The Space Technology Applications for Chinese Social and Economic Development

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Outline

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The course of Chinese space science and technology development

In the modern information society, space technology is very important for promoting social and economic development.

China has always attached great importance to space science and technology development and application, with the development of 40 years, China has achieved remarkable fruitful achievements in space technology field, space technology has played a very important role in promoting Chinese social and economic development.
The course of Chinese space science and technology development

Three matters of milestone in Chinese space science and technology development

- **The first** is that on April 24, 1970, China successfully developed and launched the first artificial Earth Satellite, "DongFangHong I" satellite, which made a historic breakthrough in Chinese space technology. From then on, China can independently develop and launch satellites, the prelude of Chinese space activities was kicked off.
"DongFangHong I" satellite
April 24, 1970
- April 8, 1984, Chinese first geostationary experiment communications satellite
- September 7, 1988, launched polar orbit meteorological "FY I" satellite
- The latest success is on September 5, 2010, "Sino VI" radio communications satellite was launched in Xichang, China.
- August 10, 2010, the 10th Chinese "remote-sensing satellite" was launched into Earth orbit in Taiyuan, China.

The satellite network is steadily advancing as planned.
The second is that on October 15 to 16, 2003, China successfully launched and retrieved the "Shenzhou V" manned spacecraft, the first manned spaceflight was a complete success. Chinese space technology made a new historic breakthrough. For that, China has independently master the manned space flight technology.
"Shenzhou V" manned spacecraft, the pilot displayed the Chinese national flag
"Shenzhou VI" manned spacecraft, 2006
"Shenzhou VII" manned spacecraft, 2007
"Shenzhou VII" manned spacecraft, 2007
The third is that on October 24, 2007, China successfully launched the Chang'e I satellite. At that time, China walked the first step in the field of deep space exploration.
October 24, 2007
Chang'e I satellite, man-made lunar satellite
Chang'e I satellite orbit transfering process
The course of Chinese space science and technology development

In short, in spacecraft development and operation, China has come from the technical test to engineering applications, from unmanned spacecraft to manned spacecraft, from man-made earth satellite to man-made lunar satellite, and formed different series of products, such as communications and broadcasting satellites, remote sensing satellites (such as earth resource satellites.), navigation satellites, etc. In short, China now has a batch of core and key technologies with independent intellectual property in space technology field, which has laid a solid foundation for accelerated development.
The Space Technology Applications for Chinese Social and Economic Development

During the 40 years, Chinese space technology is widely used in economic construction, scientific and technological development, national defense and social progress, and fruitful results have been achieved.
The Space Technology Applications for Chinese Social and Economic Development

- Satellite communications, broadcasting
- Satellite navigation and positioning
- Resource survey and mapping
- Weather and disaster prediction
- Science research
- National security ensuring
Satellite communications, broadcasting

- Satellite communication and broadcasting technology applications has been increasingly widespread, application industry has taken shape, "DongFangHong" communication and broadcasting satellites played an important role.

- In many places where transports are not convenient, where communications lines can not reach, on sea, in air, or disaster areas, etc. satellite communications and broadcasting even show superiority.
Satellite radio and television service
- Substantially increase the effective coverage and quality of radio and television service
  Particularly the rural areas
  Be very helpful to promote Chinese Distance Education, Telemedicine, Village phone

Special Communication Network
Finance, weather, traffic, oil, water resources, civil aviation, power and dozens of departments
Satellite navigation and positioning

- **Advantages of satellite navigation and positioning**: large scope, good effectiveness, high precision, etc.
- Has been widely used in marine vessels, airplanes, land vehicles, driving navigation, and also been used in the positioning of various construction and operational activities.
- Make important contributions for a variety of transportation industry to **improve transport efficiency and safety**.
Compass satellite navigation system diagram
Compass satellite navigation system
- three-dimensional satellite positioning and communication system (CNSS)
- self-developed by China, the regional navigation system,
- Combination of navigation and positioning, two-way communication and precision timing
- Provide all-weather, all-time satellite navigation, high-precision positioning, timing information
For highway transport, rail transport, marine operations, forest fire prevention, disaster forecast and other special industries, etc.
Resource survey and mapping

