Special Report

Description of the Recent Space Activities in China

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Abstract

China, People's Republic of China (PRC) is now one of the most advanced countries in some fields of space technology. These achievements have been based mainly on the development of launching facilities and vehicles, namely "Long-March" rocket group. The cost effectiveness of these launching infrastructures should become universally admitted by world space developing organizations.

In August 2001, The Institute for Future Technology of Japan and China Institute of Contemporary International Relations jointly held "the 2nd Japan-China Space Dialogue Forum". In this forum, Diet-persons, high government officials, and specialists in space activities both from Japan and China met together for future collaboration and information exchanges. We got a lot of information about recent space activities in China throughout the meeting. China has now been making remarkable achievements, and its own manned space-flight system may be established within a few years.

I will give a brief description of China's recent space activities in this article.

1. The 2nd Japan-China Space Dialogue Forum

The Forum was held at Diaoyutai State Guesthouse in Beijing from August 31 to September 1, 2001 (Figure 1). Leading participants are as follows; Japan side; Mr. Ono, Mr. Ohata (Diet members), Mr. Hatoyama, Mr. Saito (Diet members and VTR message participation), Prof. Akiba (The Lunar and Planetary Society), Dr. Iida (Communications Research Laboratory), Dr. Kibe (National Aerospace Laboratory of Japan), and Mr. Ueno (National Space Development Agency of Japan), and China side; Mr. Luan, Mr. Son, Mr. Luo (China National Space Ad-

Figure 1 The 2nd Japan-China Space Dialogue Forum at Diaoyutai State Guesthouse, Beijing on September 1, 2001.

ministration), Mr. Hua (China Aerospace Science and Technology Corporation), Prof. Wu (China Center for Resources Satellite Data Center), Prof. Ma (Chinese Academy of Space Technology), Prof. Wang (Chinese Academy of Sciences), and Prof. Wang (Harbin Institute of Technology).

2. Structure of the Chinese Space Development

Structure and connection between China's space relating institutes are complicated and developing, but there are two major parts that were born after the restructuring of government system during 1998-1999.

i) China National Space Administration

This government-side institute has responsibility for determination of space developing policy, construction and maintenance of nation's schedule, and official contact for international collaborations.

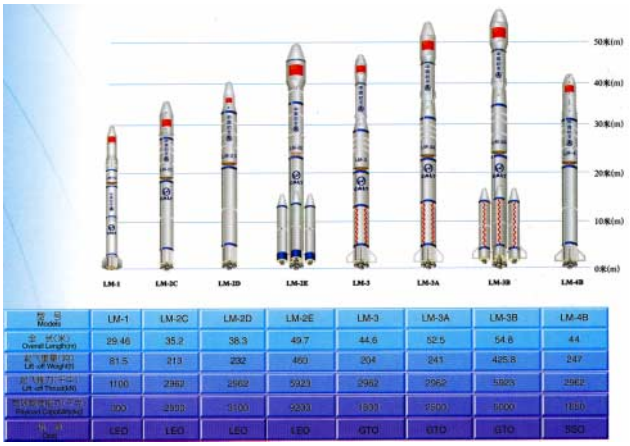
ii) China Aerospace Science & Technology Corporation

This organization is under the direct supervision of the Central Government, specializes in developing launch vehicles, spacecraft, manned spaceship, and dealing with imports & exports of space-related products and international cooperation.

Under these organizations, there are many kinds of institutes for special purposes, for example; Chinese Academy of Launch Vehicle Technology, Chinese Academy of Space Technology, etc. Some institutes under Chinese Academy of Science and Universities have also been making technological and scientific research.

3. Launch Vehicle

China has developed the "Long-March" rocket group capable of launching satellites to near-earth, geo-stationary and sun-synchronous orbits. Long-Marches those have been successfully developed and put into operation are shown in Figure 2. The payload capability has reached 9.2t for low earth orbit, and 5.1t for geo-stationary transfer orbit.



Models	LM-1	LM-2C	LM-2D	LM-2E	LM-3	LM-3A	LM-3B	LM-4B
Overall Length(m)	29.46	35.2	38.3	49.7	44.6	52.5	54.8	44
Lift-off Weight(t)	81.5	213	232	460	204	241	425.8	247
Lift-off Thrust(kN)	1100	2962	2962	5923	2962	2962	5923	2962
Payload Capability(kg)	300	2600	3100	9200	1300	2600	5000	1100
	LEO	LEO	LEO	LEO	GTO	GTO	GTO	SSO

Figure 2 Long March, Chinese launch vehicle family.

4. Satellite Applications

China has developed such spacecraft as meteorological satellites, earth resource satellites, communications satellites, and scientific experimental satellites. Remarkable achievements are as follows.

4.1. Remote Sensing

On October 14, 1999, the China-Brazil Earth Resources Satellite (CBERS-1) was put into the sun-synchronous low-earth (778km) orbit, completing about 14 revolutions per day. The local solar time at the crossing of the equator is always at 10:30 AM. A unique characteristic of CBERS is its multi-sensor payload with different spatial resolutions and data collecting frequencies. The payloads are Wide Field Imager, High Resolution CCD Camera, and Infrared Multi-spectral Scanner.

