

CSSDC promoted services also strengthened connections  
to Solar-Terrestrial community  
through deep projects cooperation

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## About Chinese Space Science Data Centre

CSSDC was founded in 1988, affiliated to the National Space Science Center, CAS. It is also a regular member of ICSU WDS.

### Be responsible for:

- Chinese space science data collection, processing, standardization, archiving and publishing
- Data standards and metadata standards construction
- Software and data tools developing
- Data visualization and analysis



# Outline

- 1. Projects Cooperation and Data activities**
- 2. Operation Model of Data Management**
- 3. Hierarchy Structure of Data Organization**
- 4. Data Service Portal – STAR-Network**

# Space Exploration Projects in China

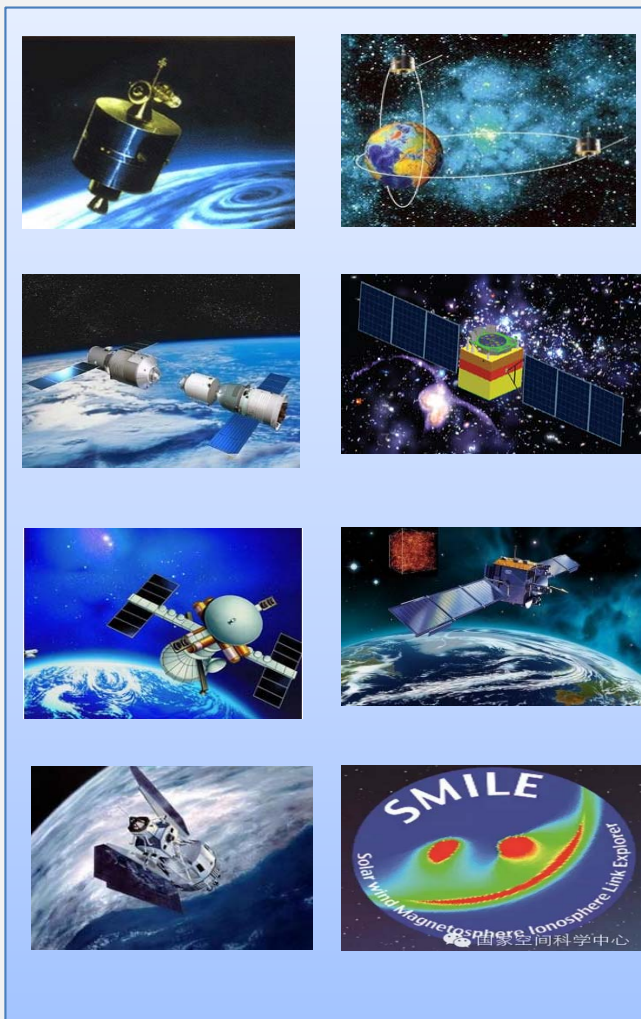


## Ground-based observatories:

- Meridian Project
- Geomagnetic observatory
- LAMOST telescope
- Meteorological Monitor and Warning Project
- ...

## Satellites observatories:

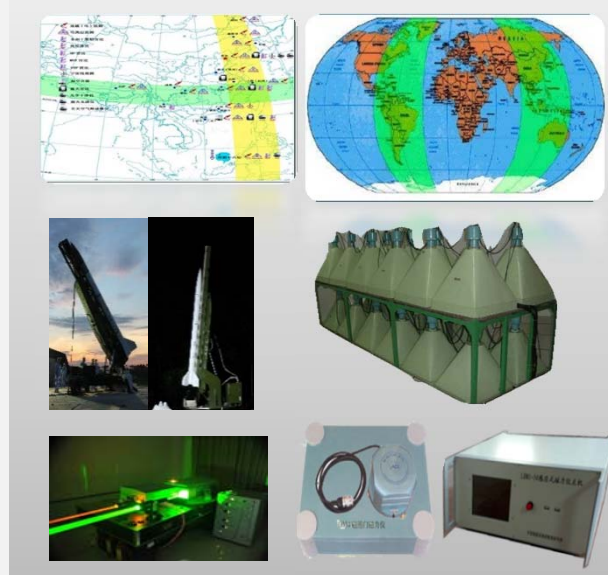
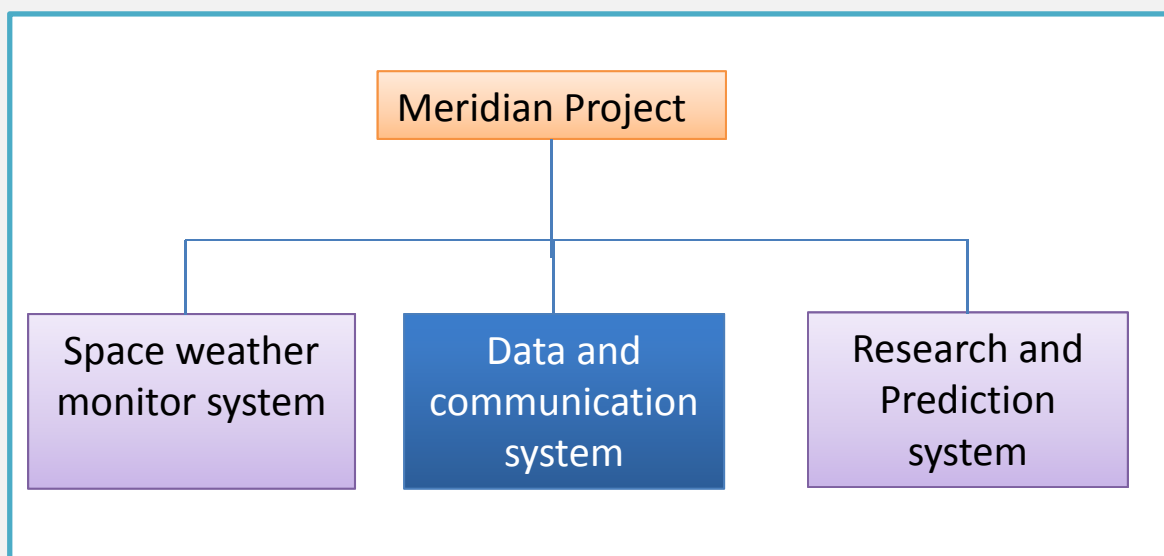
- Double Star Program
- Meteorological Satellites
- Manned space flight
- Remote sensing satellites
- Strategic priority program
- ...



