

Beijing Series Earth Observation Satellites and Services

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Twenty First Century Aerospace Technology (21AT)

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Introduction



二十一世纪空间技术应用股份有限公司
Twenty First Century Aerospace Technology Co., Ltd.

- EO satellite operator based in Beijing, 300+ employees.
- Since 2005, the company has been providing EO data and value added service in China.
- EO satellite resources:
 - ✓ Beijing-1, 4m PAN/32m MS, 2005~2012
 - ✓ Tripe Satellite Constellation, 1m PAN/4m MS, will be launched in Middle of 2015
- Beijing -1 International data distribution through DMC and disaster response through International Charter.
- 21AT will provide Triple Satellite Constellation image to worldwide customers.



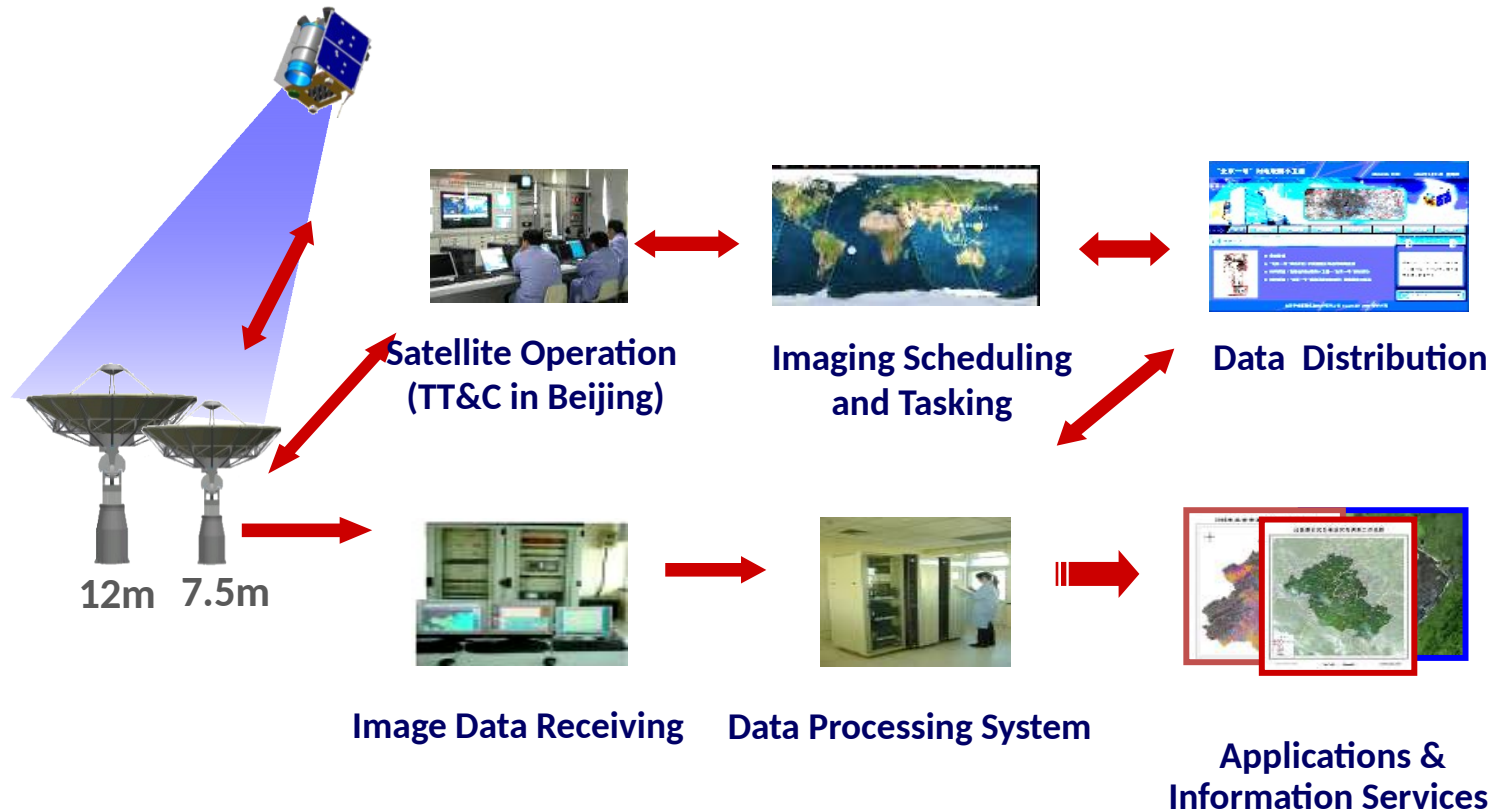
Located in Zhongguancun Science and Technology Park
Haidian District, Beijing

