

Asian Space

Research >
General

The space age began with the launch of the Russian artificial satellite Sputnik in 1957 and developed further with the race to the moon between the United States and Russia. This rivalry was characterized by advanced technology and huge budgets. In this process there were spectacular successes, some failures, but also many spin-offs. Europe, Japan, China, and India quickly joined this space club of the superpowers. With the advent of relatively low cost high performance mini-satellites and launchers, the acquisition of indigenous space capabilities by smaller nations in Asia has become possible. How, in what manner, and for what purpose will these capabilities be realized?

By David Soo

Rocket technology has progressed considerably since the days of 'fire arrows' (bamboo poles filled with gunpowder) first used in China around 500 BC, and, during the Sung Dynasty, to repel Mongol invaders at the battle of Kaifeng (Kai-fung fu) in AD 1232. These ancient rockets stand in stark contrast to the present-day Chinese rocket launch vehicles, called the 'Long March', intended to place a Chinese astronaut in space by 2005 and, perhaps, to achieve a Chinese moon-landing by the end of the decade.

In the last decade there has been a dramatic growth in space activities in Asia both in the utilization of space-based services and the production of satellites and launchers. This rapid expansion has led many commentators and analysts to predict that Asia will become a world space power.

The space age has had dramatic affects worldwide with direct developments in space technology influencing telecommunications, meteorological forecasting, earth resource and environmental monitoring, and disaster mitigation (flood, forest fires, and oil spills). Asian nations have been particularly eager to embrace these developments. New and innovative uses for satellites are constantly being explored with potential revolutionary effects, such as in the field of health and telemedicine,* distance education, crime prevention (piracy on the high seas), food and agricultural planning and production (rice crop monitoring). Space in Asia is very much influenced by the competitive commercial space sector, the emergence of low cost mini-satellites, and the globalization of industrial and financial markets. It is not evident how Asian space will develop in the coming decades in the face of these trends. It is, however, important to understand and assess the factors and forces that shape Asian space activities and development in determining its possible consequences for the region.

The laws of physics are the same in Tokyo as in Toulouse...

At present, three Asian nations, Japan, China, and India, have comprehensive end-to-end space capabilities and possess a complete space infrastructure: space technology, satellite manufacturing, rockets, and spaceports.

Already self-sufficient in terms of satellite design and manufacturing, South Korea is currently attempting to join their ranks with its plans to develop a launch site and spaceport. Additionally, nations in Southeast Asia as well as those bordering the Indian subcontinent (Nepal, Pakistan, and Bangladesh) have, or are starting to develop, indigenous space programmes.

The Association of Southeast Asian Nations (ASEAN) has, in varying degrees, embraced space applications using foreign technology and over the past five years or so its space activities have been expanding. Southeast Asia is predicted to become the largest and fastest growing market for commercial space products and applications, driven by telecommunications (mobile and fixed services), the Internet, and remote sensing applications. In the development of this technology, many non-technical factors, such as economics, politics, culture, and history, interact and play important roles.

Satellite remote sensing – environmental and security issues

Asia, and Southeast Asia in particular, suffers from a long list of recurrent large-scale environmental problems including storms and flooding, forest fires and deforestation, and

crop failures. Thus the space application that has attracted the most attention in this region is remote sensing. Remote sensing satellites equipped with instruments to take photographs of the ground at different wavelengths provide essential information for natural resource accounting, environmental management, disaster prevention and monitoring, land-use mapping, and sustainable development planning. Progress in these applications has been rapid and impressive. ASEAN members, unlike Japan, China, and India, do not have their own remote sensing satellites, however most of its member nations have facilities to receive, process, and interpret such data from American and European satellites. In particular, Thailand, Malaysia, and Singapore have world-class remote sensing processing facilities and research programmes. ASEAN has plans to develop (and launch) its own satellites and in particular remote sensing satellites.

Obviously, space technologies can also be used for non-peaceful and military purposes (dual use technology). Earth resource satellites, with their high resolution imaging capabilities, can be used for reconnaissance and spying. This strategic use of satellites – of great value for national defence and foreign policy – is of great significance in Asia taking into account the region's potential hot spots: North and South Korea, India and Pakistan, the Spratly Islands, and Taiwan and China, amongst others.

Zen and the art of satellite manufacturing

Japan is regarded as the dominant space power in Asia and its record of successes and quality of technologies are equal to those of the West. In view of the technological challenges and high risks involved in space activities, a very long, and expensive, learning curve has been followed to obtain those successes achieved. Japan's satellite manufacturing was based on the old and traditional defence and military procurement methodologies as practiced in the US and Europe.

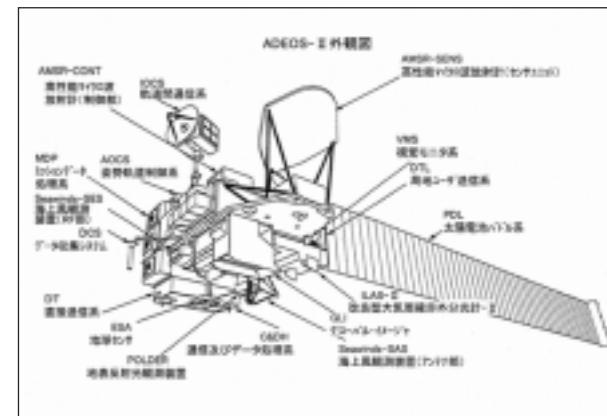
In recent years there have been fundamental changes in the way satellites are designed and built to drastically reduce costs. The emergence of 'small satellites' and their quick adoption by Asian countries as a way to develop low-cost satellite technology and rapidly establish a space capability has given these countries the possibility to shorten their learning curve by a decade or more. The global increase of technology transfer mechanisms and use of readily available commercial technology to replace costly space and military standard components may very well result in a highly competitive Asian satellite manufacturing industry.

The laws of physics are the same in Tokyo as in Toulouse, and the principles of electronics and mechanics know no political or cultural boundaries. However, no such immutability applies to engineering practices and management; they are very much influenced by education, culture, and history. These factors, in turn, have an affect on costs, lead times, product designs and, eventually, international sales. Many Asian nations are sending their engineers to be trained in the West. Highly experienced, they return to work in the growing Asian space industry. Will this acquisition of technical expertise, coupled perhaps with the world-renowned Japanese manufacturing and management techniques, be applied to build world-class satellites and reduce costs?

Studies in Asian space

The study of Asian space can be based on mainly two perspectives. The first and most common perspective concerns space science and technology and in this field there are many active programmes of research and development. The second perspective could focus on the influence of space applications on society. The relationship between technology and society has been a constant theme in the social sciences and humanities. The impacts of science and technology on society have led to changes in education, cultural values, employment and work, as well as affecting national wealth and well-being. Space technologies and applications have shown to be instruments of change themselves and can thus have profound effects on Asian culture, commerce, and communities. These focuses on the development and influences of Asian space capabilities only touch on some of many potential topics for investigation in the field of Asian space. ◀

The ADEOS-2 satellite configuration showing the layout of satellite and its instruments. ADEOS-2 is the second of the Japanese 'Advanced Earth Observation Satellite' programme.



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Note >

*The use of real time broadband satellite telecommunications and video links for medical diagnosis and patient care to remote rural communities having no access to doctors and hospitals.