## About Meridian Project

**Meridian Space Weather Monitor Project** is aimed to develop an understanding of near-Earth space's response to solar activities and to eventually enhance the success of space weather predictions.

It is a ground-based observatory chains that consists of 15 observatories, includes 23 kinds instruments, such as magnetometers, cosmic rays, LIDAR, radar, digisondes and sounding rocket etc.



# Activities in Meridian Project

CSSDC established data management guides, metadata specification and software for Meridian Project.

## Data management guides

**Includes :**

- Data plan
- Data level standard
- Data naming & identification
- Data organization frame
- Time system
- ...

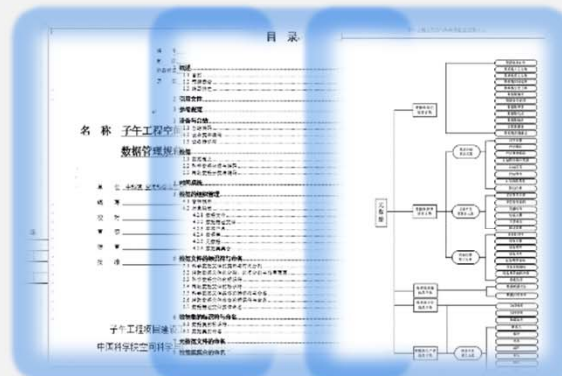
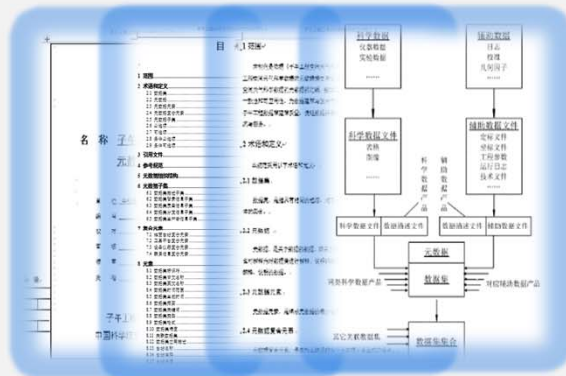
## Metadata Specification

**Mainly referenced SPASE :**

- Data abstract
- Data background
- Data quality
- Data origination information
- Data distribution information
- ...

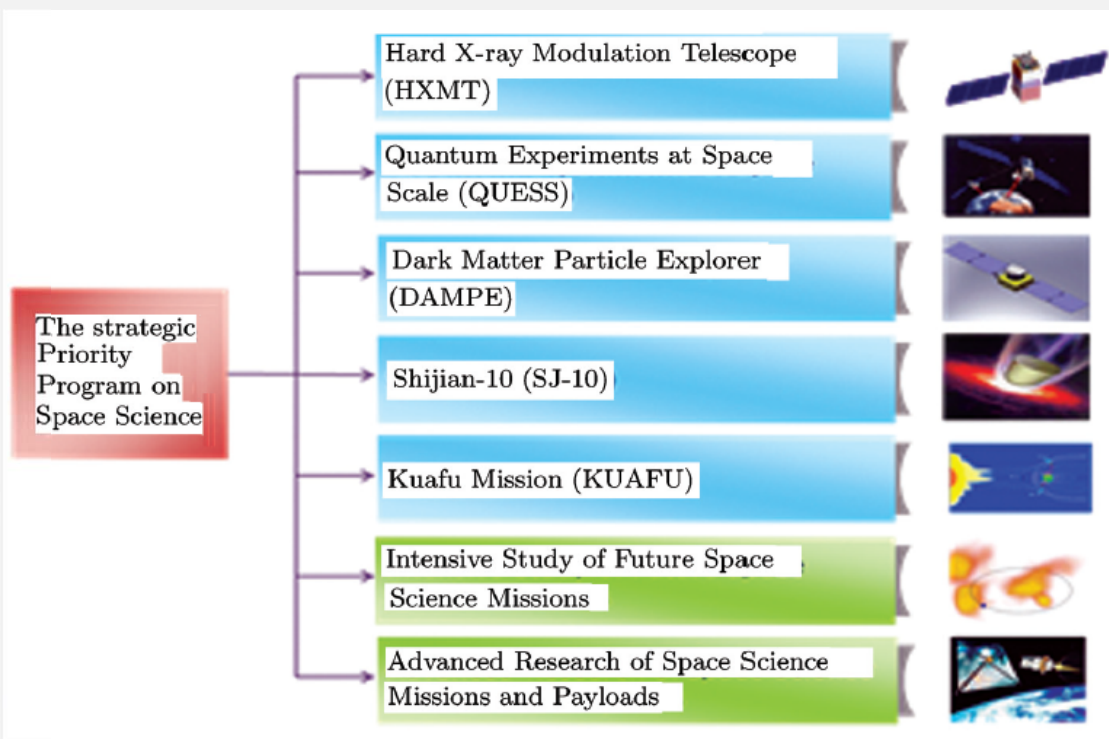
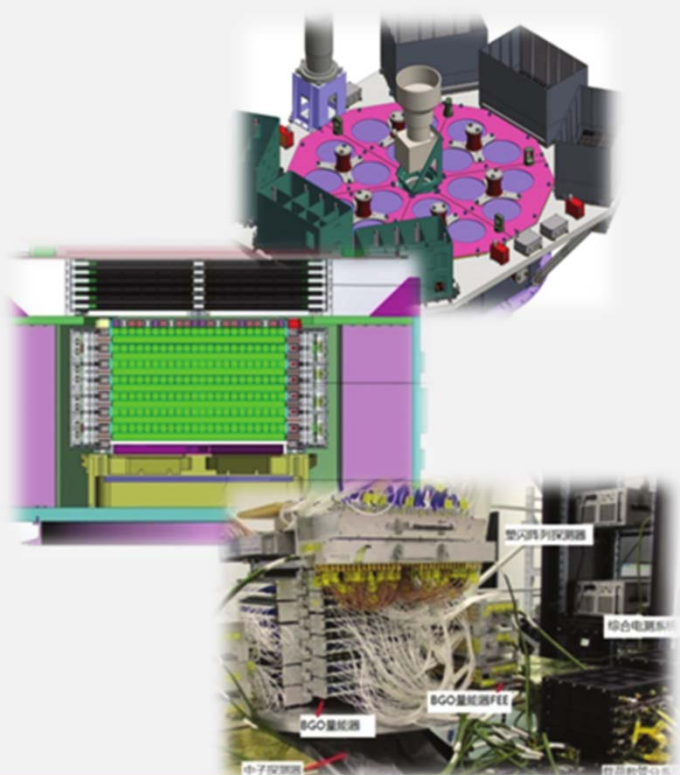
## Software

