

## アジア太平洋宇宙機関構想

Toward the Establishment of Asia and  
the Pacific Space Agency

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This paper examines the past major regional cooperative efforts in the space field in Asia. It points out the problems in the past activities of APRSAF and APSCO. In order to enhance the level of space activities, it proposes the creation of a new regional space organization, namely Asia and the Pacific Space Agency (APSA) through the integration of APRSAF and APSCO.

APSA's expected activities will be mentioned in this paper. In analyzing diversified space activities in both the national and the international space agency, the Space Activity Index (SAI) will be introduced, which may be a useful tool to quantitatively consider desirable space development patterns in each country and agency.

The paper also proposes the establishment of the Asian Space Policy Institute (ASPI) which would carry out various space field research and propose desirable space policies in the region to promote regional and global cooperation.

Finally, the paper refers to the urgent need for structural reforms in the Japanese space development system to meet these new directions.

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**Introduction**

Due to buoyant foreign direct investment and expansion of trade, coupled with the diffusion of technology and information, most countries in the Asian region have attained substantial economic growth in the past two decades, in spite of the serious Asian financial crisis in 1997 and the recent global economic crisis in 2008. As a result, conventional beliefs about Asian economic stagnation have completely changed. Now China's GDP is almost equivalent to Japan's and the real GDP of India is about 90% of Japan's. If China's economic growth rate for the past decade is maintained into the next decade, China's nominal GDP will be double that of Japan's.

As a result of the steady economic growth in Asia, a number of Asian countries have succeeded in enhancing their space capabilities. China is at present one of the leading nations in space development and application in the world with manned space flights, the lunar project, and numerous satellite projects. India has also enhanced its space capabilities and is a major space-faring nation today with the development of indigenous launch vehicles and satellites. Both China and India have demonstrated very active space application activities including remote sensing, GIS, and telemedicine. It should be noted here that the success of space development and applications are attributable to persistent and tireless efforts in both countries. Needless to say, the introduction of

foreign technology played an important role in the early stages of space development in both cases. Not only have the above two countries shown remarkable progress in space development and application activities, so too have the Republic of Korea, Thailand, and a number of other Asian countries.

In spite of the rapid economic development of many Asian countries, they still face serious problems that might be solved by both individual and collective efforts. Some of the problems are a result of the rapid and unbalanced economic and social development in the region. Other setbacks are related to natural disasters, natural resources, energy, political instability, the spread of the influenza virus, national security, and so on. The development of space technologies could be a powerful and economical means to mitigate and/or solve these problems.

Regarding the regional integration in Asia, ASEAN has played an important role for the development and stability of South-east Asia. ASEAN's 'soft-type' or loosely structured cooperation is the reason for its long continuity. Recently, ASEAN expanded its partners to ASEAN Plus Three and further to ASEAN Plus Six. This regional cooperation demonstrates that economic and social cooperation is possible and desirable in spite of the religious, cultural, and political differences in the ASEAN region. This suggests that the Asian region could promote more regional collaboration projects, even in this urgent yet cumbersome area.

### **Regional cooperation in the Asian space field**

In the Asian region, there have been numerous efforts for regional cooperation in the space field. The most well known activities are in the remote sensing field through the annually held Asian Conference on Remote Sensing (ACRS). ACRS started in 1980, with the leadership of Dr. Shunji Murai and other experts from Asian countries. ACRS was based on the Asian-style spirit of democratic participation without hegemony and purely on academic research without any political implications. This kind of soft cooperation is one of the reasons for its long-term success. Through the close human network and the mutual exchange of information established by ACRS, coupled with the transfer of technology from developed countries, remote sensing capabilities in many Asian countries have been remarkably enhanced. Presently, India and China are the leading countries in remote sensing activities not only in Asia but also in the world.

The Ministerial Conference on Space Application held in Beijing in 1994 was a historical milestone for space development and cooperation in Asia. China expressed a strong will to take initiative in promoting regional cooperation in the space field, and several cooperative projects were identified at this conference. The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) took the initiative in implementing follow-up projects, which, in part, contributed to the establishment of the Asia-Pacific Space Cooperation Organization (APSCO). ESCAP also implemented various projects involved in the Regional Space Applications Programme for Sustainable Development (RESAP). The Second Ministerial Conference was held in India in 1999. Although UNESCAP has shifted its priority from space to disaster risk reduction, ESCAP's steady efforts in RESAP contributed to the enhancement of space application capabilities in Asia.

