

Preliminary Results of the CSES Mission during its in-orbit Test

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China Seismo-Electro Magnetic Satellite (hereafter called ‘CSES’), is the first space-based platform for the earthquake stereo-monitoring system and also the first launched satellite for the national geophysical field detecting mission in China.

CSES uses the CAST2000 micro-platform with the 3-axis stability. Its orbit is solar synchronization circle with descending local time (LT) at 14:00, 5-day revisiting period and 5-year life time. There are 3 types of payloads including 8 payloads onboard CSES: High Precision Magnetism (HPM), Electric Field Detector (EFD), Search Coil Magnetism (SCM), Plasma Analyzer Package (PAP), Langmuir Probe (LAP), High Energetic Particle Package (HEPP), GNSS Radio Occultation (GRO) and Tri-Band Beacon (TBB). In which, the higher energy detector of HEPP was manufactured by Italian National Institute Nuclear Physics, and the scalar detector of HPM was manufactured by Austrian Space Institute. CSES will offer the following products: Geomagnetic field, electromagnetic wave and spectrum; In-situ electron and ion density/temperature, ion drifting velocity; ionospheric structure parameters; Energetic Particle’s flux and counts. These products will strong benefit the related scientific activities, such as the earthquake science and earthquake monitoring, the global magnetism and ionosphere model construction, great earthquake/volcano and magnetic storm analysis and multi-layers coupling mechanism research.

At 15:51 on February 2, 2018, CSES was launched at China Jiuquan Satellite Launching Center. According to the plan, the in-orbit test will last 6 months and be delivered in August, 2018. Up to now, CSES has finished satellite platform test,

payloads functional test and part of the performance tests. According to the draft results after 3-month's commission test, we reach the following points:

(1) The capabilities of CSES meet the general requirement of the project. Besides the common test, some special tests for CSES have been done, including the orbit-seismic belts matching, electromagnetic cleanliness of the platform, mutual interference among the platform and payloads, and different working modes switch, etc. All results are as expectation.

(2) Up to now, the performance test can be concluded that: the electromagnetic cleanliness of the platform meets the design index, and the effect to the payload is limited and could be distinguished clearly; function of each payload generally meet the general requirement of the project; the link and transfer are stable and reliable among satellite-ground measurement and control, data up and downlink, data transformation; data processing progress are updated continuously and the data products come to stable; data management ability almost meet the design.

(3) Based on those data, the global geomagnetic field and ionosphere was achieved which is coherent to IGRF model and IRI model and also to the SWARM observatory. The effect of global VLF signals could also be found clearly from CSES with good space-temporal correspondence.

(4) The in-orbit test of CSES will go on till the end of July. During these time, work will be arranged to better performance, satellite-ground jointly observatory and data quality assessment by the international in-orbit satellite and ground-based resource, earthquakes and geomagnetic storms.

(5) Following the "Announcement on strengthen the China Seismo-Electromagnetic Satellite data arrangement by CNSA and CEA", CSES data will be open to people in the fields of earthquake, geophysics, space physics, electromagnetic propagation. In August 2018, the manual for data products will be distributed and then the data will be announced in succession.