



3RD SPACE EXPLORATION CONFERENCE & EXHIBIT

China's Space Industry and International Collaboration

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Brief History



- **52 years since 1956, first space institute established**
- **Learning from Soviet Union until 1960**
- **U.S.A.'s close door policy until now**
- **China's self-reliance Policy**

Major Achievements



- **12 series of Long March Launching Rockets**
- **>100 Launches**
- **>80 satellites in remote sensing, telecommunication, GPS, scientific experiment**
- **Manned space flights——Shenzhou 5 (2003) and Shenzhou 6 (2005)**
- **Lunar Exploration Project——Chang'e 1 (2007)**

LM-2F Launch Vehicle



- **Stages 1 & 2 & 4 strap-on boosters**
- **58.3 meters long**
- **Launch Mass: 480 tons**
- **Total Thrust : 600 tons**
- **Reliability & Safety Index: 0.97 & 0.997**
- **10 Sub-Systems**



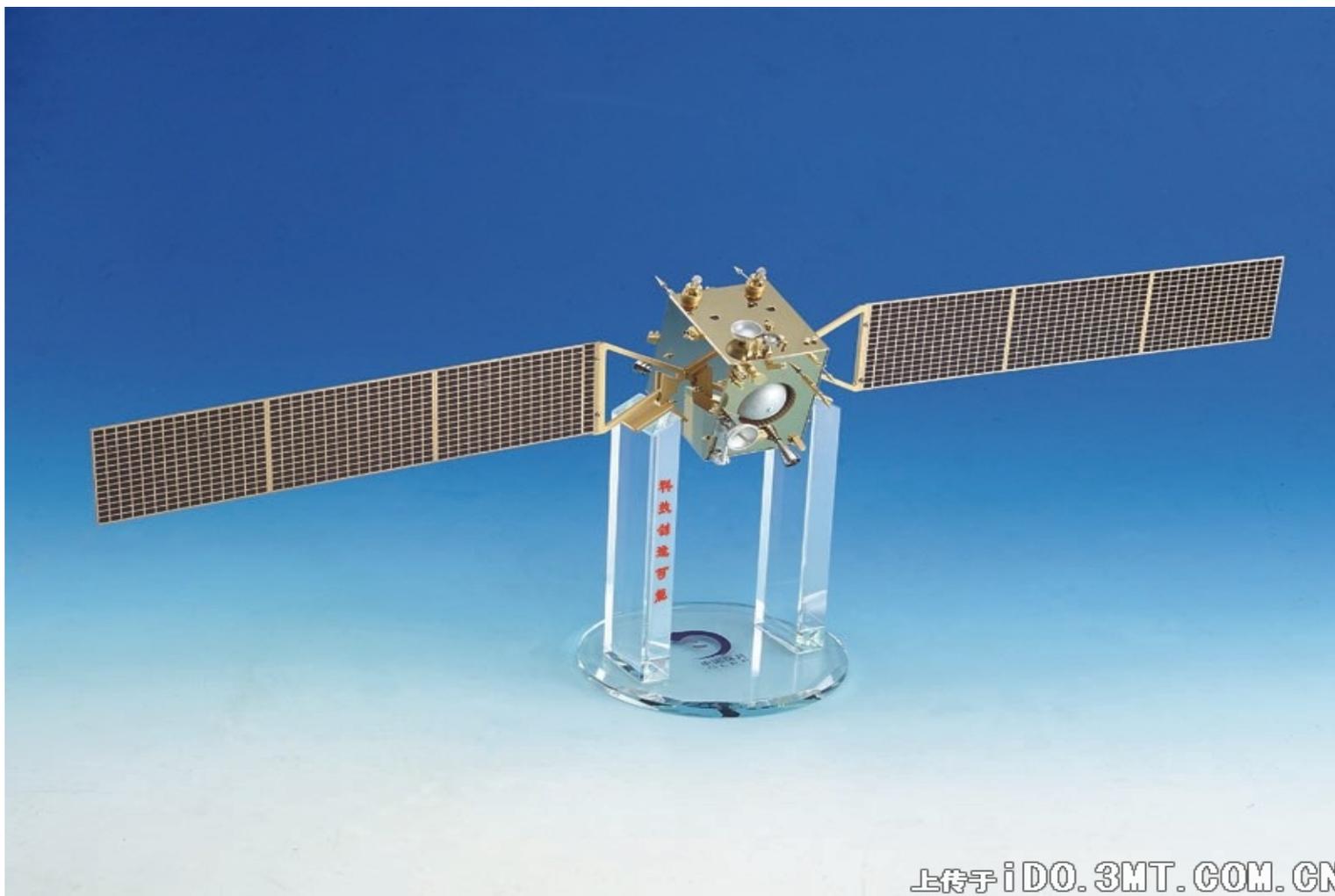
Manned Space Flight--Shenzhou 6



Manned Space Flight--Shenzhou 6

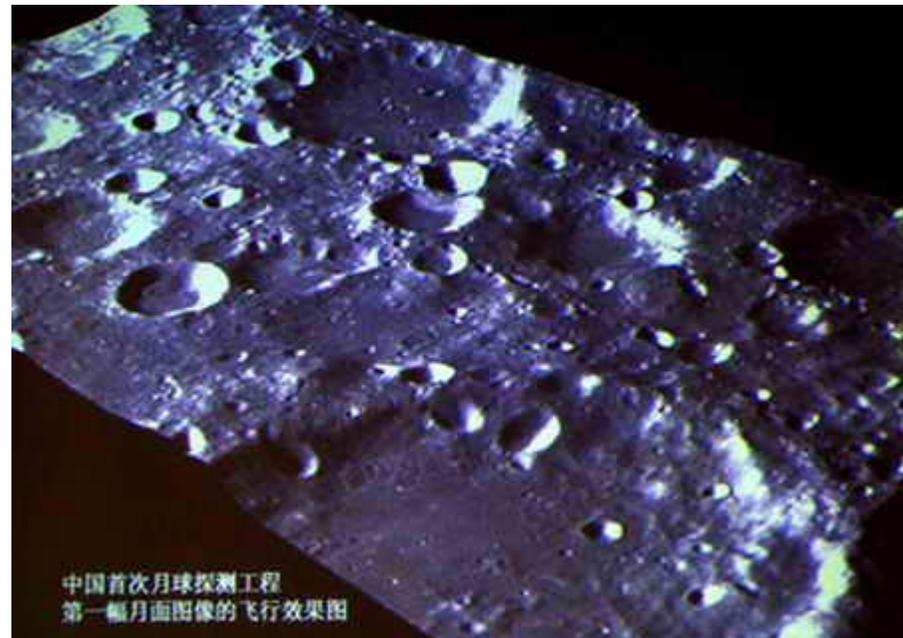
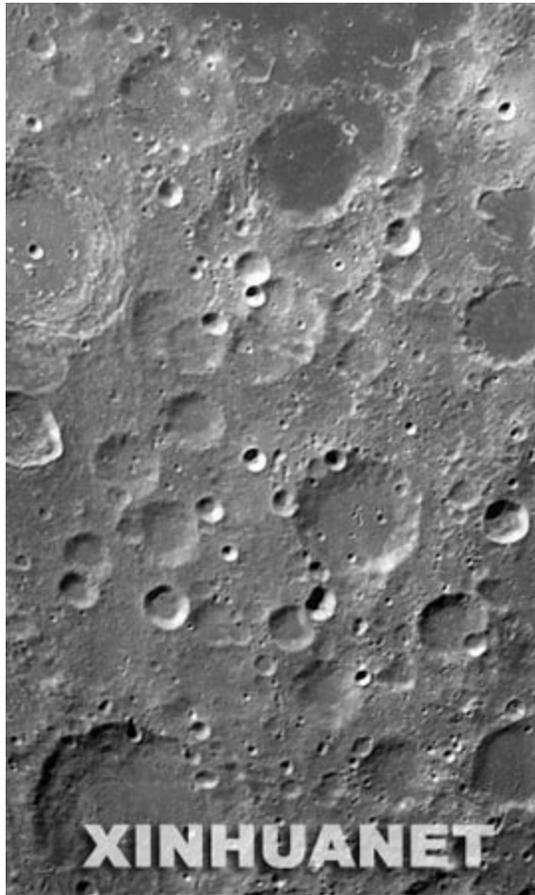