First and Only Commercial EO Satellite Operator in China



From Satellite Operation to Information Services

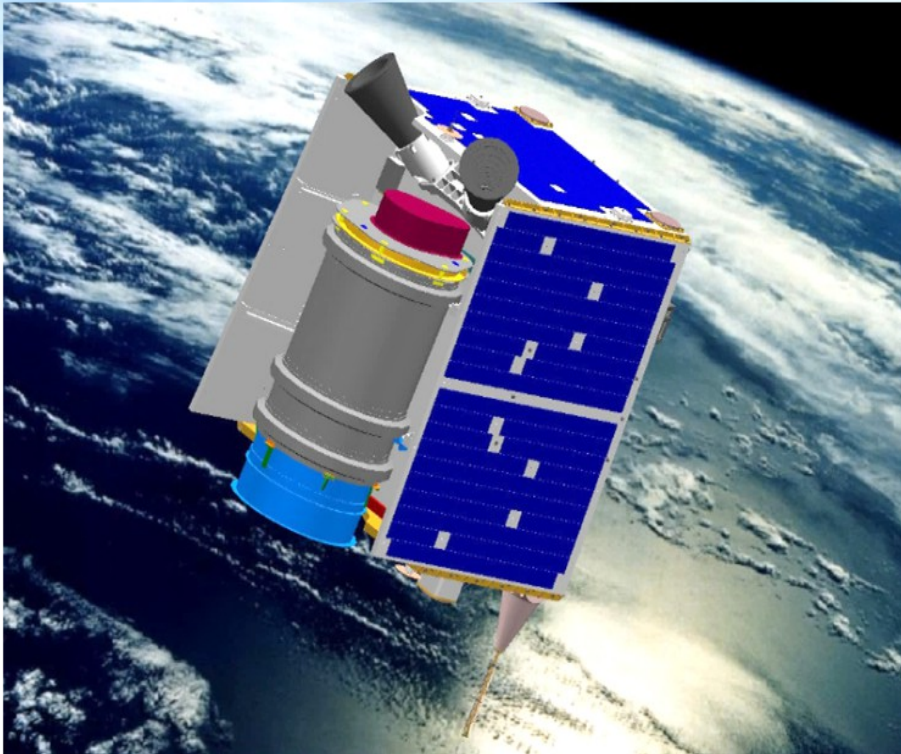
First space-ground integrated small EO satellite system in China