- Data collection
- Data verifying
- Data management
- Data publishing
- Metadata editing
- ...

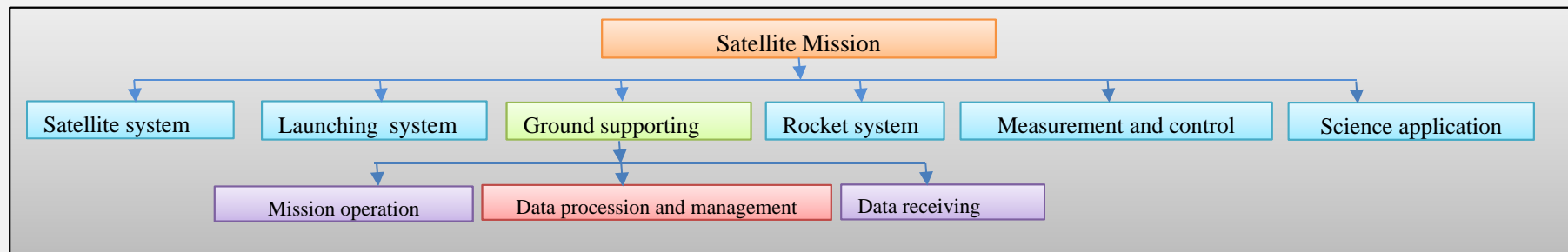


# About Strategic Priority Program on Space Science

**SPP on Space Science** officially started in 2011, The main goal of the SPP is to deepen our understanding of universe and planetary earth, seeking new discovery and new breakthrough in space science.



# Activities in Strategic Priority Program on Space Science



## Data process and management sub-system:

- Raw data processing (conversion, formatting, verifying)
- Data management, archiving
- Data distribution and publishing
- ...

