and making use of the unique features of space to conduct experiments that serve the needs of society.

Space detectors are equipped with scientific instruments for various purposes in different ways:

¡ñTo orbit around the Earth and observe the Earth from far away;

¡ñ To closely observe the moon or other planets;

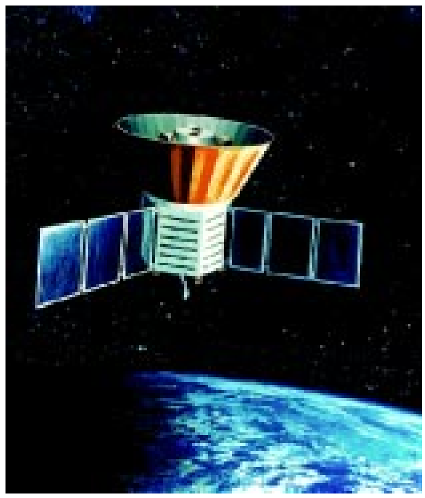
¡ñ To travel around the moon or other planets for observation and long-term study;

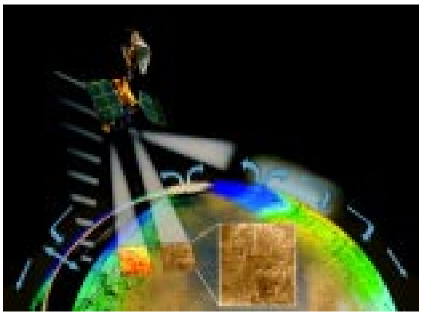
¡ñ To make hard landings on the surface of objects under investigation in situ for a limited period of time;

¡ñ To make soft landings on the surface of objects and acquire samples for study on Earth; and

¡ñTo travel through interplanetary space for long-term investigations.

Space exploration focuses on disciplines concerning the Earth's surface and space environment, astrophysics, material science, and life science. From the time the first artificial satellite had been launched into space on October 4, 1957 up until 2000, more than 100 detectors were launched. Great achievements have been made through these space missions, and the amount of knowledge





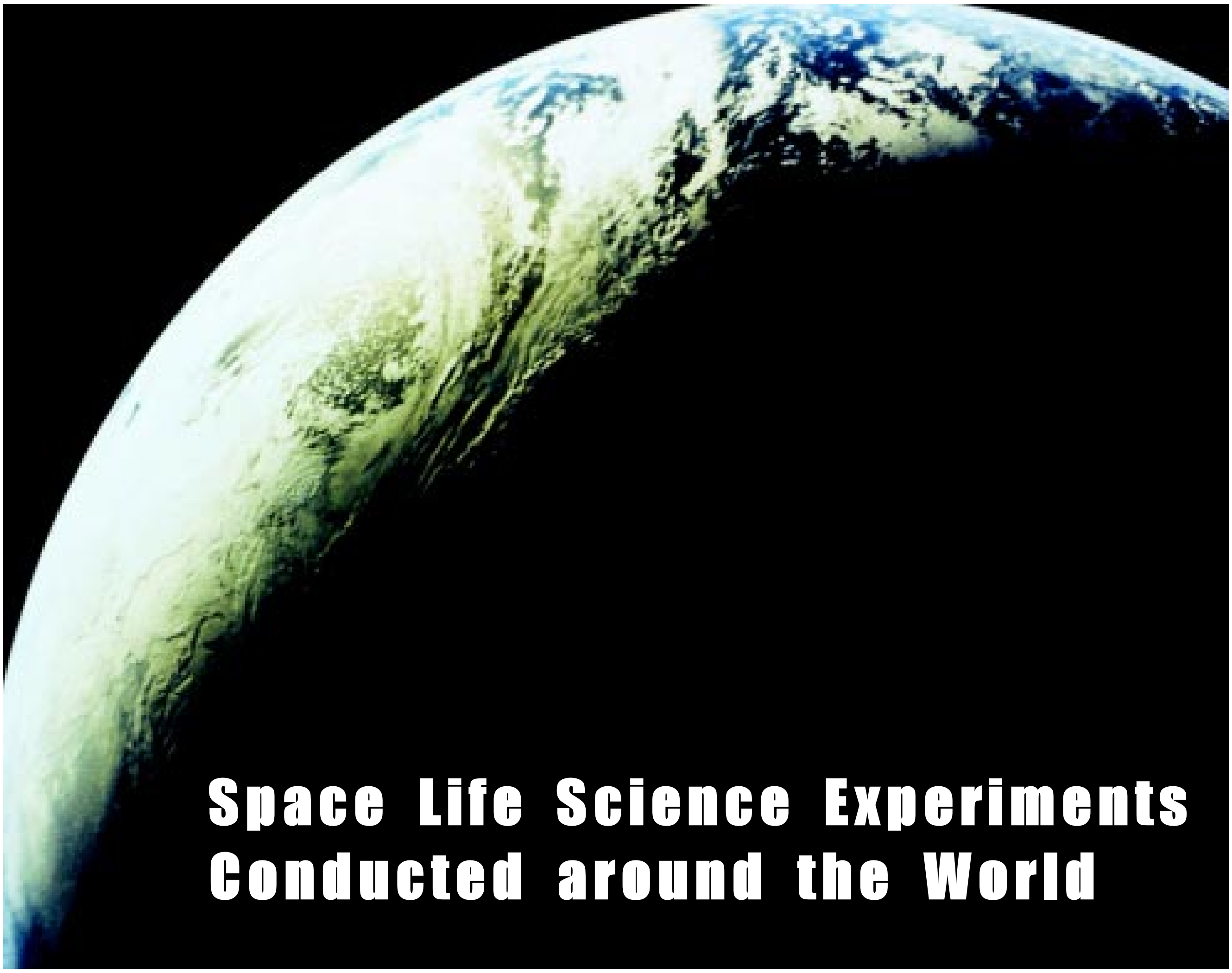
that has been acquired is far greater than all the knowledge achieved over the previous thousands of years.