Rapid Response, “Guaranteed Data” and Efficient Delivery



21AT Satellite Resources: BJ-I Small Satellite



Orbit

SSO

GSD

4m PAN, 32m MS

**Swath
Width**

24km/600km

MS bands

G/R/NIR

Off-pointing

$\pm 30^\circ$

Revisit

5-7 days

**Launched in 27 Oct. 2005
Operated for 7 years,
Exceeded 5 years design lifetime**



4m PAN

+



32m MS

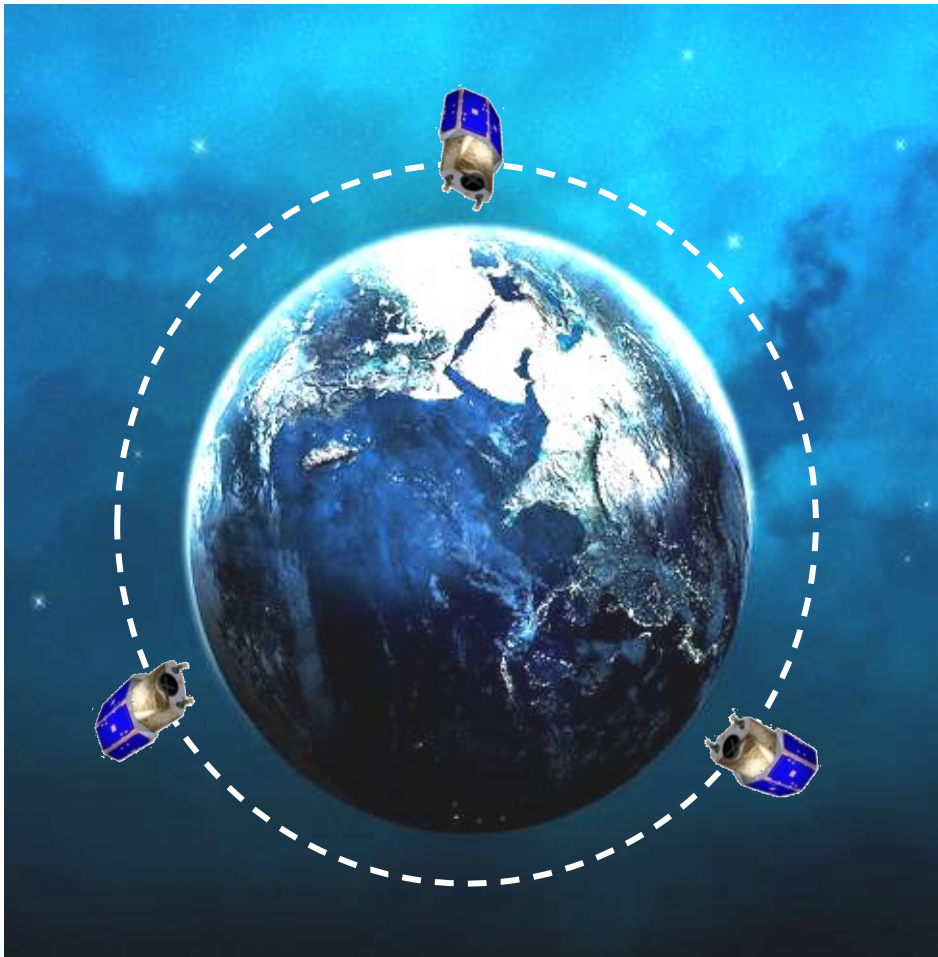


Fusion



21AT satellite resources: Triple Satellite Constellation

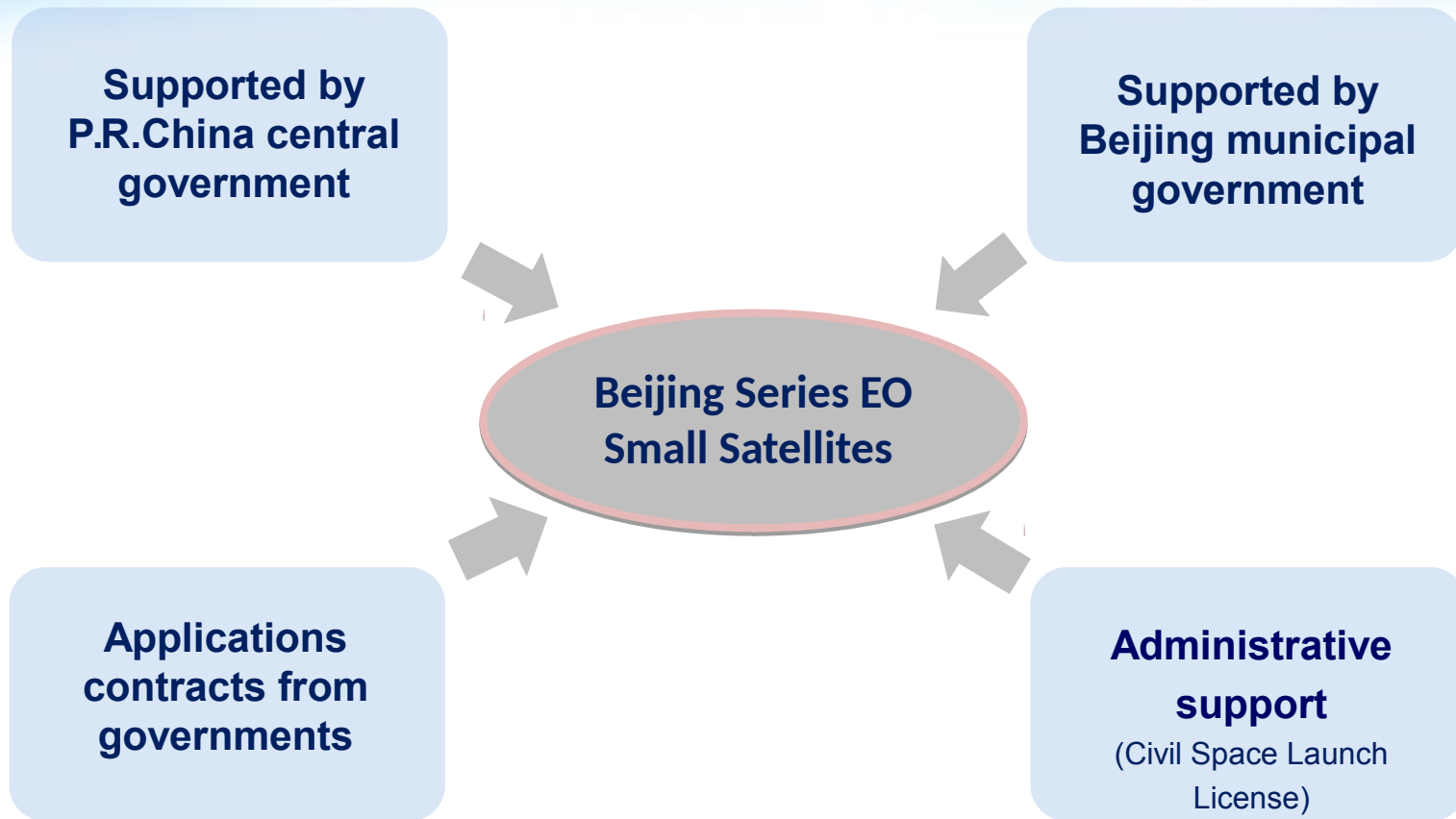
First purposely built <1m 3 identical satellite constellation with global daily revisit capability



Sat. Num.	3
Orbit	SSO, 650km LTAN:10:30am
GSD	PAN: 1m, MS: 4m
Swath Width	23km
MS bands	B/G/R/NIR
Off-pointing	$\pm 45^\circ$
Revisit	1 day
Manufacturer	SSTL in UK

Launching in July by Indian PSLV and providing image in October 2015

Government Supports to Small Commercial EO Satellites



Strong Supports from Government for Space Commercialization

Bilateral Cooperation on Small EO Satellite Constellation

Long term cooperation with the leading low cost small satellite manufacturer

– SSTL in UK on Pioneering:

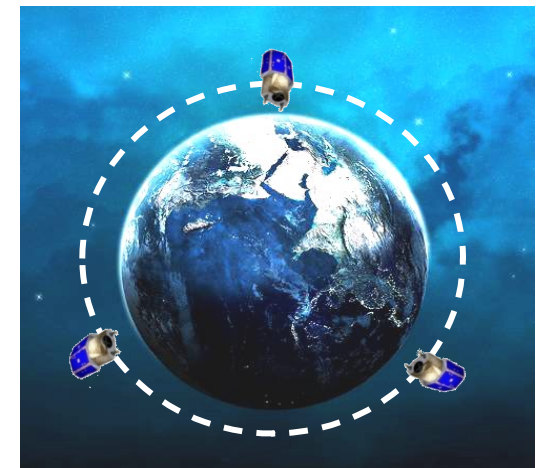
- High resolution EO satellites development
- Constellations for operational services



Signing of the Cooperation Agreement of Triple Satellite Constellation between 21AT and DMCii/SSTL at presence of both Prime Ministers