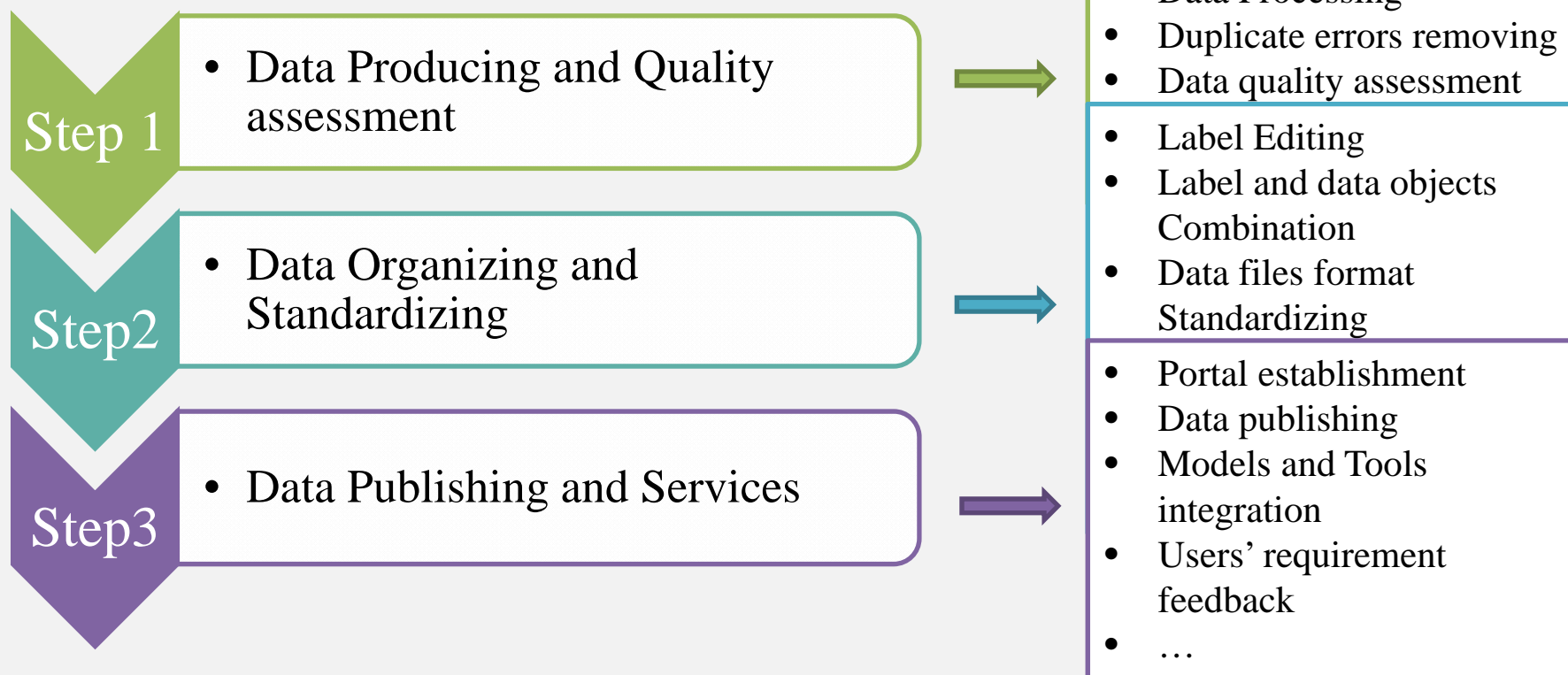
## Specification Construction

- Satellite data management policy
- Data product definition and classification
- Data labeling
- ...