On January 31, 1958, the first US satellite, Explorer 1 was launched, and it made the discovery that the EarthÕs radiation belt is full of energetic electrons and particles, in the well-known Van Allen radiation belt. In late 1958, Pioneer 3 was launched, also by the US, and when it had made it as far as 100,000 kilometers from the Earth another radiation belt was discovered. These are two illustrative achievements of the early space era, which demonstrate the advantages of satellite and space detection in exploring outer space.

Since 1958, satellites, spaceships, space stations and shuttles have been used to explore the near-Earth environment, such as radiation belts, the magnetosphere, solar radiation, auroras, and cosmic rays. Many space detectors were launched, such as the American Explorer series, the Orbital Observatory for Geophysics, the Orbital Observatory for the Sun, as well as the Soviet detector series, including Cosmos and Predictor Proton, and the Chinese SJ (practice) series. Equipped with scientific payloads, these detectors measured the EarthÕs atmosphere, the ionosphere, the magnetosphere, solar radiation spectra, the composition of space particles, energetic electrons and protons, as well as the Earth and interplanetary magnetic fields. The results of these measurements extended scientific understanding of the relationship between such space phenomena. The results also provide vital data to ensure the success and safety of launchings, flights, astronaut living conditions, as well as of walks in outer space and other space activity.

Since 1959 humans have extended their footprints from near-Earth space to the moon, and further out into deep space. Various detectors have surveyed the moon and other solar planets such as Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Neptune, and Haley's Comet. Of this space activity, moon exploration was the most thorough, with astronauts even physically sent to the moon in order to scrutinize it on location. Human beings have not only photographed and drawn topographic maps of Venus and Mars, but have also landed on their surfaces to carry out scientific surveys. Up until now, scientists have uncovered a variety of enigmas about the moon and the planets. However, many mysteries that had aroused a great deal of debate among astronomers in the past have now been solved.

Since the first astronomical satellite to monitor solar radiation was launched in 1960 by the US, many other astronomical detectors have been launched aimed at studying X-rays, gamma-rays, ultraviolet radiation (UV) and infrared-rays. Without the atmospheric absorption of celestial radiation, astronomers can measure all of the electromagnetic spectra from extraterrestrial space. These space detectors make high-sensitivity and high-resolution observations possible, extending radiation observation to the bands of UV, X-rays and gamma-rays previously unattainable through ground-based observation.



Space Life Science Experiments Conducted around the World

Translated by Prof.Chen Kangwen
Center for Space Science and Applied Research ,Chinese Academy of Sciences (CSSAR)

Space life science is the study of life-active phenomena and principium responses to special factors in the environment of outer space, through the use of spacecraft. The biomaterials tested include microorganisms, plants, animals, and our own human selves. The scientific fields include space biology, space medicine and exobiology.

The research scope of space life sciences involves two main aspects: one is to investigate environmental effects in space on different kinds of cells and scientific organisms, especially the effects of radiation and microgravity on bio-development, regeneration, immune systems, and bone constitution. It has also brought up many issues related to healing of the immune system, loss of bone composition, muscle atrophy, and daminified regenesis of cells and tissue. The other aspect is to investigate space organisms and the origins of life.

Over the last 40 years, there have been certain animals, plants, seeds and microbes carried on different spacecraft out into space and investigated under the effects of the space environment. Russian cosmonauts have conducted long-term tests and observations on the effects of the space environment on microbes, plants, animals and the human body, at the Russian Peace orbital station and on US manned space shuttles. Some significant results have been presented.

Russian cosmonauts have grown more than 100 species of plants in a 900 square centimeter ‘green house’at the Peace orbital station, studying the effects of a microgravity environment. The results have shown that most tested plants were able to complete their life cycle from germination to the fruiting process. The seeds of wheat and oil crops have been harvested at the orbital station. This indicates the possibility of growing crops in orbital stations. Moreover, there have been many experiments carried out with monkeys, dogs and mice in space. The procedure for developing and hatching quail eggs, for drosophila (fruit flies) to produce eggs and propagate, for bees to construct hives and for fish to propagate, were investigated: all of which were observed under microgravity. Sixty quail eggs were carried in flight for seven days at the space station in February 1999. Thirty eggs hatched young quails, but only three of these survived after the landing on Earth. The results showed that embryos were affected by environmental factors in space.