Lunar Probe Project--Change-1



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First Lunar Surface Photos



Lunar Probe Project—Change 1



- 3 Years
- 17,000 Scientists and Engineers
- Young Team averaged in the age of 30s
- 100% China-Made
- Technology Breakthroughs
 - All-direction Antenna
 - Ultra-violet Sensor

International Exchange and Cooperation : Main Activities



Over the recent years, China has signed cooperation agreements on the peaceful use of outer space and space project cooperation agreements with **Argentina, Brazil, Canada, France, Malaysia, Pakistan, Russia, Ukraine, the ESA and the European Commission**, and has established space cooperation subcommittee or joint commission mechanisms with **Brazil, France, Russia and Ukraine**.

China and the ESA



- **Sino-ESA Double Star Satellite Exploration of the Earth's Space Plan.**
- **"Dragon Program," involving cooperation in Earth observation satellites, having so far conducted 16 remote-sensing application projects in the fields of agriculture, forestry, water conservancy, meteorology, oceanography and disasters.**



The Double Star Project (DSP)



Comments:

"This agreement marks a significant advance for international cooperation in the exploration and peaceful use of outer space. It is one of the most important landmarks in scientific collaboration since ESA and the People's Republic of China first agreed to exchange scientific information more than 20 years ago." said ESA Director General, Antonio Rodotà at the Double Star ceremony in Paris on 9 July 2001.

"The Double Star programme will be just the first step in substantial cooperation between the Chinese National Space Administration and ESA. The signing of today's agreement paves the way not only for reciprocal cooperation between scientists, but for the establishment of comprehensive cooperation between the two agencies." said Luan Enjie, Administrator of the Chinese National Space Administration



The Double Star Project (DSP)



- **THE MISSION:**

Double Star follows in the footsteps of ESA's ground-breaking Cluster mission by studying the effects of the Sun on the Earth's environment. Conducting joint studies with Cluster and Double Star increases the overall scientific return from both missions.

- **ACHIEVEMENTS:**

- **On 14 October 2007, TC-1 satellite returned to Earth after completing its mission. TC2 was lost contact in early August 2007, after almost 3 years of operations, it was well beyond its nominal life-time of 6 months.**
- **Many important scientific achievements are gained in the following areas: magnetic reconnection, trigger mechanism for magnetospheric storms, physical processes such as particle acceleration, diffusion, injection and upflowing ions during storms.**

China and Brazil---- Earth Resources Satellite Program



- **1st and 2nd Sino-Brazilian Earth Resources Satellite 02 launched in 1999, and 2003**
- **Supplementary protocols signed on the joint research and manufacturing of satellites 02B, 03 and 04, and on cooperation in a data application system, maintaining the continuity of data of Sino-Brazilian Earth resources satellites and expanding the application of such satellites' data region wide and worldwide.**



In 2007, 3rd Sino-Brazilian Earth Resources Satellite 02B was launched successfully, which played an important role in monitoring the heavy snow storms in the early of this year in China.

China and France



- Extensive space exchanges and cooperation
- the Sino-French Joint Commission on Space Cooperation
- Important progress in space science, Earth science, life science, satellite application, and satellite TT&C.



