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CNSA REPORT ON THE STATUS OF CURRENT AND FUTURE SATELLITE SYSTEMS

Executive summary

China National Space Administration (CNSA) currently operates FY operational satellite system and 4 R&D satellite systems, including HY, HJ, ZY, and GF series satellite. China will keep launching several satellite systems in near future. This report introduces the status of CNSA's in-orbit satellite system and the status of future satellites in developing.

The status of current and future CNSA Earth observing system

1 INTRODUCTION

With the development of space industry during last five decades, the technique of satellite remote sensing for the Earth observation has been extended rapidly in China. The remote sensing images and dataset have been used in diversities of applications, such as mineral and resource, land use, ecosystem control, flood and drought monitoring, et al. China will build an Earth observing system (EOS) for continuously and stably observing the Earth from the space, including FY series satellites, CBERS series satellites, HY series satellites, and environment and disaster small satellite constellation (HJ) series. Meanwhile, China is also keeping developing the ground receiving and processing system of EOS.

2 THE STATUS OF CURRENT SATELLITE SYSTEMS

Currently, the on-orbit functionally operating satellites of CNSA includes FY-3A, FY-3B, HY-1B, HY-2, HJ-1A, HJ-1B, HJ-1C, ZY-3, and GF-1. The brief descriptions of each mission are as follow:

2.1 FY Series Satellites

FY-Series has become operational meteorological satellites and serve as one of important members of the global operational meteorological satellite system. FY-3A/B were launched successfully on May 27th 2008 and November 5th 2010, respectively. Both satellites are running stably on orbit. The detailed information can be found in documents provided by CMA .

2.2 HY Series Satellites

HY series includes ocean colour satellite (HY-1) and Ocean Dynamics environmental satellite (HY-2).

The HY-1 satellite was equipped with two payloads: ocean colour and temperature scanner and 4-band CCD imager, mainly used for monitoring ocean colour, sea surface temperature, and sea ice. HY-1A/B were launched on May 15th 2002 and April 11th2007,



respectively from Taiyuan Satellite Launching Centre. HY-1A satellite stopped working on March 30th 2004. HY-1B satellite is still functional in orbit.

Ocean Dynamics environmental satellite program (HY-2), equipped with Microwave Radar Altimeter, Microwave scatter meter, and Microwave Radiometer, was mainly used to detect marine Dynamics status, including ocean surface wind, ocean surface height, the effective wave height, sea surface temperature, and other important parameters. HY-2 was successfully launched on August 16th, 2011 from Taiyuan Satellite Launching Centre. After the satellite experienced the measurement evaluation, HY-2 satellite runs well and has some typical applications. The sensor calibration and validation also has been performed in 2013. The detailed description can be seen CNSA-WP-02.

2.3 ZY Series satellites

The ZY series satellite was developed jointly by China and Brazil with the name of CBERS. Three CBERS satellites, CBERS01/02/02B, were launched successfully in 1999, 2003, and 2007. Currently, all these three satellites finished their mission but their measurements have been still used in many application areas.

ZY-3 is a high-resolution three-dimensional mapping satellite, which has 4 payloads whose images can be used for mapping and resources survey, such as producing 1:50000 and 1:25000 scale topographic maps. ZY-3 was launched on January 9th 2012 from Taiyuan Satellite Launching Centre. It works well on-orbit and provides high quality measurements which have been applied into diversity application areas.

2.4 Environment and Disaster Small Satellite Constellation

The environment and disaster small satellite constellation is composed of several optical satellites and microwave SAR satellites. The first stage of the constellation, named HJ-1 programme includes two optical satellites and one SAR satellite, for environment monitoring, ecosystem protecting, and disaster detecting with high spatial and temporal resolutions.

HJ-1A/B were launched on Sep. 6th 2008 from Taiyuan Satellite Launching Centre. HJ-1A is equipped with a CCD camera and a hyper-spectral camera while HJ-1B is equipped with a CCD camera and an IR camera. The 30-m nadir IFOV and the 700-km swath enable two satellites to perform globally observation in every two days.

After launched, HJ-1 obtained a lot of research achievements in data evaluation and operational applications. The measurement of HJ-1 has been used in the operational running system of environment protection and monitor. Both HJ-1A and HJ-1B passed their nominal design life of 3 years and are experiencing aging.

HJ-1C was launched on Nov. 19th 2012 from Taiyuan Satellite Launching Centre. It is a S-band SAR small satellite, providing 5-m and 20-m spatial resolution with different swath width. HJ-1C is currently in the on-orbit test stage.

2.5 GF Series satellites

GF-1 is the first satellite of the GF high spatial resolution Series for Earth observing the Earth. It was launch on Apr. 26th 2013 from Jiuquan Satellite Launching Centre. GF-1 could achieve 2-m panchromatic and 8-m multispectral measurements with 60-km swath, as well as 16-m multispectral moderate resolution measurements with 800-km swath. GF-1 is currently in the on-orbit test stage.

3 FUTURE SATELLITE SYSTEMS

3.1 FY-4 satellite

FY-4 is the second generation of geo-stationary meteorogological satellite in China, which is planned to be launched in 2015. The detailed description can be found in working papers provided by CMA .

3.2 CFOSAT satellite

CFOSAT is developing jointly by China and France for ocean dynamic environment monitoring. Satellite will be equipped with a directional wave spectrum form SWIM and a wind scatterrometer SCAT. The development stage of CFOSAT is at PHASE C and its launch time is preset at the end of 2014.

3.3 ZY-4 satellites

CBERS 03/04 is the next generation of CBERS 01/02. The CBERS 03/04 is in the phase of will be launched at the end of 2012, It will be equipped with high resolution camera, IR camera, and wide-filed camera, providing 5-meter panchromatic measurement, 10/20-meter multi-spectral measurement, 40/80-meter infrared measurement, and 73-meter multi-spectral measurement with wide-field swath. ZY-3 is plan to be launched at the end of 2013.

China Earth observation satellite system is playing an important role in the national development, environmental protection, disaster detection etc., CNSA currently works at the transition stage of changing R&D satellite to operating satellite. Several R&D satellites will be experiencing an on-orbit test and become gradually into the operation mode. With CGMS this excellent platform, CNSA is very glad to communicate and share our experiences with others. CNSA is devoted to explore new EOS technology and sensors, and make more contributions for the optimization of global EOS.