The Russian cosmonauts placed some bio-samples, such as microbes, amino acids and proteins, in special apparatus at the Peace orbital station for 5,000 hours to determine effects and stability under X-rays or cosmic rays. Through this experiment, original life materials from Earth were investigated in space, and some organic chemical materials collected from the dust of comets were examined and studied, with the object of determining the origins of life.

Since the 1980s, manned US space shuttles have carried certain seeds and small animals to observe the effects of microgravity conditions. The Challenger space shuttle carried 120 species of vegetable, fruit and flower seeds on April 6, 1984; 1200 tomato seeds were used to test the effects of germs under ion-irradiated and microgravity conditions. On September 12, 1992, the advanced space shuttle carried 180 bumblebees, 7,600 fruit flies and inseminated chicken eggs, in order to conduct 19 tests to observe life-sustaining habits and propagating processes under microgravity conditions. The Columbia space shuttle carried 48 mice to study the adaptive processes of mammals against microgravity, from outer space to touching down on Earth.

On July 13, 1995, the Discovery space shuttle carried 10 cyetic mice and other organisms, in order to study the effects on growth and development under a microgravity environment. The Columbia space shuttle carried 1,500 crickets, 233 fish, 152 mice and 135 snails, in order to study the effects on the nervous system in a space environment. There have been 11 other experiments conducted to estimate various effects on cosmonauts in a space environment.

Since 1987 Chinese scientists have used recoverable satellites to carry over 50 plants and over 300 species of rice, wheat, microbes and silkworms, so as to investigate biological responses to space factors.

In 1990 wheat seeds were carried out into space by satellite. The first generation showed that many phenotypic

properties, such as higher growth, longer spikes and greater yields, as well as seed production and weight of each spike had changed, when compared with the control experiment. A selective cultivation of No.1 rice was successfully carried by satellite in 1998. Results showed that the stalk grew to 80 cm in height, the spike to 19 cm in length, with a yield rate of 97%, or 407 kg per 1/15 ha. The stalks also became thicker, with greater disease-resistant and anti-parasite properties. A selective cultivation of cucumber seed carried by satellite grew more quickly, with more leaves, flowers and fruit. A Òspace tomatoÓhad increased yields of 17.2% to 23%, and the filial generation presented stronger and more stable disease-resistance abilities. A ‘space green pepper’revealed single fruit weight increasing 1 to 3 times, its vitamin composition increasing 20%, with increased yields of over 50%, and the’space green pepper’plant demonstrating stronger disease-resistance. Through using’space microbes’ in the production of feed for deer, results showed that the amount of deer meat produced increased 20% and amino-acid composition increased 5%, although the quantity of feed produced was less.

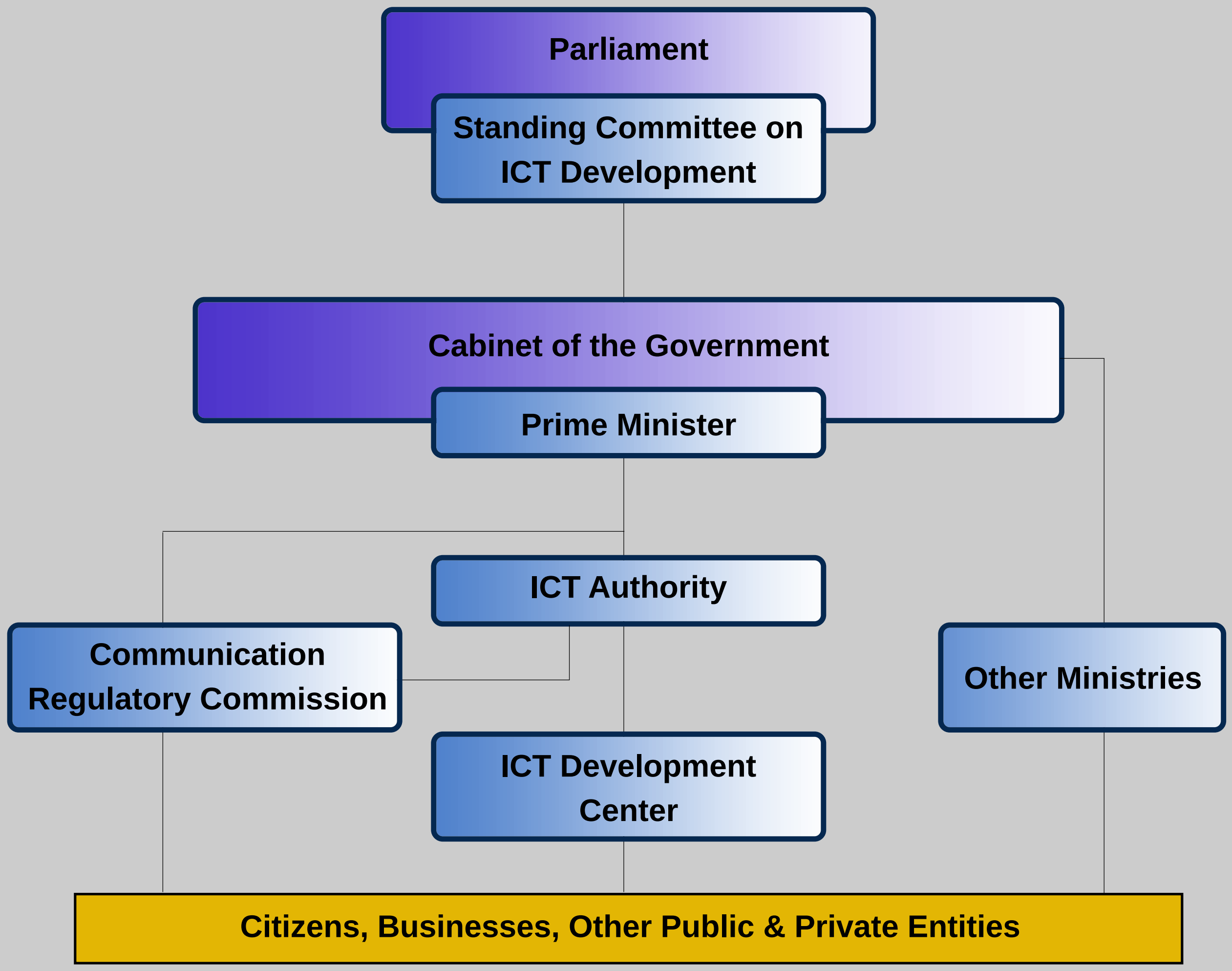
On October 5, 1990, 2 mice along with some silkworm and fruit fly (drosophila) eggs were carried by the 12th recoverable satellite from China, in order to study the genetic effects, along with the effects on drosophila propagation and on embryo development of the silkworm. Some significant data regarding cardiovascular functions, immune systems and genetic characteristics were obtained. The drosophila experiments were performed throughout the process of egg production, hatching and propagation in space. The silkworm experiments were also conducted throughout the same processes in a space environment.