The geo-stationary meteorological satellite FY-2B was launched on June 25, 2000, and located at 105°E. Another polar orbit meteorological satellite, FY-1C has been operated since 1999. (Figure 3)

4.2. Communications

DFH-3, telecommunication satellite as shown in Fig-

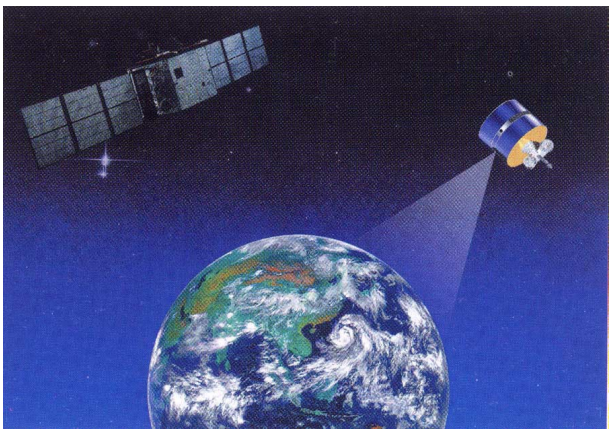


Figure 3 FY-1 and FY-2 meteorological satellites.

ure 4 was launched on May 12, 1997. There are now, in China, 30 domestic VSAT (Very Small Aperture Terminal) communication service providers and 15,000 small station users. China also has been building satellite TV education and broadcasting programs, and more than 30 million people have got college or technical secondary school education and training through it. China has also set up a satellite direct broadcasting experimental platform to transmit CCTV by digital compression to the vast rural areas where can not be covered by wireless TV broadcast. In this way, China's TV broadcasting coverage has been greatly increased.

4.3. Space Biology

China became the third country in the world with recoverable satellite technique in 1975 as shown in Figure 5. This recoverable system has yielded some achievements in crystal and protein growth, cell cultivation, and crop breeding. Agriculture is one of the most important research areas in China, and the mutation in space environment (micro-gravity and radiation) has experimentally started to use for the nation's food-increasing program. (Figure 6)

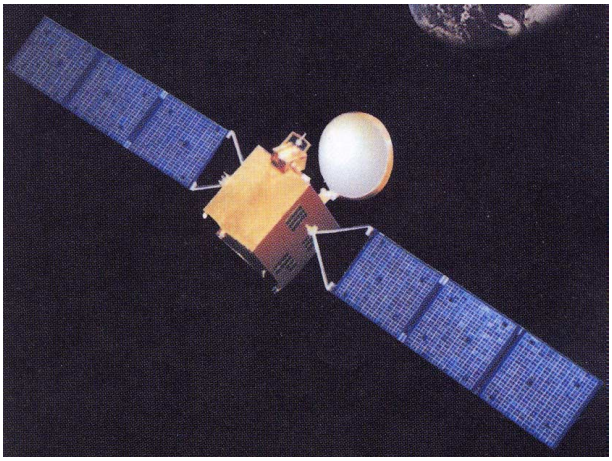


Figure 4 The DFH-3 telecommunication satellite.

5. Manned Space

At 6:30 AM on November 20,1999, a new Long-March rocket launched the "Shenzhou" unmanned experimental spacecraft and it was successfully returned to the ground on November 21 as shown in Figure 7 and 8. This event is symbolizing a breakthrough in the basic technologies of manned spacecraft and a significant step forward in the field of manned space flight. Realization of manned space flight is one of the China's short-term development

Figure 5 A recoverable satellite was successfully returned to the ground.

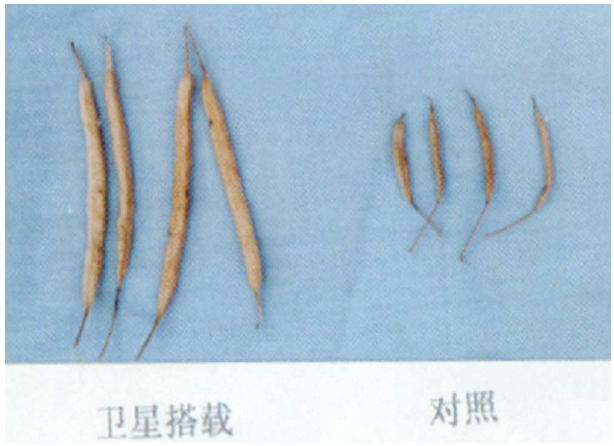


Figure 6 An example of the mutation in space environment.

Figure 7 “Shenzhou” Chinese experimental manned spacecraft.

Figure 8 President Jiang Zemin inspected the recovered module of the Shenzhou.

targets for the next decade, and China may become the third nation carrying out manned space flight in the world.

Concluding remarks

In regard to space development, China has become one of the most aggressive countries in the world. So, it is important to support international exchanges and cooperation in space communication, earth environment monitoring, space environmental exploration, micro-gravity science, space life science, and space biology.

References

1. “China’s Space Activities”, The State Council Information Office, P.R.C., November 2000, Beijing.
2. “China’s Space Activities 2000”, China National Space Administration.
3. “China Aerospace Science & Technology Corporation”
4. http://www.dgi.inpe.br/html/eng/cbers.htm

Presentations at “the 2nd Japan-China Space Dialogue Forum”