

## **CONSTRUCTION AND DEVELOPMENT OF CHINA**

### **HIGH-RESOLUTION EARTH OBSERVATION SYSTEM**

Executive summary

In May 2010, China officially launched construction of Major Special Project – the China High-Resolution Earth Observation System (CHEOS). The Earth Observation System and Data Center of China National Space Administration (EOSDC-CNSA) is responsible for organizing the construction of the CHEOS. An overview of the CHEOS and its current progress are presented.

## **Construction and Development of China High-Resolution Earth Observation System**

### **1 OVERVIEW OF THE SPACE-BASED SYSTEM IN THE CHEOS**

By following an arrangement of integral observation from space, air and ground, the CHEOS develops space-based system, near-space system, aerial system, ground system and application system as a whole to materialize earth observation at high temporal, spatial and spectral resolution, which is now in smooth progress. This report will highlight the space-based system under construction and development, including 5 satellites at present, which are:

- GF-1 satellite. GF-1 employs CAST2000 bus, configured with one 2m panchromatic/8m multi-spectral camera and one 16m multi-spectral medium-resolution and wide-view camera. GF-1 realizes an integration of imaging capacity at medium and high spatial resolution and with large swath, with designed lifespan of over 5 years. Launched into orbit on 26th April 2013, after in-orbit test, GF-1 has been working in good condition.
- GF-2 satellite. GF-2 employs CS-L3000A bus, configured with one 1m panchromatic/4m multi-spectral camera, with designed lifespan of over 5 years. Currently GF-2 is well under development and construction and is scheduled to launch in the second half of 2014.
- GF-3 satellite. GF-3 employs CS-L3000B bus, configured with multi-polarized C-band SAR at meter-level resolution, with designed lifespan of 8 years. GF-3 is scheduled for completion of development and construction in 2015.
- GF-4 satellite. GF-4 employs GEO remote sensing bus, configured with a 50m staring camera, operating on the geo-synchronous orbit. GF-4 can provide an imaging area of 7000km×7000km with individual scene covering an area of 400km×400km, and with capacity for high temporal resolution remote sensing monitor at minute-level. GF-4 is designed for 8 years. GF-4 is currently well under development and construction and is scheduled to launch in 2015.
- GF-5 satellite. GF-5 employs SAST5000B bus, configured with six types of payloads, including visible and short-wave infra hyper-spectral camera, spectral imager,



greenhouse gas detector, atmospheric environment infrared detector at very high spectral resolution, differential absorption spectrometer for atmospheric trace gas, and multi-angle polarization detector. GF-5 is designed for 8 years and is scheduled to launch in 2016.

## **2 APPLICATION OF CHEOS SATELLITES**

CNSA extremely values promotion of data and application of the CHEOS satellites. During implementation of the CHEOS, along with the construction of satellites, we develop main application demonstration system on different levels, i.e. sector application, regional application, industrialized demonstration and common technology development, to structure application demonstration system and thematic product system, to realize effective conversion from data to information and knowledge, and to promote large-scale industrialized application of remote sensing data..

## **3 PRELIMINARY ACHIEVEMENTS OF GF-1**

In line with the promotion direction of the CHEOS remote sensing data and application, preliminary achievement of GF-1 application is presented on the following aspects, including data distribution, land resource investigation, mineral resource management, atmospheric and water environment quality monitor and natural disaster emergency respond and monitor. Details are given as following:

- EOSDC-CNSA facilitate and provide GF-1 data to various clients including tens of national ministries and agencies, local governments, research institutions, universities, enterprises and organizations in China. By the end of March 2014, an amount of 550 000 scenes have been delivered. Among them, the 2m panchromatic and 8m multi-spectral data cover an approximate 93% area of China effectively; the 16m multi-spectral data cover China over 10 times effectively.
- On the aspect of land and mineral resource management, demonstrate the achievements from following examples - Pingliang in Gansu Province and Hengyang in Hunan...
- On the aspect of atmospheric and water environment quality monitor, demonstrate the achievements from following examples – aerosol and Taihu Lake water quality monitor...



On the aspect of natural disaster emergency respond, demonstrate achievements from following examples - floods in Heilongjiang Province, earthquake in Pakistan, Chile, Yutian area in Xinjiang...

#### **4 INTERNATIONAL COOPERATION AND PROMOTION OF THE CHEOS**

CNSA is extraordinary willing to impel large-scale and industrialized satellite data application with all members together. EOSDC-CNSA is responsible to undertake international cooperation of development and construction of satellites and application in the CHEOS. With CHEOS progressed, the data from GF-4 and GF-5 will be extensively applied to resource and environment, disaster prevention and relief, and public security, which will also be significant means in meteorology, climate, hydrology and global change monitor. We hope to exploit the platforms of CGMS and WMO to explore potentials of satellite application, and to joint-construct satellite monitoring system.