Mongolia Information & Communications Technology Authority

Former Policy and Coordination Department for Information and Communication Technology (ICT) of the Ministry of Infrastructure (MOI) and the Post and Telecommunications Authority (PTA) the Implementary Agency of the Government of Mongolia were restructured into new Government Agency 'Information and Communications Technology Authority'(ICTA) as from October 20, 2004.

The Authority is responsible for all ICT policies, coordination and implementation under the direct auspices of the Prime Minister of Mongolia and ICT sector has been given a great priority and is regarded as the leading direction of the Government development strategy.

Government Structure (ICT)



Vision

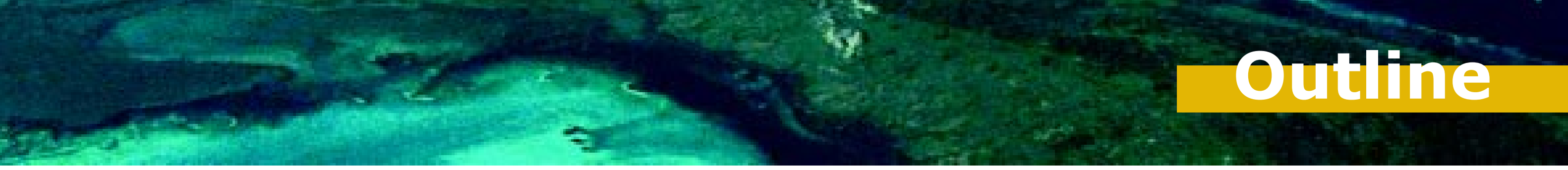
Establish state policy and regulatory regime that provides favorable environment for development of government-legislation, economy-business, and citizen-society frameworks based on consideration of information and communication technology as a major accelerator to develop Mongolia in the 21st century.

Mission

The mission of the ICT development vision in Mongolia is to develop a knowledge-based society and improve the quality of people's lives.

Goals

- Government-Legislation framework: The government is an open information and service provider that builds an information society structure.
- Business-Economy framework: To create a business environment capable to ensure efficient integration into the world economy, to enhance intellectual capacities of domestic, national products and improve their competitiveness.
- Human Development framework: Re-



gardless of where citizens live, to ensure opportunities for their equal and active participation in social life and for an easy communication with each.

Objectives

The main objectives of the Information and Communications Technology Authority (ICTA) of Mongolia are:

* Encourage and advise for providing policies of development, a short term and long term planning and reform for ICT;

* Encourage improvement of the legal environment for ICT;

* Encourage and advise on making program and projects of development for ICT;

* Regulate policy implementation on resource and capability for ICT sector,

* Provide public administration and Management leadership, management of capital/assets and financing and internal service;

* Encourage regulation on human resources and cooperation issues in the ICT sector;

* Improve monitoring of the implementation of policy and planning of the sector; provide information and establish database for ICT;

* Establish a consolidated system of public information;

* Eliminate digital divide in the society.