Beijing-1 is part of the DMC



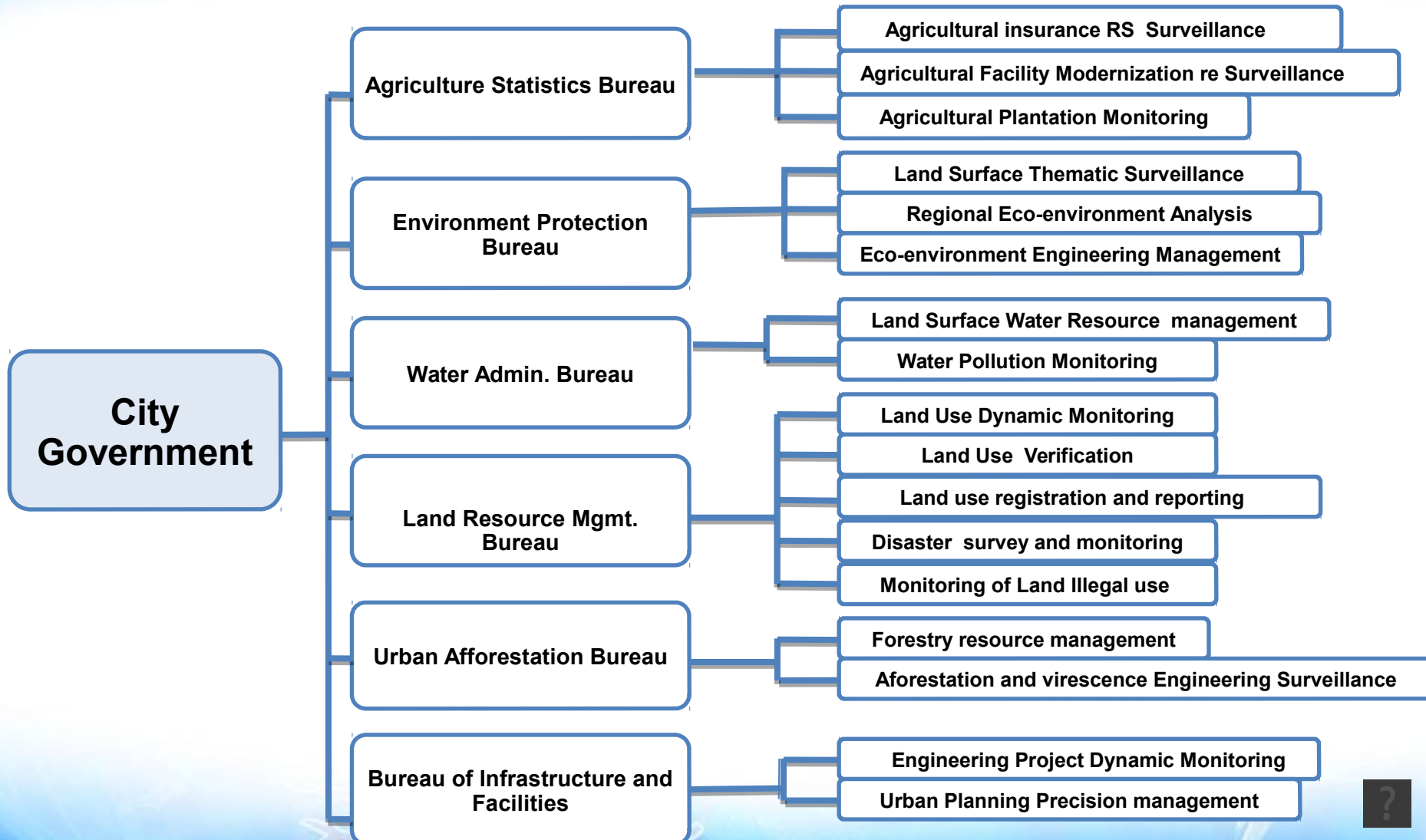
Commercial Triple Satellite Constellation

Low cost small satellite constellation is an solution for operational services



Services Overview of Intelligent City Management System

More than 100 Services for 11 government departments that can be classified into 6 categories. The following is the six major government departments served:



Intelligent Management System – Illustration



- Data
- Information
- Software

**Data Resources
Share Services**

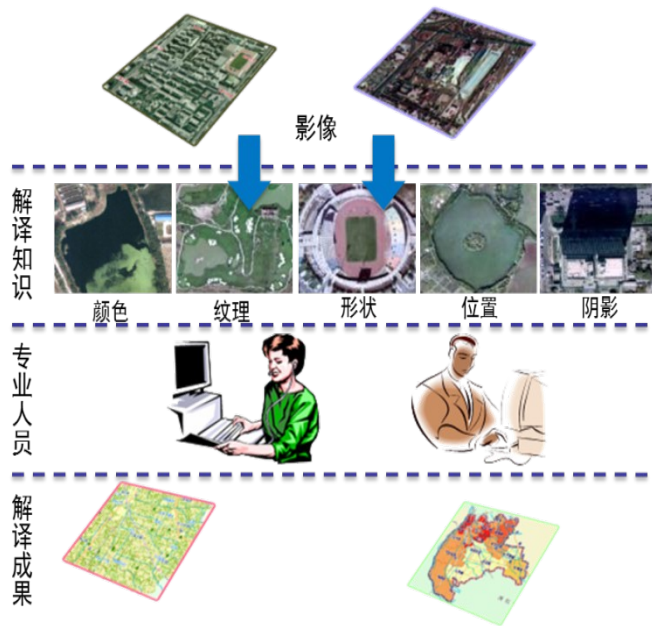
**Regional Basic
Geographic Data**

Regional Resources



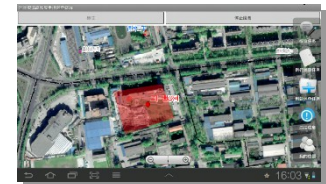
Thematic Remote Sensing Information Products