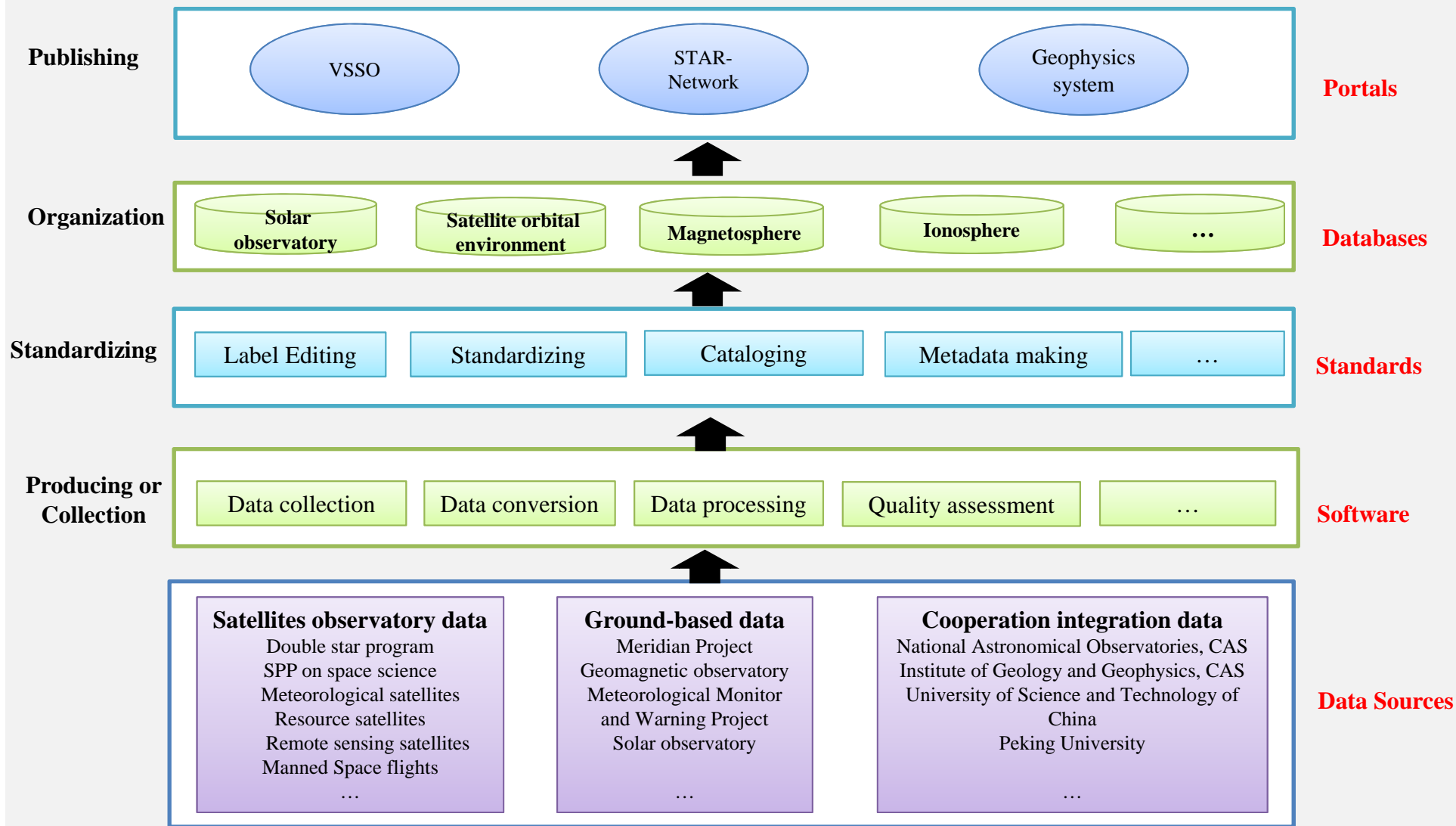




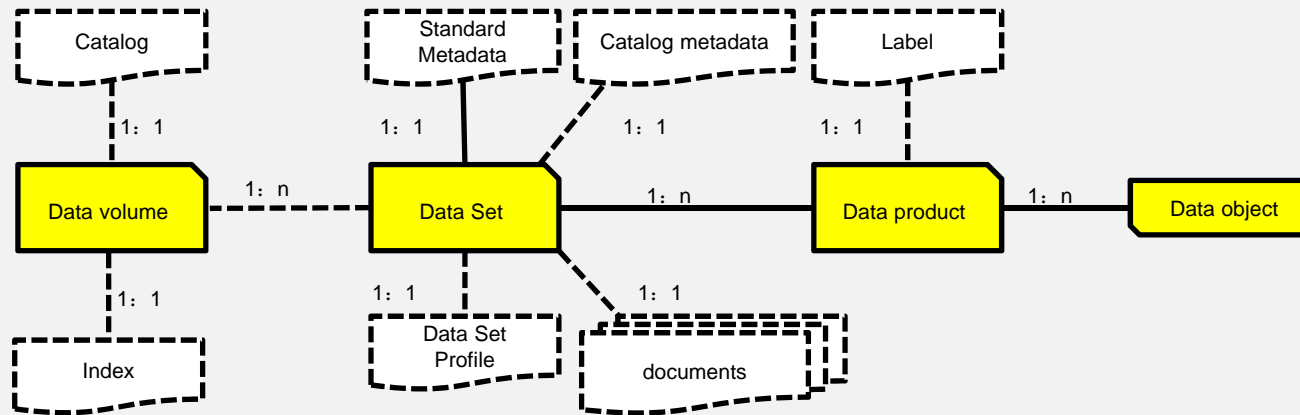
# Operation model of data management



# Operation model of data management



# Hierarchy Structure of Data Organization



**Data Object:** A set of results from a scientific observation or the data used for processing or interpreting the scientific data object.

**Data product:** One or several objects combined with data label.

**Entities  
Definition**

**Data Set:** An aggregation of data products with common origin, history, or application.

**Data Volume:** One unit of multiple data sets with directory structure .

# Label of the Product

Data label is required for describing the contents and format of each individual data product. It is convenient for users to locate and understand the data products.

Data label should contains the key information as much as possible:

- File name
- Observatory/instrument name
- Data level
- Brief introduction of contents
- Temporal/spatial resolution
- Contact information
- Description of each field
- ...

```
# File name:SSL_OFM_SCI_MF_L1_1_01D_20130808.dat
# Instrument = "OFM"
# Station_ID = "SSL"
# Process_Level = "level 1"
# Sample_Time = "1"
# Sample_Unit = "seconds"

# Label: UT_YR-MO-DA = UTC Date
# Label: UT_HH:MM:SS = UTC Time
# Label: F = Intensity of the geomagnetic field(nT)
# Invalid Data filled with 99999

#           ShiSanLing Overhauser Magnetometer Data
#           UT_YR-MO-DA   UT_HH:MM:SS           F
#-----
```

```
# File name:HFT_LID_SCI_ATD_L2B_1_01D_20111009.dat
# Instrument = "LID"
# Station_ID = "HFT"
# Process_Level = "level 2B"

# Label: UT_YR-MO-DA = UTC Date
# Label: UT_HH:MM:SS = UTC Time
# Label: Altitude = Altitude from ground(km)
# Label: Temperature = Atmosphere Temperature(K)
# Invalid Temperature filled with -999.999

#           HeFei LIDAR Atmosphere Temperature Level 2B Data
#           UT_YR-MO-DA   UT_HH:MM:SS           Altitude   Temperature
#-----
```

# Standard Metadata of data set

Standard metadata is designed for data exchange and understanding, based on SPASE data model and describes the attributes of the data set in details.

—Data Resources

- Numerical Data
- Display Data
- Catalog
- Granule
- Annotation

—Organization Resources

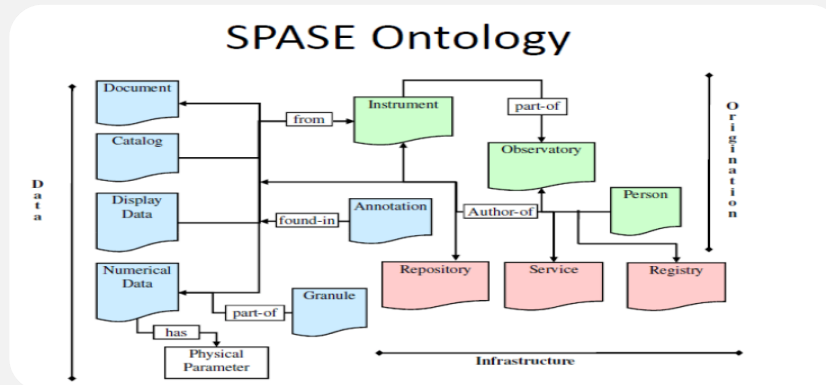
- Observatory
- Instrument
- Person
- Document

—Infrastructure Resources

- Registry
- Repository
- Service

```

<?xml version="1.0" encoding="UTF-8" ?>
<Spase>
  <Version>2.0.0</Version>
  <NumericalData>
    <ResourceID>spase://VMO/NumericalData/ACE/MAG/200301</ResourceID>
    <ResourceHeader>
      <ResourceName>ACEMAG200301</ResourceName>
      <ReleaseDate>2006-07-26T00:00:00.000</ReleaseDate>
      <Acknowledgement>
        User will acknowledge the data producer and instrument P.I. in any
        publication resulting from the use of these data.
      </Acknowledgement>
      <Description>
        ACE MFI 1-minute averaged magnetic-field data in GSE coordinates
        from Jan 2003. These data have been derived from the 16 second
        resolution ACE MFI which were linearly interpolated to a 1-minute
        time grid with time stamps at second zero of each minute.
      </Description>
    </NumericalData>
  </Spase>
  
```



# Catalog Metadata of data set

A kind of metadata mainly designed for data retrieval and sharing, origin from the standard metadata.