Implementation & Coordination Functions

Information Technology

Make policies to introduce a new public service, application, Internet, information infrastructure and policy, planning and strategy for development of IT;

Informatization

Database, coordination of internet domain names, planning computerization policy;

Communications

Telecommunication, rural communication, TV & radio, government network, mobile communication and radio waves' allocating policy planning;

Coordination of IT programs and projects

To develop IT and Informatization policy, program of implementation strategy, to support implementing projects, research;

Program of communications and project coordination

Policy of ICT sector, program of implementation strategy, support for project implementation, research and coordinate;

Legal, economic, cost and standardization

To improve legal environment, coordination of cost, standardization and numbering policy;

Finance and economics

Activities of finance, economic, stock registration and administration and funding of the sector;

Cooperation

To organize training, workshops and cooperate with international and donor organizations, expand foreign relation and cooperation;

Public administration and public service, internal affairs and monitoring;

Coordinate administration service, media, cooperation and promotion.

CURRICULUM VITAE

PERSONAL BACKGROUND:

Name:	Saikhanbileg
Surname:	Chimed
Date of Birth:	1969
Place of Birth:	Dornod Province, Mongolia
Nationality:	Mongolian
Marital status:	Married
E-mail:	saikhanbileg@icta.gov.mn

EDUCATIONAL EXPERIENCE:

2002: Master in Law Science, George Washington University, USA
1995: Lawyer, Law School, Mongolian National University
1991: Teacher of History, Youth Institute of Moscow, Russia

WORK EXPERIENCE:

2004 - present : Chairman, Information and Communications Technology Authority - The Government of Mongolia
2004: Chief of Press and Media of the Mongolian Government, Press Representative of the Prime Minister of Mongolia
2000 - 2004: Director, E and T Law Bureau
1999 - 2001: Head of Administration Board, MNU
1998 -1999: Cabinet Member of the Mongolian Government, Minister for Education Science and Culture
1996 : Member of Parliament, State Ikh Khural

PROFESSIONAL SKILLS:

1991 - 2003: Officer, Head, Head of Ulaanbaatar City Council, Secretary and President, Mongolian Youth Federation

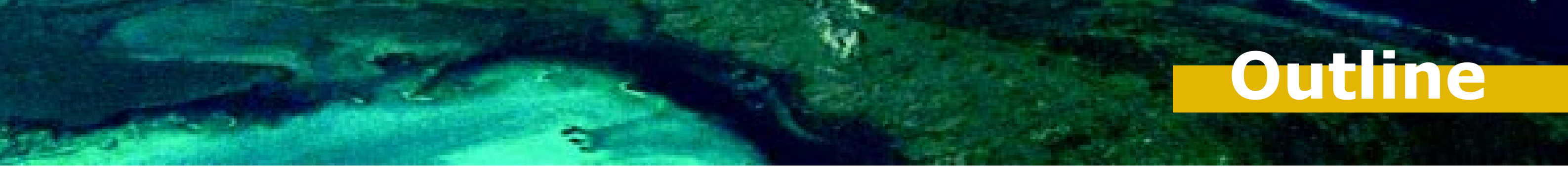
INFORMATION & COMMUNICATIONS DEVELOPMENT CENTER

The basic role of the Information & Communications Development Center /ICDC/ is to implement telecommunication and IT strategies, network planning and projects based on policies made by ICTA. ICDC owns all telecommunication facilities on behalf of the State and establishes the infrastructure platform for IT-based networks including the value added services.

The budget is made of the income of a part of rental fees of State-owned telecommunication assets.

The details of the overall roles and obligations of ICDC are as follows:

* To be an owner of the national telecommunications backbone network that consists of international and domestic long distance transmission lines and switching facilities;
* To plan and implement technical, technological and organizational actions and conduct research and study works within the framework of the government policy towards stable operations and development of the network;
* To implement projects, conduct related accounting, evolution, analysis works and appraisal in accordance with the strategy plan for expansion of the National Telecommunications Backbone Network;
* To organize investment into the National Telecommunication Backbone Network and conclude network operation contracts with providers based on infrastructure and macro economic development and social needs & demands.
* To render professional and methodological assistance to local organizations and relevant bodies pursuant to implementation of the state policy;
* To develop the state owned backbone network and to furnish the state administrative central body with relevant information.



Outline

E-Mongolia

Vision of 'E-Mongolia' National program

To establish the information society and the foundation of the knowledge based society in Mongolia by enhancing extensive application of ICT in all society sectors.

By 2012 Mongolia becomes one of the top ten ICT developed countries in Asia.

Objectives:

* Establishment of legal environment for ICT development;

* Creation of broadband backbone network throughout Mongolia;

* Connection to the international backbone gateway;

* Abolishment of monopoly in ICT sector to enhance the competitiveness and public access;

* Establishment of the government institutional memory by creating government centralized database and information system;

* Establishment of the new management structure based on ICT;

* Creation of the new economic environment and enhancement of the competitiveness utilizing e-commerce;

* Development of the knowledge based industry penetrating ICT;

* Implementation of the result-oriented, citizen-centered social policy, utilizing ICT;

* Development of the human resource development at all level;

* Improvement of the public ICT literacy by bridging digital divide;

* Establishment of the information security system

* Utilization of ICT as a tool for improving quality of life.

e-Government

Goal:

To build up the Citizen-Centered, the Result-Oriented, Market-Based Government by utilizing ICT in the government sector, including central and local administrative units.