Information Interpretation Process



On-Site Verification Mobile Terminal

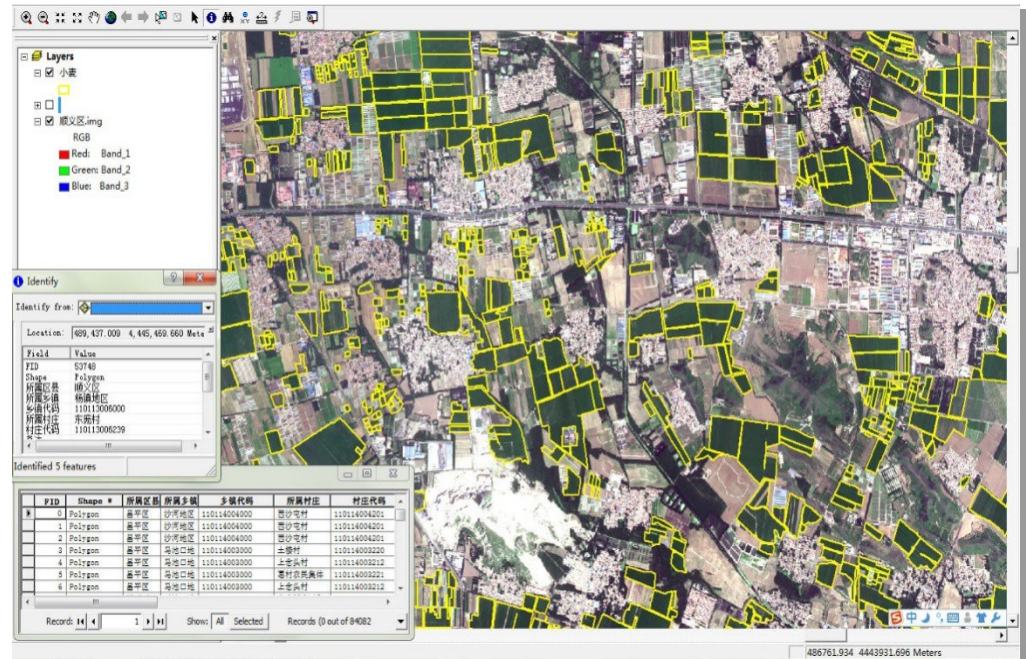
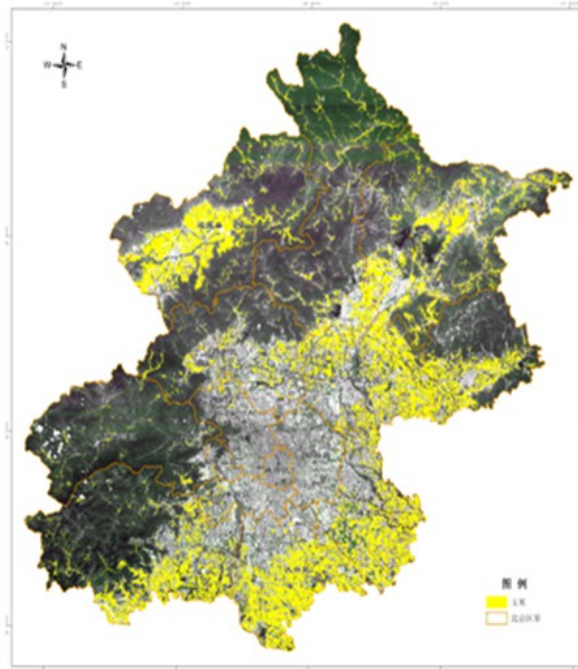
- ❑ Real time check position
- ❑ Table of required survey and completed fields
- ❑ Navigate to required survey fields
- ❑ Fill field survey table
- ❑ Field survey photography
- ❑ Field location and boundary drawing
- ❑ Capable of adding land updated status and planning application layers
- ❑ Export field number, field survey table and relevant photos



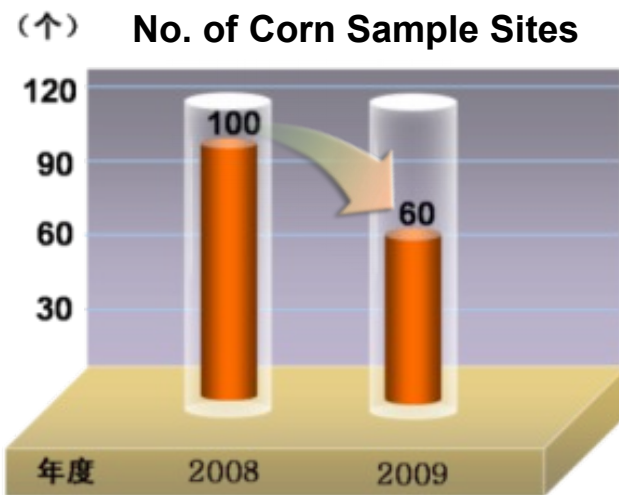
Agriculture Static Survey

Beijing Major Crops Monitoring (Wheat and Corn)

- ❑ Implement regional wheat and corn monitoring 3 times per year
- ❑ Accurate extraction of field area
 - Assist compensation distribution based on area
- ❑ Statistic accuracy > 95%



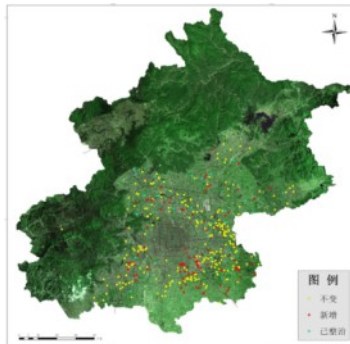
Benefits



- ❑ **Statistic work efficiency improved significantly**
- ❑ **Number of sample sites reduced by 40%**
- ❑ **Manpower needed for basic survey reduced by 75%**
- ❑ **Enhance accuracy and update frequency of statistic data**