In Solar-Terrestrial physics, the Cataloging Metadata contains the following elements:

- **Discipline Classification**  
*such as space physics, space astronomy etc.*
- **Observed Region**  
*such as Sun, Magnetosphere etc.*
- **Observed Object**  
*such as electron, ion, proton etc.*
- **Physical Parameter**  
*such as temperature, density etc.*
- **Observed Group**
- **Observatory**
- **Instrument**
- **Keywords**

```
<?xml version="1.0" encoding="utf-8"?>
<catalog id="SZ_ISM_DTS_30M">
  <datasetName>
    ShenZhen ISM TEC and Ionospheric Scintillation index data
  </datasetName>
  <academicClassification>
    Solar-Terrestrial Space Physics
  </academicClassification>
  <observedRegion>
    Ionosphere
  </observedRegion>
  <observedObject>
    plasma
  </observedObject>
  <physicalParameter>
    TEC
  </physicalParameter>
  <physicalParameter>
    Ionospheric Scintillation index
  </physicalParameter>
  <observatoryGroup>
    Meridian Project
  </observatoryGroup>
  <observationPlatform>
    ShenZhen station
  </observationPlatform>
  <observatoryInstrument>
    GPS-TEC Scintillation Monitor
  </observatoryInstrument>
</catalog>
```

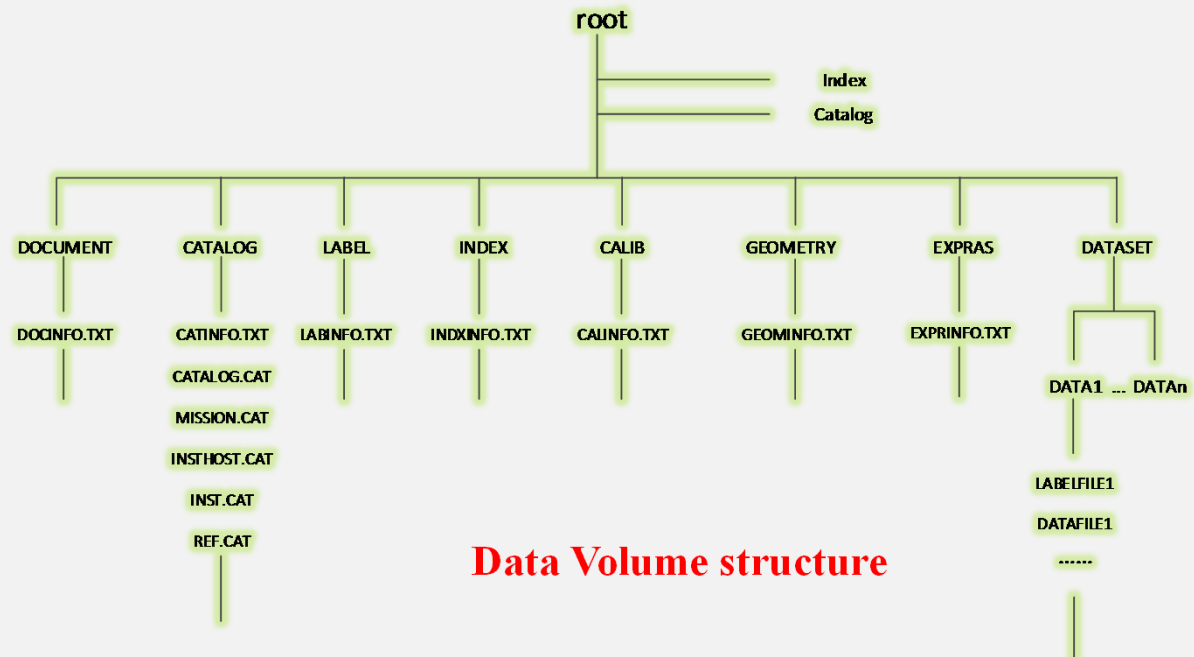
# Volume Catalog and Index

**Volume Catalog :**Information and introduction about data sets and missions:

- Method of data sets procession and production
- Data contents introduction
- Mission, observatory, instruments information
- Scientists involved
- ...

**Volume Index:**

Describes volume contents, organization, also includes each file's path.



**Data Volume structure**

# Solar-Terrestrial and Astronomical Research Network (STAR-Network)

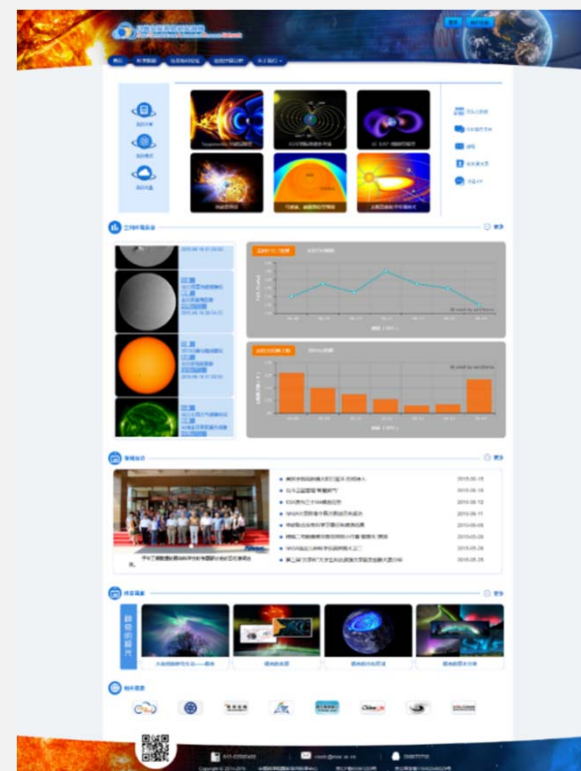
A virtual space science research platform based on cloud model, connecting data, models, tools and e-Science infrastructures seamlessly.