Objectives:

* Back office development, which includes record keeping, inventory, human resource management, finance and accounting and budgetary works;

* Front office development: to provide 70% of services through an online form by 2012 which will enable transparent and quality public service for citizens and business organizations (G4C, G4B) ;

* Utilize ICT as a tool to create more democratic government by providing fast, open, reliable government service, abolishing bureaucracy and bribery, encouraging citizens to be involved in the state and local policy making process.

e-Commerce

Goal:

Establish a new economy, by enhancing the competitiveness of Mongolian entrepreneurs, increasing the exchange of products and service, using e-commerce as a tool for business ventures without time and distance limitation.

Objective:

* E-commerce will be one of the major factor for international trade;

* 70 % of soums, 100% of province centers and capital city shall participate in e-commerce by 2012;

* B2B market shall improve by 10 times B2C market by 20 times.

Outline

e-Industry

Goal:

Strengthen the Mongolian industrial sector in support of an information society via the development and linking of IT networks in production and management by 2012.

Objectives:

* Establishment of a competitive ability in the international market promoting domestic ICT industry;
* Penetration of ICT in all industrial sectors, including infrastructure;
* Enhancement of domestic Software industry to develop e-industry;
* Prepare 5000 Software engineers and researchers (half of them will possess international engineering.

e-Citizen

Goal:

To provide safe, convenient, worry free life environment for the citizens by actively utilizing ICT in all social sector.

Objectives:

* Development of an information infrastructure for e-citizen;
* Bridge the digital divide in society in the information age, while promoting equal access in a simple expedited way.

e-Education

Goal:

Develop human resource at all level for development of an information society.

Education obtained in Mongolia to be acknowledged around the world.

Objectives:

* Achievement of an average international ICT literacy level by 2012 (80% of all capable people);
* 70 % of soums, 100% of province centers, cities will attend in distance learning system by 2012;
* Creation of the model e-schools (50 % of schools will have e-school capability by 2012);
* Development of R&D.

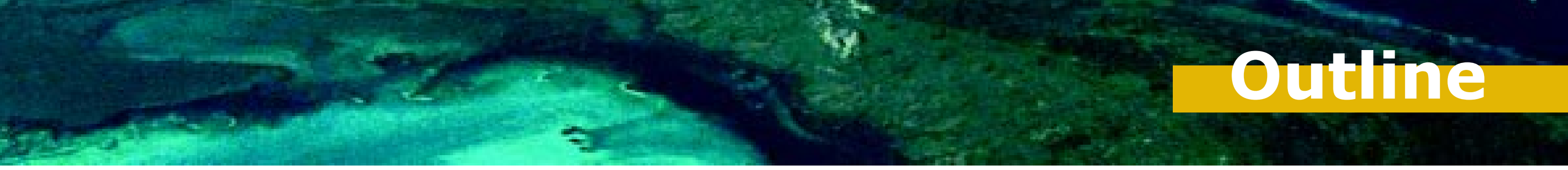
e-Health

Goal:

To harmonize health sector and transform into Patient centered, inexpensive, reliable, worry free service anywhere and anytime.

Objective:

* Establishment of the integrated electronic database system of medical records;
* Applying for ICT as tool to improve public health education;
* Utilization of the distance treatment, diagnostic, monitoring as a new tool in rural areas.



Bangladesh Space Research and Remote Sensing Organization (SPARRSO)

Introduction

Bangladesh Space Research and Remote Sensing Organization (SPARRSO) is a multisectoral research and development agency of the Government of the People's Republic of Bangladesh. It is functioning as an autonomous organization and is engaged in the peaceful uses of space science and remote sensing technology in the country.

Application of space technology in Bangladesh began as early as in the 1968 through the establishment of an Automatic Picture Transmission (APT) Ground Station at the premises of the Atomic Energy Centre, Dhaka. Subsequently, Space and Atmospheric Research Centre (SARC) was created in the Bangladesh Atomic Energy Commission in 1972 and APT ground station was absorbed within SARC. Bangladesh took up a programme called the Earth Resources Technology Satellite (ERTS) in 1973. Later, the ERTS was renamed as Bangladesh Landsat Programme (BLP). Bangladesh Space Research and Remote Sensing Organization was established under an executive order in 1980 merging SARC and BLP. An act was passed in the National Parliament in 1991 establishing the Bangladesh Space Research and Remote Sensing Organization (SPARRSO). The government in 1994 approved the Service Rules of the organization.

SPARRSO Activities

SPARRSO is engaged in multi-sectoral R& D activities in monitoring of the natural resources, environment and natural hazards in the country and providing expert services to the line user agencies. In the pursuit of these activities, SPARRSO has been applying space technology in different fields such as agriculture, water resources, forestry, geology, fisheries, oceanography, meteorology, environment, climate changes, natural disasters etc. The results of the study carried out in different fields mentioned above are discriminated to the Govt. and other user agencies for the implementation.