Illegal Dumping Rubbish Surveillance

Using remote sensing technology to solve “Rubbish Surround City” problem



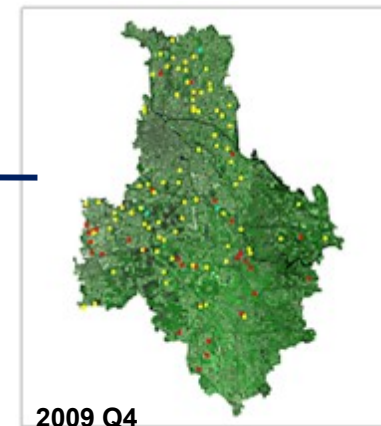
Quarterly monitoring location of rubbish sites



Evaluation of clearing priority



Comparison of management effect



Report to local government department



Illegal Dumping Rubbish Surveillance

Before



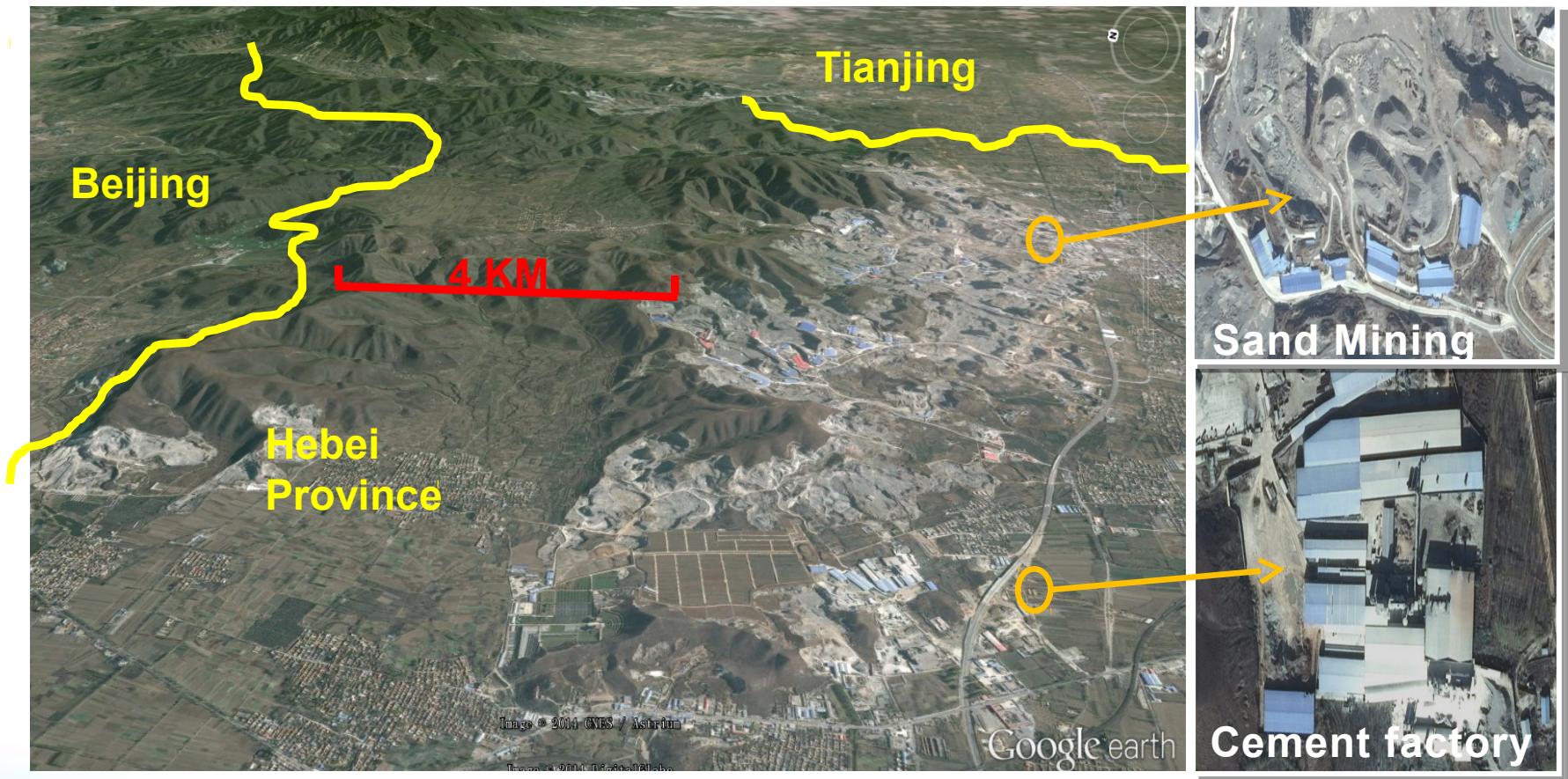
After



Environment Impacts from Surrounding Provinces

- the only way to collect such information

Air pollution sources identified from satellite imagery



Air Pollution Sources Tracking

Factory pollution source demolished but appearing again nearby



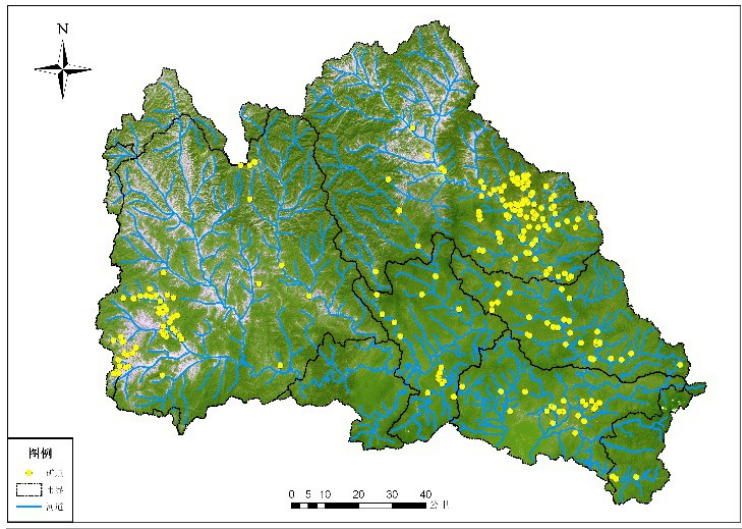
2012



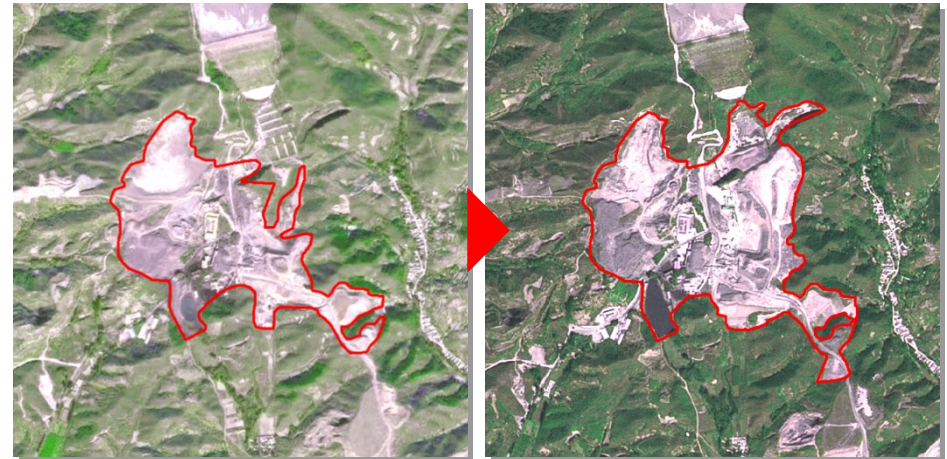
2014

Water Pollution Source Tracking

- ❑ Dynamic monitoring of mining sites located at upstream of reservoir
- ❑ Identify change of mining site location and area
- ❑ Provide information support for mining site management and water quality protection