## Vision:

- To serve and support the space satellite mission
- To improve the science research efficiency

## Goals:

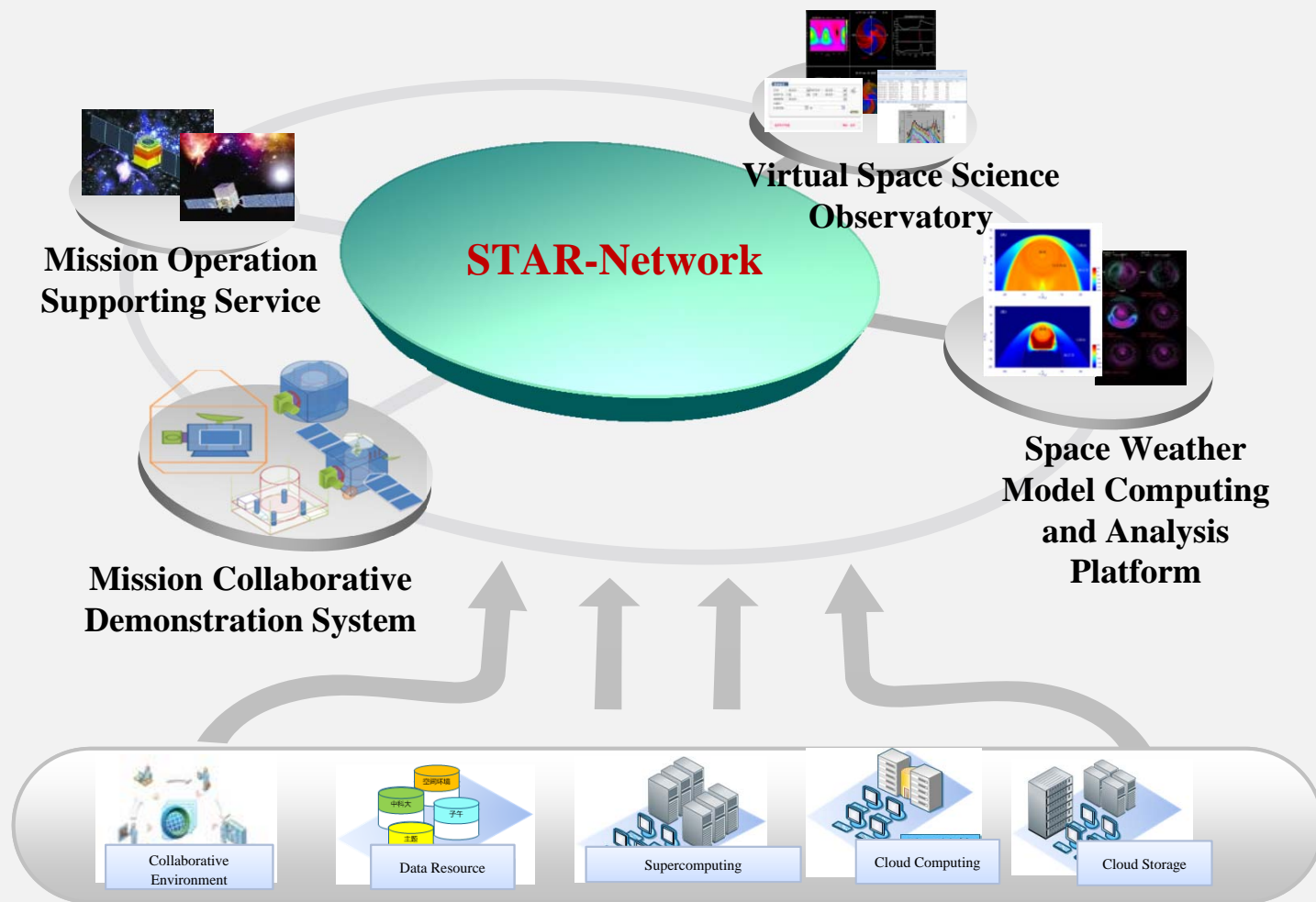
- Providing easy access to space scientific data resources
- Setting up a bridge between data and disciplinary tools/models
- Constructing cyber infrastructure driven by space research
- Supporting new perspective and ways to understand the space phenomena



Solar-Terrestrial and Astronomical  
Research Network  
— [www.starnet.ac.cn](http://www.starnet.ac.cn)