Weather monitoring, thematic mapping, monitoring of river course changes, monitoring of droughts, floods and weather hazards, inventory of forests, landuse analysis, vegetation index mapping, crop monitoring, coastal zone monitoring and change detection, geologic mapping, sea surface temperature mapping and surface circulation dynamics etc. are also being done on regular basis. SPARRSO carry out study, survey, training, and to undertake technical research in the fields related to space and remote sensing technology and to cooperate with any other local, foreign or international organization or agency in the related matter. SPARRSO also formulates projects for carrying out research in the field of space and remote sensing technology and applications and implement them with the approval of the government. In addition SPARRSO undertakes user specific work in association with the user agencies/organizations and universities.

Facilities

SPARRSO in its stride for rapid development of remote sensing capabilities in the country has established and developed satellite ground stations, laboratories and other ancillary facilities for receiving, analyzing and processing of remotely sensed data. The major facilities developed by SPARRSO are mentioned below:

Meteorological Satellite Receiving Ground Stations

SPARRSO has established two Ground Stations for receiving data from meteorological satellites. The Advanced Meteorological Satellite Ground Station (AMSGS) receives both low and high resolution images from the U.S. NOAA (National Oceanic and Atmospheric Administration) series of satellites in twice a day, while the GMS (Geo-stationary Meteorological Satellite) ground station receives images from GEOS-9 satellite every three hours.

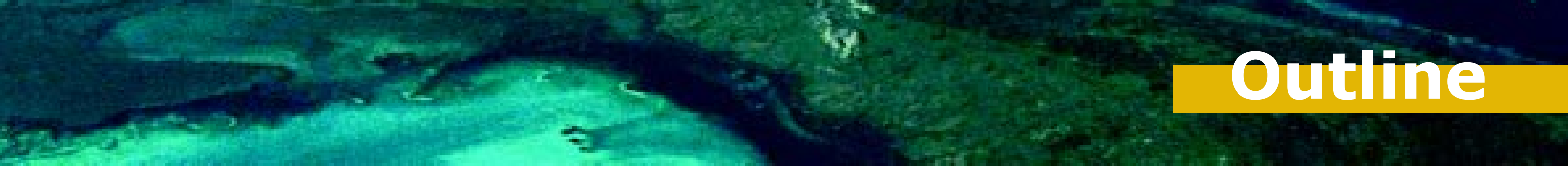
Digital Image Processing Systems

SPARRSO has acquired sophisticated image processing systems for analysing all types of remote sensing data required for monitoring resources, disasters and the environment. The systems include IIS-IVAS (S-600) supported by MicroVAX 3400 (DEC) computers and PC-based ERDAS Imagine software working in Pentium IV PC with 35 (thirty five) high resolution graphics terminals. Besides there are A3 size scanners and A4 to A0 size colour printer/ plotters and colour laser jet printers.

GIS Facilities

The first ever Geographic Information Systems (GIS) in the country (ERIM GIS) was installed in SPARRSO and training was provided to other users and updating of GIS facilities went on. Now the following GIS facilities are available in SPARRSO:

Mainframe ARC/INFO, PC ARC/INFO, ERIM GIS (Raster), IDRISI (Raster), ERDAS Imagine Professional, Imagine Orthobase, Imagine Vector, stereo Analyst



for Image, including digitizers, scanners, plotters and printers.

Photogrammetric and Cartographic Laboratory

For visual interpretation of satellite and aerial photographic data and to produce necessary output products like thematic maps SPARRSO has developed well-equipped laboratories. Map-o-Graph, Zoom Transferscope, Planvariograph, Mirror stereoscope, Stereoscope with x-y tables, Planimeters, (Polar, X-Plane, Digital), Pantograph, Procom2, , Ammonia printer, Large format copying machine etc. are among the important equipment.

Remote Sensing Photographic Laboratory

Photographic reproduction, enlargement, reduction and contact prints of both aerial photographs, satellite imagery information is essentially required for different sectoral research studies and mapping. For this, SPARRSO has a modern photographic laboratory enriched with SEG-6 enlarger/rectifier, Map-o-Graph, dryer, contact printer, large format Durst enlarger, Chromega- KENNOX - 510 RT Colour RA Processor; Omega colour enlarger, slide copier, Metaform colour processor (Reversal processes), Klimsh and SIXT large format contact copier, KG-30 contact printer, Lynhof master technica (4"x5") camera, digital camera and manual processing facilities.

Audio Visual Aid

SPARRSO has audiovisual devices like slide projectors, overhead projectors, multimedia display system etc. for various presentations/lectures in seminars, meetings, training, workshops etc.

Library

SPARRSO maintains a technical library having good number of books, covering different fields of relevance. The library also contains journals and periodicals on different aspects of remote sensing technology and applications published locally and internationally. SPARRSO regularly publishes annual report, quarterly newsletter and the Journal of Remote Sensing and Environment. The publications are circulated widely in and outside the country.

