

Chances and challenges brought by the space science plans to Chinese Space Science Data Center(CSSDC)



Ziming Zou Jizhou Tong Zhen Ji Yaqin Yuan
National Space Science Center, Chinese Academy of Sciences



The brief introduction of CSSDC

Objectives

- Establish a big data infrastructure to promote the innovation of scientific researches;
- To create a space science data center with international influence.

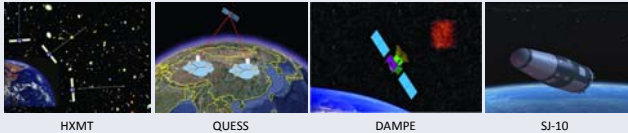
Core missions

- Establish a complete system of space science data resources, focus on the realization of space science data management integrity, systematic and standardized, and ensure the permanent safety and long-term availability of space science data;
- Develop big data theory methods and set up the framework of spatial temporal data organization to promote applications of the big data technology in the discipline ;
- Provide demonstration applications and services based on a big data application platform.

Best Practices of CSSDC

I. The Plan for Space Science Satellite Missions :Strategic Priority Program (SPP) on Space Science

- 2011-2015: Hard X-ray Modulation Telescope (HXMT), Quantum Experiments at Space Scale(QUESS), Dark Matter Particle Explorer(DAMPE), Shijian-10(SJ-10).



- 2016-2020: Space-based multi-band astronomical Variable Objects Monitor(SVOM), Solar wind - magnetosphere interaction panoramic imaging satellite program (SMILE), Magnetosphere - ionosphere - thermosphere coupling small satellite constellation exploration plans(MIT), Global water cycle observation satellite (WCOM)



II. Meridian Project(MSWMP)

The Meridian Space Weather Monitoring Project (or Chinese Meridian Project) is a ground-based program to monitor China's geo-space environment to acknowledge the needs of both basic science and useful space weather operations. The Meridian Project consists of a chain of 15 ground-based observatories located roughly along 120° E longitude and 30° N latitude.



III. The International Space Weather Meridian Circle Program (ISWMC)

The ISWMC aims to observe the physical processes of the catastrophic space weather in geo-space; to clarify the regional characteristic of the space environment; to develop space weather forecast models, and will provide the solar wind data, geomagnetic data, the upper atmosphere of the probe data, ionospheric data, etc.

Our management of data and products

- CSSDC has formed a standardized data processing and management system for data processing, data management, data storage and data archiving which can strictly control the quality of data.



- In order to protect our data, products, services, CSSDC has also constructed multiple cluster systems with high availability, high performance computing, with double centers for data backup.



Double centers for data backup

Servers

Our service platforms (the English versions will be on line soon!)

- CSSDC has set up a Scientific Satellite Mission Operation Support Platform to acquire and process observation data from SPP, and distribute the data products to other systems, also it can issue the data and archives. Besides, mission supporting is another function of the platform, including observations planning, load state monitoring, etc.



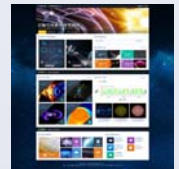
Space Science Mission Operation Network (SMOC)
www.smoc.ac.cn



Virtual Space Science Observatory (VSSO)
<http://vssso.cssdc.ac.cn/>

- CSSDC has established a data service system (VSSO) for academic community, which can provide users with a variety of data resources, a scientific problems-oriented data retrieval and discovery service, data processing and analysis tools, and data visualization analysis tools, etc.

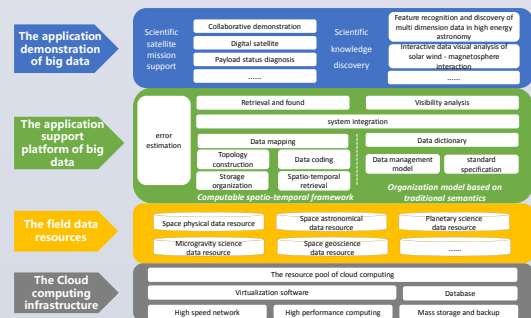
- CSSDC begin to focus on cloud computing and big data technologies, and has set up an application service environment (STAR-Network), which is space scientific missions-oriented with whole life cycle. The STAR-Network can provide a collaborative demonstration system of science missions, a space weather model platform, a support platform for scientific satellite missions operation, a private cloud storage and so on.



Solar-Terrestrial and Astronomical Research Network (STAR-Network)
<http://starnet.cssdc.ac.cn/>

Chances and challenges of CSSDC

With the development of space science satellite missions, space science has entered the Fourth Paradigm of big data : Data-Intensive Scientific Discovery. The emergence of massive data puts forward higher requirements for data storage, large scale collaborative data processing, data integration and interoperability, data mining and so on. Therefore, CSSDC puts forward a concept model of the era of big data :



- The cloud computing infrastructure: build a virtual cloud platform for data users to provide virtual computing space;
- The field data resources: have innovated in diversified scientific research models, such as the construction of Collaborative Innovation Center, and promoted the integration of different data which are from different source , then new knowledge and new discoveries are emerging;
- The application support platform of big data : while developing the traditional semantic organization model, CSSDC will devote to research on computable temporal framework and focus on breakthrough in key technologies in data mapping, errors estimation, spatiotemporal retrieval and so on;
- The application demonstration of big data : not only provides data retrieval, data download, data applications and other conventional data services, but also develops new technologies in the scientific satellite mission supporting, scientific knowledge discovery, etc.