- Satellite photos have been applied widely in investigating land and marine resources.
- Domestic and foreign satellites have been used to survey and investigate the resources and environment of the major economic areas in whole China.
- With the method, labor force and financial resources are not only saved, but also it is very quick.
- At the same time, topographical maps and a variety of professional plans are drawn with satellite photos.
Resource survey and mapping

- "Resource One" and “Resource Two" earth resource satellite
  - Their successful launching and business operations, created a new situation of Chinese satellite remote sensing applications.
  - Widely used in agriculture, forestry, geology, water resources, mining, environmental protection and land resources survey, urban planning, disaster monitoring and other fields, has become an important source of information for the many resources and environment monitoring systems.
  - Chinese major national projects

  Western development, natural disaster monitoring, large-scale land improvement, etc.
"Marine One" satellite

- the first business test satellite for the detection of ocean color
- **provide important information service** for development and utilization of marine living resources, coastal engineering, estuaries governance, marine environmental monitoring, environmental protection, etc.
- Promote Chinese Satellite remote sensing of marine
Weather and disaster prediction

Meteorological satellites not only improve the accuracy of weather forecasts, but also they have played a very effective role in the forecast of typhoons and storms, sea surface temperature monitoring, etc.

Ever since there were meteorological satellites in China, the typhoon forecast has been almost accuracy. Meteorological satellite data has played an active role in monitoring many kinds of disasters such as forest fires, floods and etc.
In China in recent years, the extreme weather events and other disasters frequently occur, posing great threat to Chinese people's lives and property.

To meet the many challenges posed by climate change, Chinese meteorological authorities vigorously strengthen the building of an integrated detection system. Integrated Detection System as an important force, like Chinese meteorological satellites in space "telescope", 24-hour monitoring of the Earth "situation changes."
Weather prediction

- FY series of satellites have remarkable benefits
  - have been put into operational applications, initial realization of operations and series,
  - Have played an important role in weather forecasting, climate prediction, weather research, natural disasters and ecological environment monitoring, etc.
FY I satellite

FY I D satellite
The first photo obtained by FY-D meteorological satellite
Satellite Images
Some disasters in China in recent years
September 2, 2010, Baoshan Town, Long Yang District Dong Village vama landslide site
May 7, 2010, Guangzhou suffered heavy rainfall
July 26, 2010, Hanjiang 20-year return period flood arrived in Wuhan Jiang Duan
Real shot of 2008 Spring snowstorms in southern China
5.12 Wenchuan earthquake relief medical rescue team
Disaster prediction

Over the years, Chinese have been in a passive situation in natural disasters. With the continuous development of space technology, its application for disaster warning, disaster mitigation and relief, cause more and more people's attention, demonstrating its great potential.
Disaster prediction

- Earthquake
  - Wenchuan Earthquake, Sichuan, China, 2008
  - Yushu earthquake, Qinghai, China, 2010
Disaster prediction

- Wenchuan Earthquake, Sichuan, China
  - Time: 12 May 2008
  - Focal depth: 14km
  - Magnitude: Richter magnitude 8.0, moment magnitude 7.9
  - Epicentral intensity: 11 degrees
  - Casualties: killed: 69,142  missing: 17,551 people
Tragic scene of Wenchuan earthquake
Airborne Image of Wenchuan earthquake
Airborne Image of Yingxiu Town in Wenchuan County, the epicenter and the hardest hit
Disaster prediction

- Yushu earthquake, Qinghai province, China
  - Time: 2010/04/14 07:49:40
    - Magnitude (M): 7.13
    - Latitude (33.1° N) Longitude (96.7° E)
    - Depth (km): 33
  - By the end of the time, at 18:00 May 30, 2010, in Yushu earthquake, 2698 people were killed, and 270 missing.
青海省玉树县发生7.1级地震

北京时间2010年4月14日7时49分

震级：Ms 7.1级
震源：约33公里
Yushu earthquake relief site
Disaster prediction

Space technology has a wide range of applications in natural disaster monitoring, the applications in earthquake mainly include:

- Disaster quick report
- Disaster spatial information security
- Dynamic monitoring of secondary disasters
- Disaster reconstruction planning.
Debris Flow Disaster

- **Zhouqu County Debris Flow, 2010**

  The night of August 7 to 8 am, **Zhouqu County**, Gunman Tibetan Autonomous Prefecture of Gansu Province, China, sudden large Debris Flow Disaster, causing major casualties.