The first Asian Space Conference (ARC) has held in Chiang Mai in 2004, together with the 25<sup>th</sup> ACRS. ARC is a forum for space related matters on a volunteer base. ARC was subsequently held in Hanoi in 2005, Singapore in 2007, and Taipei in 2008. Unfortunately, major space-faring countries and space agencies have paid little attention to this conference, so it has not had much impact on space professionals. The problem is that ARC has not produced any constructive and/or novel ideas for regional space development. One possible suggestion for the survival and re-vitalization of ARC is to hold ARC combined with the annual ACRS Conference.

### **Japan and APRSAF**

In 1993, the Asia-Pacific Regional Space Agency Forum (APRSAF) was established under the leadership of Japan. At APRSAF, new Japanese space projects were introduced and member countries exchanged information on space activities. However, APRSAF remained little more than a tea party for more than a decade, yielding few fruitful results. Then, in 2006, the traditional forum pattern changed slightly with the inauguration of the Sentinel-Asia project, which focused on disaster preparation and risk management systems in the Asian region.

Pursuant to the recommendation at the UNISPACE III conference in 1999, the International Charter "Space and Major Disaster" was initiated by the European Space Agency (ESA) and French space agencies (CNES) in 2000. The aim is a unified system of space data acquisition and delivery to those regions affected by various disasters through

authorized users. Sentinel-Asia is the Asian version of the International Charter. Following the Sentinel-Asia project, the Space Application for Environment (SAFE) was initiated to monitor environmental changes by earth observation satellites including JAXA's Advanced Land Observing Satellite (ALOS).

In recent years, however, there has been a favorable change in APRSAF in two aspects. One is that Japan has proposed some concrete space application projects. Secondly, Japan has finally paid some attention to other Asian countries. Unfortunately, not enough attention has been spent on developing cooperative projects in the field of Asian space development and applications.

In spite of these policy shifts, Japan's role is still marginal in APRSAF. Since Japan has not developed its own constellation by a set of earth observation satellites, Japan's limited earth observation satellites are not enough to provide timely data and coverage in case disasters occur. Furthermore, in order to tackle disasters more seriously, JAXA should spend more money and employ professionals, while at the same time strengthening the activities of the Asian Disaster Reduction Center (ADRC). In spite of the large number of member countries in APRSAF, international cooperation through APRSAF still faces limitations.

### China and APSCO

With hosting the first Ministerial Conference on Space Applications for Space Applications for Sustainable Development in Asia and the Pacific in Beijing in 1994, China expressed openly that it would take the initiative in Asian space matters. China unveiled a portion of its space projects to the conference participants. China understands the importance of space and has taken a programmatic approach toward this end. Even before this conference in 1994, China, Thailand, and Pakistan had signed an MOU on Asia-Pacific Multilateral Cooperation in Space Technology and its Applications (AP-MCSTA) to jointly develop space projects, which later evolved into the Asia-Pacific Space Cooperation Organization (APSCO). Beijing became the site for its secretariat in 2002. Under the AP-MCSTA, the Small Multi-Mission Satellite (SMMS) project was implemented. While China had a very clear space policy for promoting regional cooperation through utilizing UNESCAP effectively as a tool, Japan was unable to propose any concrete regional space projects or related contributions until 2005. APSCO was formally established in December

2008 with eight signatory states, including Peru. It should be noted here that politically complicated countries like Pakistan and Iran are both signatory members, and China has given a helping hand to Iran's satellite project. Unlike APRSAF, APSCO is a legal organization. Its member countries are still small in number, but will definitely increase with China's economic growth and increasing political power. It should be remembered that many Chinese living overseas play a key role in a number of South-east Asian countries, and the network between China and Chinese expats is very strong.

China has also had successful satellite missions with Brazil, through the China-Brazil Earth Resources Satellite program (CBERS). CBERS program is a good example of bilateral cooperation in the space field. With the success of the CBERS project, China might be able to increase its cooperation with other partners in several African countries. In the future, APSCO could be an international space agency covering a wide region of Asia and the Pacific, South America and Africa.

Since the early 1990's, the University of Surrey and the Surrey Satellite Technologies Ltd. (SSTL) have initiated micro-satellites projects in Asian and African countries, and contributed greatly to the transfer of satellite technologies to developing countries. By giving similar assistance in the field of space technology, China could become a leader and an irreplaceable sponsor for developing countries.