Mining site pollution source location monitoring

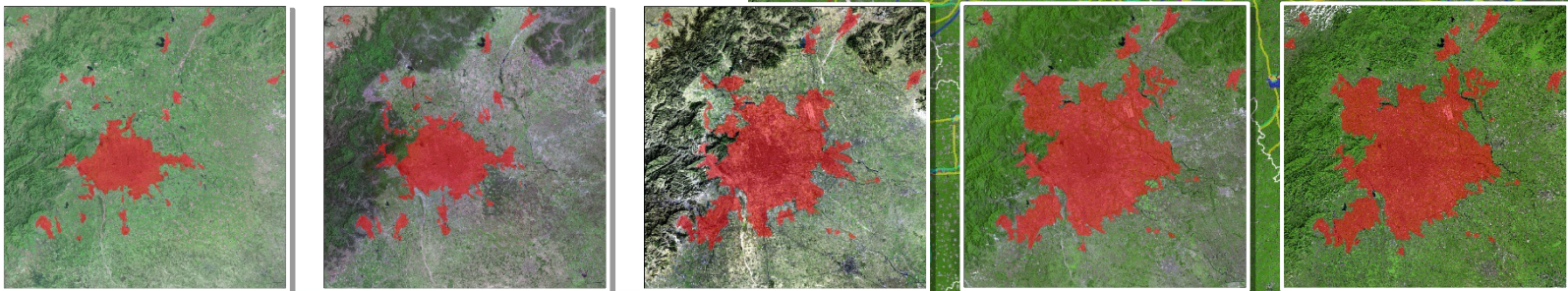


Mining site dynamic change monitoring

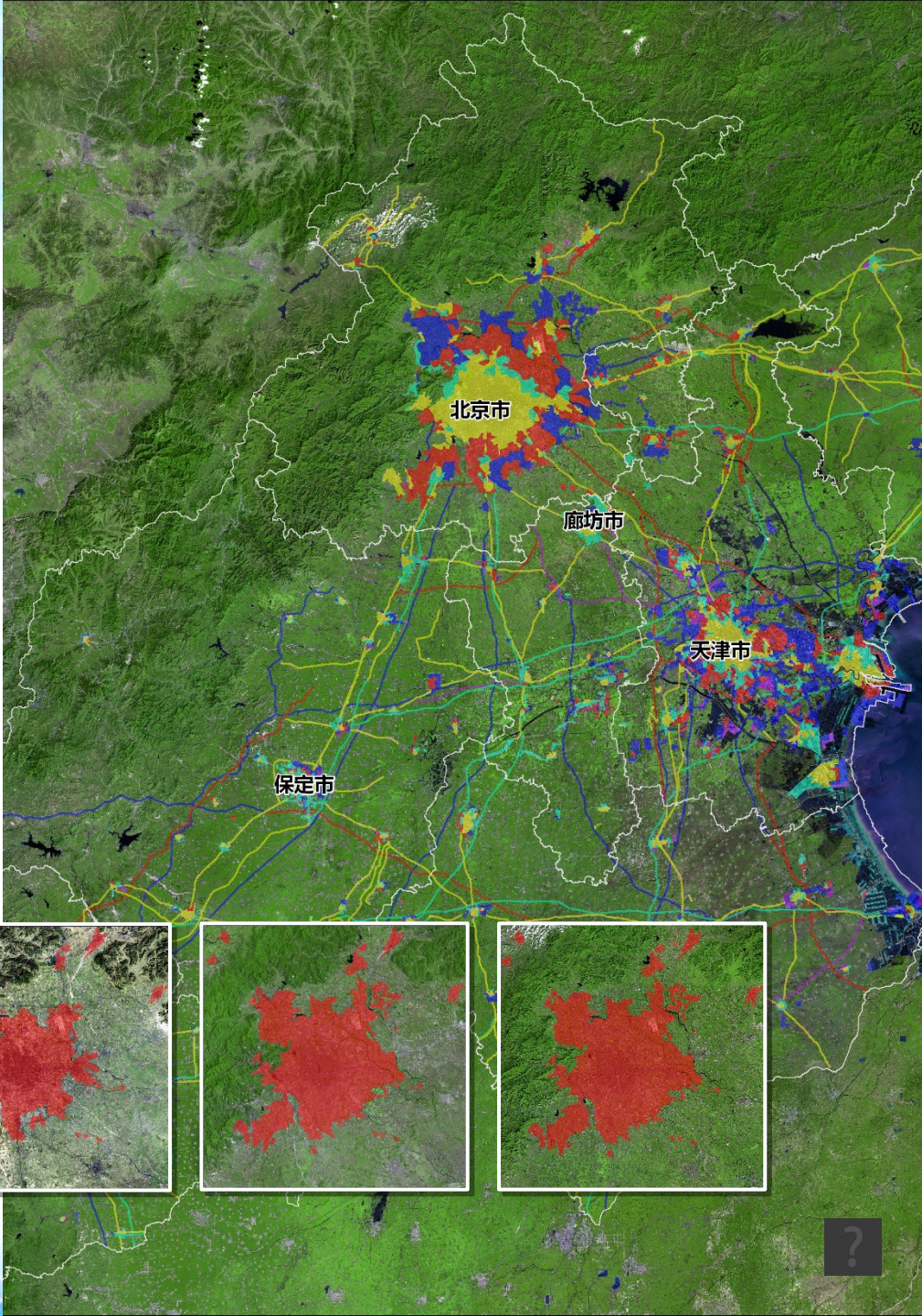
Land Use Change



Land Use Change Detection



Urban Expansion



Disaster Monitoring

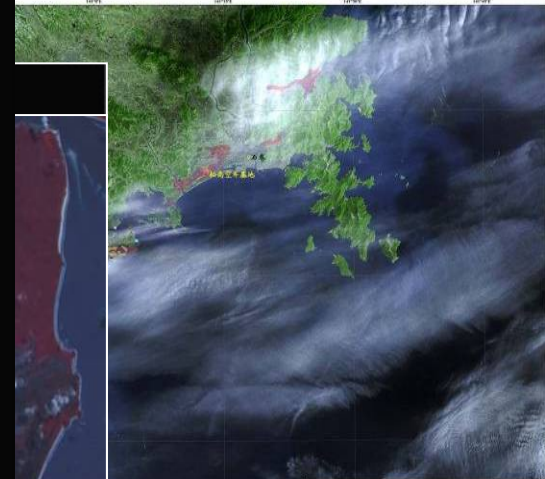
F Earthquake in Turkey 2011

Thailand Flood in 2011

Earthquake in Japan 2011



强震海啸灾情北京一号小卫星遥感监测图



灾情监测结果:
北京时间2011年3月11日13时46分,日本本州岛仙台港以东130公里处(东经142.6,北纬38.1)发生9.0级地震,震源深度为24km,是1900年以来全球第五强震,并引发了大规模海啸。
利用2011年3月13日获取的北京一号小卫星多光谱影像和震前影像对日本(东经140.5~141.5,北纬37.3~38.6)范围内受灾区域进行了地震海啸灾情监测。监测结果如下:
在监测区内,受地震海啸影响的范围主要包括石卷、仙台、福岛等地的沿海冲积平原及低洼地区,面积达241.16km²,其中建筑区面积达46.11km²,国道总长度约32km。截止北京时间2011年3月13日上午7点43分,海啸退潮后仍有113.90km²范围淹没在海水中,其中建筑区面积11.62km²。