China and Russia



- **The Space Cooperation Sub-Committee of the Committee for the Regular Sino-Russian Premiers' Meeting**
- **A long-term cooperation plan with marked results**
- **Cooperation in manned space flight area including astronaut training**
- **The “Cooperative Agreement between the China National Space Administration and the Russian Space Agency on joint Chinese-Russian exploration of Mars”, signed in March 2007**



Artwork depicts a proposed design for Russia's Phobos-Grunt probe, which would reportedly carry Chinese instruments to a moon of Mars

China and Ukraine



- **The Sino-Ukrainian Joint Commission on Space Cooperation**
- **A cooperation plan.**



Sun, Laiyan met with the Ambassador of Ukraine in Beijing

China and USA



- **Unfortunate short-lived collaboration in late 1980s, a failure in launching service, followed by investigation**
- **Out of space club, ISS 16**
- **Many words, no actions**
- **Low expectation, no results and no illusions**
- **Lack of trust, lack of mutual understanding; Is China a threat?**
- **ITAR and the issues of control of missile technologies and nonproliferation**
- **Positive effects of close door policy: government investment, a great pool of young scientists and engineers, and working harder**
- **Great potential, optimistic with patience: earth science, climate research, data sharing on various scientific missions, and robotic exploration of several kinds**

Commercial Cooperation Activities



- In April 2005 ,China launched a communications satellite "Alcatel APSTAR VI" into orbit.
- In December 2004, China signed a commercial contract for a communications satellite with Nigeria, providing in-orbit delivery service to that country.
- In November 2005, China signed a commercial contract for a communications satellite with Venezuela, providing in-orbit delivery service and associated ground application facilities.
- In May 2007, China launched communications satellite NIGCOMSAT-1 for Nigeria.
- In April 2007, China launched Compass-M1 successfully and would like to provide service to the neighbor countries.

Multilateral Cooperation



- In October 2005, the representatives of China, Bangladesh, Indonesia, Iran, Mongolia, Pakistan, Peru and Thailand signed the Asia-Pacific Space Cooperation Organization (APSCO) Convention in Beijing, and in June 2006 Turkey signed the Convention as well
- China continues to promote the Asia-Pacific Region Multilateral Cooperation in Small Multi-Mission Satellites Project. Together with Bangladesh, Iran, the Republic of Korea, Mongolia, Pakistan and Thailand, China has started the joint research, manufacture and application of small multi-mission satellites, to be launched in 2007

Multilateral Cooperation



- China takes a positive part in activities organized by the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) and its Scientific and Technical Subcommittee and Legal Subcommittee.
- China has acceded to the "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies," "Agreement on the Rescue and Return of Astronauts, and on the Return of Objects Launched into Outer Space," "Convention on International Liability for Damage Caused by Space Objects," and "Convention on the Registration of Objects Launched into Outer Space," and strictly fulfils its responsibilities and obligations

Multilateral Cooperation



- China has acceded to a disaster mitigation mechanism consisting of space organizations from different countries in the light of the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters
- China Signed the International Charter "Space and Major Disasters" in 2007

International Exchange and Cooperation: Priority Cooperation Areas



- Scientific research into space astronomy, space physics, micro-gravity science, space life science, lunar exploration and planet exploration;
- Data sharing and services of Earth observation satellites, and application and research in the areas of resources investigation, environment monitoring, prevention and mitigation of disasters, and global climate change monitoring and forecasting;
- Sharing of space TT&C network resources, and mutual provision of space TT&C assistance;
- Design and manufacture of communications satellites and Earth observation satellites;
- Manufacture of ground facilities and key components of satellite communications, remote sensing, and navigation and positioning;
- Application of satellite communications and broadcasting in tele-education and tele-medicine, and expansion of application scope of satellite broadcasting and TV, and related services for satellite navigation and positioning;
- Commercial satellite launching services, export of satellites and their components and parts, and construction and services of satellite ground TT&C and application facilities;
- Exchanges and training of personnel in various fields of space activities.