  1478 people killed, 287 missing,
Spot Image of the mudslide-hit region (April.15 2010) (Image/CEODE)
Airborne Image of the mudslide-hit region (Aug.8 2010)
Analysis on the superposition of remote sensing images and DEM
With various kinds of "practice" scientific exploration and technological experiment satellites, and the implementation of Geospace Double Star Exploration Program, a series of space environment exploration and space science experiments projects have been carried out, contributed greatly to Chinese space science innovation and development.

In May 1999, China launched the "practice V" satellite which is Chinese first modern small satellite, with which China has done space environment radiation detection, space fluid science experiments, and so on, and has made important detection and experimental results.
National security ensuring applications

- In National security ensuring, Military satellites play an important role in satellite application for military, including military reconnaissance, missile warning, command of military communication, navigation and weather protection, etc.
- Reconnaissance satellites can not only monitor the enemy's military action real-timely in a wide range, but also detailedly investigate important military targets.
- A variety of military satellite can not only provide a variety of military needs in peacetime, but also play an important role in the war.
In short, the achievements of Chinese space technology are playing an increasingly important role in promoting Chinese economic and social development. With satellite remote sensing technology, some natural disasters, such as earthquakes, landslides, floods, drought, snow, forest fires, etc., can be predicted and assessed, and billions of dollars losses can be reduced every year. Space technology is applied to some traditional industries, such as transportation, and their transformation can be promoted. By breeding seed trials with recoverable satellite, and the Shenzhou spacecraft, the crop has significantly increased abilities in drought, waterlogging, disease resistance. With the further development of space technology, its application will show infinite potential.
Development trend of Chinese space technology

In the new development situation of China, economic construction, national defense construction, and science and technology development make more urgent needs for space science and technology. China is vigorously speeding up the development of space science and technology to serve the national economic development and the development of human society better.
Development trend of Chinese space technology

- China will start and implement some great major projects such as high-resolution Earth observation system, manned space and lunar exploration engineering, etc.
- high-resolution Earth observation system

- Development of new meteorological satellites, oceanic satellites, earth resources satellites, stereo mapping satellites, environment and disaster monitoring satellites, etc.

- Preliminarily form long-term and stable operation of satellite earth observation system

- Develop the geostationary orbit telecommunications satellites and direct TV broadcasting satellite with long-life, high reliability and large capacity for establishing a relatively complete satellite telecommunications and broadcasting system.

Develop many long life, high reliability and large capacity communications satellite in geostationary orbit for foreign countries
High-resolution Earth observation system

- Improve the Compass navigation test satellite system, develop new navigation and positioning satellites, establish **Chinese satellite navigation and positioning systems step by step**

- Develop space telescopes and other scientific satellites, develop space science observations and experiments

- Develop satellites for new technology experiment, and strengthen the space flight validation of new technology, new materials, etc.
– On the satellite application for scientific research of microgravity, making full use of favorable conditions on ground and in space, China will have the possibility to make significant progress on some prospects such as microbial and plant breeding, semiconductor materials, etc.
manned spaceflight

- Conduct experiments on spacecraft space docking
- Build short-term care, long-term autonomously orbiting space laboratories.
- Carry out the follow-up work of manned space project.
Lunar exploration engineering

In the field of deep space exploration

- complete the tasks in the second phase project of Lunar exploration and achieve a soft landing and lunar probe automatic inspection survey,

- Carry out preliminary study in Phase III project of the moon exploration, and ultimately realize to take sample of the lunar sample and return automatically.
In addition, in due course,

China will make further research on Mars exploration, and gradually step forward more distant from the moon to deep space.
Conclusions

- Achievements and shortages
- Urgent needs and studious development
- International Cooperation
Thank you very much!