### APSA

In Asia, both APRSAF and APSCO are engaged in cooperative space projects. In order to avoid the duplication of work and to promote regional cooperation, it is proposed that APRSAF and APSCO should be merged into one agency, the Asia and Pacific Space Agency (APSA). In Europe, regional integration started from the energy sector with coal and nuclear power. In Asia, the space sector could become a pioneering agency for regional integration. APSA should be a soft-type organization and apply the *juste retour* principle that has been applied in ESA. In this way, each member country could get project funds in proportion to their contributions. Member countries should be situated within the Asia and Pacific region, but the site of the head office should be outside the big three space-faring nations. Membership should also be open to nations outside Asia. South American countries and African countries could be associate members. Besides, the U.S.A., ESA and other space-faring nations and agencies could also be associate members.

Some of the expected activities by APSA might be as follows: (1) disaster prevention, disaster monitoring, and disaster management; (2) monitoring and dissemination of environmental data; (3) space education; (4) possible utilization of the International Space Station, especially KIBO and Chinese manned spacecraft; (5) technology transfer in the space sector; and, (6) monitoring of pirate ships and other suspicious vessels. Of course, member countries could propose other projects. Asia is characterized by very rich cultures. This cultural diversification and differences between member countries would bring about new space application projects.

The United States has imposed the International Traffic Arms Regulations (ITAR), which restricts the export of launch vehicles and satellite components. At present, ITAR is a serious barrier for the development of space industries and space activities in other countries. Thus, Asian countries have to rely on other advanced countries like Russia and Europe. If China, Japan, and India could accelerate the transfer of space technology to other member countries, the space capability of Asian nations would be enhanced. This would, in the long run, benefit both developed and developing countries.

### **Space Activity Index (SAI)**

The space sector encompasses various space activities. The Space Activity Index (SAI) may be a useful tool in order to analyze the space activities of each nation and space agency. SAI could also be a useful tool in formulating space policies in each country. SAI is derived from the same method as the Human Development Index (HDI) employed by the annual Human Development Report prepared by UNDP.

SAI is composed of six indexes: (1) Launch Vehicle Index; (2) Satellite Index; (3) Space Application Index; (4) Space Tourism Index; (5) Space Exploration Index; and, (6) Space Security Index. The Launch Vehicle Index means a nation's capability to manufacture launch vehicles. The Satellite Index means a nation's capability to build satellites. These two indexes are crucial for indigenous space development, and avoiding any problems associated with the utilization of foreign technology. Yet, in order to enhance these two index values, it is necessary to make huge investments, to have a high level of manufacturing technology, and to have enough space engineers. Several countries have high points on this index.

The third index, the Space Application Index, is the most important one directly related to people's

welfare. This index could be divided into two groups. One encompassing satellite communication and broadcasting activities, which are prevalent and commercially viable in Asia. The other aspect is remote sensing, GIS and navigation (such as GPS applications). Distance learning and telemedicine are also included in this category. The fourth index is concerned with space tourism. So far space tourism is very limited due to the huge cost for orbital flights. However, with the success of Space Ship One, which won the X-prize, the building of sub-orbital commercial spaceships, and the construction of spaceports in progress, sub-orbital space tourism will take place in the near future. This is the sector where huge incomes will be generated in the future. The fifth index has been considered to be the most important for space agencies. New findings and information obtained from space exploration activities give immeasurable hope to many people. The major space-faring nations are now involved in Moon and Mars missions. Of course, due to the 2008 global economic crisis, some countries have had to curtail their space exploration projects. Other scientific experiments such as micro-gravity experiments and Space Solar Power Systems (SSPS) would be included in this category. Finally space security has been the most crucial activity for most space-faring nations. Needless to say, the development of space security has both positive and negative aspects. Space technology is useful for conflict mitigation, to prevent terrorist activities, and to maintain peace on Earth as well as the safety of the Earth itself.

### **Asian Space Policy Institute (ASPI)**

In order to promote regional cooperation in the space field and to gain people's understanding and support for space activities, there is an urgent need for the Asian Space Policy Institute (ASPI), which would analyze and make appraisals of space plans and programs in the region as well as propose desirable policies and projects for the region and each member country upon request.

In the US, there are a number of think tanks and academic institutions concerned with space policy; such as the Space Policy Institute at George Washington University, CSIS, the Rand Corporation, Fulton, the Eisenhower Institute, and the Monterey Institute of International Studies. These think tanks and institutions have played a crucial role in providing diversified and concrete space policy agendas in and outside the United States.

In Europe, the European Space Policy Institute

(ESPI), located in Vienna, was established in 2003 to provide decision makers with an independent view and analysis on mid-to-long-term issues relevant to the use of space. ESPI has contributed to formulating European space policies.