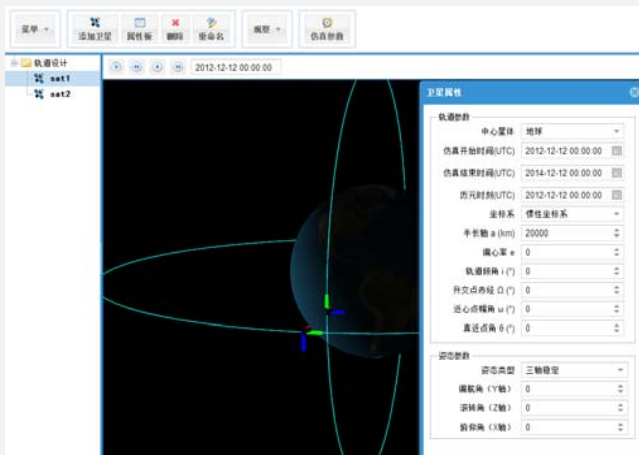
# Function components of STAR-Network



# STAR-Network--Mission Collaborative Demonstration System

## Tools includes:

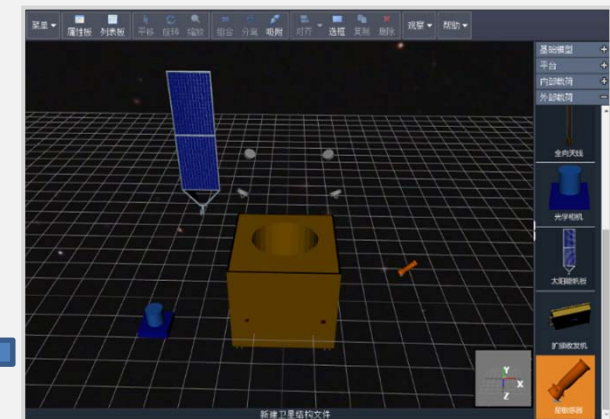
- Interactive satellites orbit designation
- Satellite structure and payloads layout
- Payloads observe region analysis
- Satellite raw data transfer analysis
- ..



Interactive satellites orbit designation

Design and revise the target orbit rapidly, also analysis the character of the orbit.

Assemble the payloads and lay out the composition of instrument



Satellite structure and payloads layout

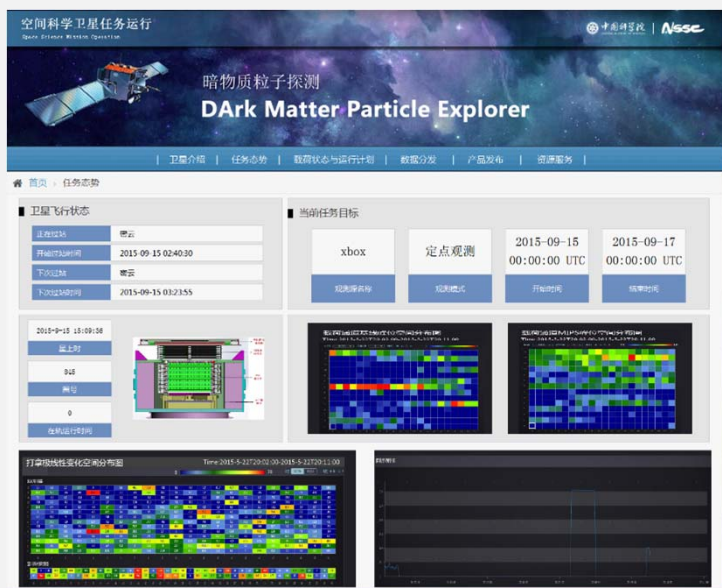
# STAR-Network--Mission Operation Supporting Service

## Operation support service:

- Observe plan formation
- Payloads status monitoring
- Space environment information
- Scientific data quick-look
- ...

## Data pipeline:

- Data acquirement
- Data pre-processing
- Data distribution
- Data archiving
- Data issuing

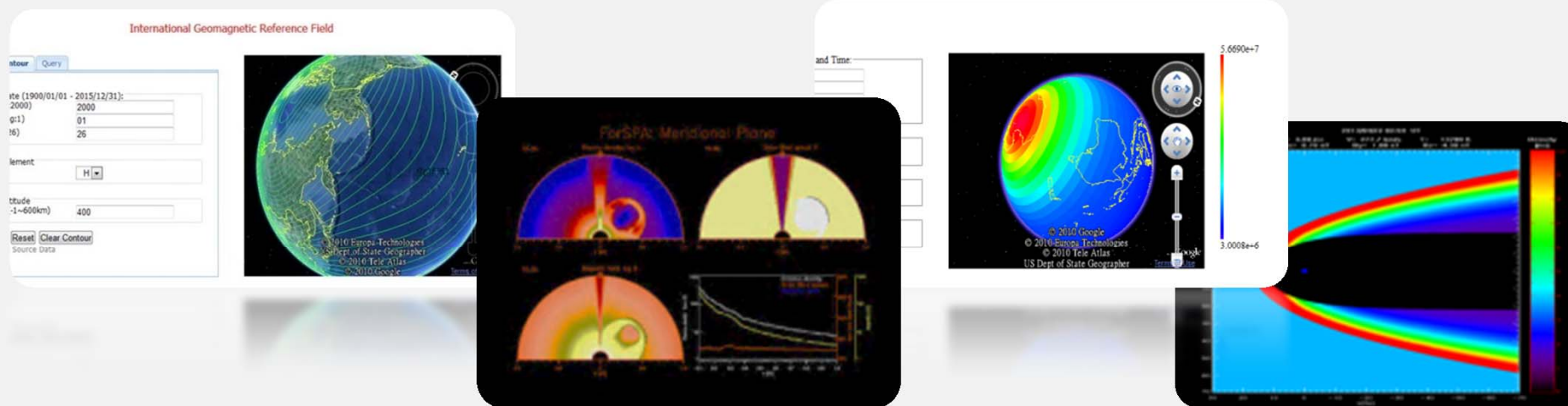




# STAR-Network—Space Weather Model Computing and Analysis Platform

A series of interactive numerical simulation models and prediction models in space weather and its effects:

- Solar coronal transition in interplanetary space
- Solar wind – aurora numerical model
- Energetic particles transition
- Bow shock and magnetopause shape prediction
- ...



## Vision of CSSDC

To serve the Solar-Terrestrial research community more widely and effectively.

### **Improve serving abilities:**

- More qualified data resources
- More accurate computation models
- More effective analysis tools
- More powerful infrastructure

### **Enhance projects cooperation in future mission:**

- International Meridian Space Weather Monitor Project
- Solar wind Magnetosphere Ionosphere Link Explorer
- Strategic Priority Program on Space Science
- ...

**THANK YOU FOR LISTENING**

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