Creation of Digital Data Base

SPARRSO has been trying to build up a database of satellite imagery and also digital aerial photographs. These data will provide an invaluable wealth to SPARRSO in particular and the country at large. The database will provide a basis for both rural and urban development programmes in any sector of national economy. Using special software, which has been acquired recently, can make mosaic of aerial photographs. Upazila wise database with accurate geo-references has been created so as to go down to mauza level planning of resources in the country. The Bangladesh Bureau of Statistics (BBS) deserves a special credit for acquiring these aerial photographs for the first time in digital level. The village clusters, mauzas, road network, rivers, canals, ponds, important buildings and houses, forests, agricultural land etc. all have been brought under digital data base.

The process involves arduous methods of correcting the images, transferring and matching of different maps and relates them to geographical references. Having done all those processing and interpretations enumeration area maps are being prepared for the BBS. These maps after authentication will be used to collect census data of different nature based on which development of the country will take place. SPARRSO has signed an agreement second time to prepare EA maps of 21 districts with the BBS.

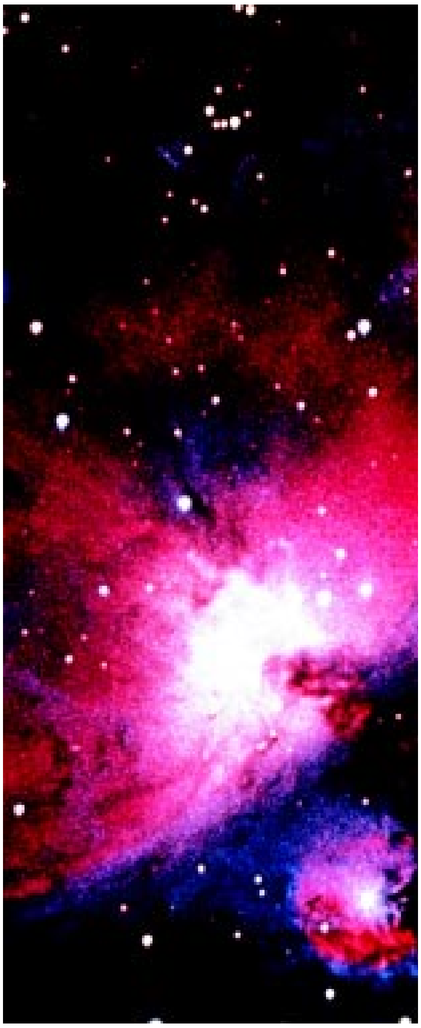
Expert Services and Transfer of Technology

Being the national focal point for space and remote sensing, SPARRSO has been providing expert services in the field to various organizations of the country. It has also been performing user specific jobs on request from the user agencies. It has been providing data to the users on a nominal price through the 'User Service Unit' of the organization. It has been undertaking R & D activities and training schemes where participants are invited from different fields from various organizations. This type of activities are helping the user agency personnel to learn about and to participate in the state of the art of remote sensing and help transfer of technology from SPARRSO to the user agencies. Distribution of Newsletter, annual report and publication of the journal of remote sensing and environment foster the dissemination of the technology better.

Remote Sensing Education and Training

Most of the SPARRSO scientists and engineers have been trained abroad (USA, France, England, China, Japan, Korea, Thailand, Pakistan, India etc.) in different fields. SPARRSO encourages its personnel to avail in country facilities for higher studies leading to M.S., M.Phil., & Ph.D. from local universities. Some of the young scientists are pursuing higher studies leading to M.Tech, M.S. & Ph.D. from accredited universities in India & Europe. SPARRSO provides its support and facilities for its personnel who intend to pursue higher studies.

SPARRSO has also close liaison with local and foreign universities and provide part time faculty for teaching postgraduate courses and supervising thesis of their students. Some of the universities have already taken steps to offer courses on remote sensing, space science, meteorology and environmental science. This mutual cooperation is fostering unfurling of ideas about recent technologies among the students.



CALL FOR PAPER

The Secretariat of AP-MCSTA will publish the *ASIA-PACIFIC SPACE OUTLOOK* quarterly (four issues per year). This magazine will be an open media to serve the AP-MCSTA and Asia-Pacific Space cooperation. It will be distributed to the Asia-Pacific region countries. *ASIA-PACIFIC SPACE OUTLOOK* will introduce the latest progress of space science, technology and its applications in Asia Pacific region and worldwide.

The contents of *ASIA-PACIFIC SPACE OUTLOOK* will be:

- Space news;
- AP-MCSTA activities reports;
- Space technology and its applications, space science research;
- Education and training programs;
- Space policy and space law;
- Interview of space scientists and heads of space agencies of Asia-Pacific Country;
- Academic research paper on space science and technology and its applications;
- Introduction of space agencies/organizations of Asia-Pacific Country;

The secretariat of AP-MCSTA welcomes papers from all countries in Asia-Pacific region and worldwide related to the above topics. The paper must include writerÕs full name and contact telephone, E-mail address, etc.

¥ontact: Editorial Office of *ASIA-PACIFIC SPACE OUTLOOK*

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