ASPI could formulate and propose several space policies for ASPI and the United Nations as well as each Asian country. Some of the topics which ASPI could consider are as follows: (1) regional security; (2) the application of new space technology; (3) new space businesses, including space tourism and the possibility of a spaceport network in Asia; (4) space education for elementary and secondary school students in the region; (5) the possibility of building and utilizing satellites according to the “one nation, one satellite” rule; (6) micro-gravity experiments by constructing a drop-tower in selected countries; (7) construction of space museums and space parks; (8) increasing the number of astronauts in accordance with the “one nation, one astronaut” principle; and finally, (9) exploring possible space application ideas by offering prizes. APSI could also deal with space law issues in the Asian region.

### **Needed reform in the Japanese space development system**

The space development system in Japan has been characterized as bureaucratic. Under this system, however, Japan has succeeded in developing both its liquid and solid, indigenously developed launch vehicle. Regardless of several failures, Japan has enhanced its manufacturing capabilities with regards to geostationary broadcasting and communication satellites, and developed a number of sophisticated scientific satellites. Unfortunately, due to the Super 301 imposed by the United States, satellite manufacturing should follow the rules of international open bidding, except for satellites used for scientific and security missions. This measure was imposed during the period when Japan’s excessive trade surplus was a key issue in the U.S. In contrast with the U.S.’s satellite market, until almost the end of the 20<sup>th</sup> century Japan’s space development was based on the principle of strictly peaceful purposes. Thus, demand for military satellites did not exist in Japan, which resulted in a limited number of satellite launches per year, and a lack of competitiveness within the Japanese satellite manufacturing industry.

In spite of a limited budget, Japan has acquired a number of meaningful projects, including weather satellites, earth observation satellites, and scientific missions – including X-ray scientific satellites and

Hayabusa. It should be emphasized here that Japan initiated a number of pioneering scientific space projects.

However, Japanese space development is still characterized by technology push-type space development. As the name of the Japan Aerospace Exploration Agency (JAXA) itself illustrates, JAXA’s main task is technology development rather than space application. Space exploration and space experiments are the focus of JAXA. In order to make Japan’s space activities more meaningful to the public, namely to shift toward more comprehensive and more application pull-type development space, JAXA should be renamed Japanese Space Agency (JSA). At present, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), and the Ministry of Public Management, Home Affairs, and the Post and Telecommunication are the governing agencies for JAXA. MEXT lacks policy formulation capabilities, which has been demonstrated by several space plans, including the JAXA Vision for 2025. The JAXA 2025 Vision lists diversified purposes, yet it is oriented mostly towards scientific missions. Originally the JAXA 2025 Vision considered the inclusion of human space flight, but such proposals were removed from the present vision. The JAXA 2025 Vision only presents a hypersonic aircraft with Mach 5 as the main target project. Thus, the JAXA 2025 Vision without any real vision, is the outcome of the Japan’s bureaucratic space development. It should be added here that the continued participation with the International Space Station project is still being pursued by Japan, regardless of its substantial expense and less than anticipated tangible outputs. JAXA should be a focal point of Japan’s major space activities. JAXA should have more autonomy and formulate Japan’s dynamic civilian space policies.

Regarding space security, eight Information Gathering Satellites (IGS) have been launched since 2003, in which two satellites were lost by the H-2 launch vehicle failure in November 2003. Although the IGS project is under the direct control of the cabinet, data obtained were never disclosed to the public and have not contributed to Japan’s national security at all so far. Thus, the Japanese Ministry of Defense should develop its own reconnaissance satellites, which would enhance Japan’s intelligence capabilities, thereby contributing to the prevention of any conflicts with neighboring countries. To do so, however, the government might need to make a minor amendment to Article Nine of the Japanese Constitution.

Japan’s sluggish space activities and lack of

leadership may be attributable to poor policy formulation. These phenomena have been commonly seen in the central as well as local government in Japan. In order to overcome such detrimental practices, it is necessary to establish the Japanese Space Policy, Law, and Culture Association, which will discuss space policies and propose objective and constructive policy proposals. The stagnation of Japanese space development arises not only from a limited budget and bureaucratic space agency but also from the lack of a string policy agenda.

### **Conclusion**

Asia's economic development has brought about remarkable space development and application activities in a number of Asian countries. In order to utilize more fully the usefulness of space technology, it is desirable to establish a regional space agency. Japan should take a leadership role in this matter. In order to initiate new and meaningful space cooperation, structural reforms in the Japanese space development system are required.