在地震海啸影响范围内,还包括福岛第一和第二核电站、火力发电场4处、仙台空港、松岛空军基地、大型港口6个(其中渔港3个)等重要建筑与设施。

制作单位: 航天国家遥感中心
北京一号卫星应用技术有限公司
二十一年空间信息技术应用股份有限公司
制作时间: 2011年3月13日

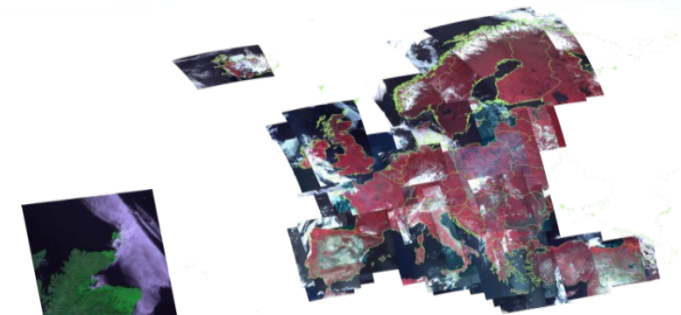
20110311日本海啸

Through International Charter

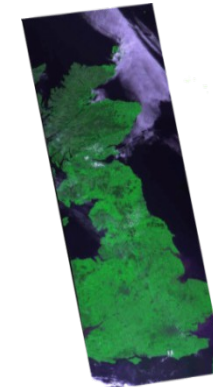


Beijing-1 Contribution to International Commercial EO Services

Application Type	Geographical Areas
Precision Agriculture	USA, UK, France
Deforestation Monitoring	Amazon
Customer Evaluation	USA
Tropical Monitoring	Burkina Faso, Ghana, Mali
Crop Yield Evaluation	Brazil
Land Cover Monitoring across Europe	European Countries
Illicit Crop Monitoring	Afghanistan



European Coverage



UK Coverage

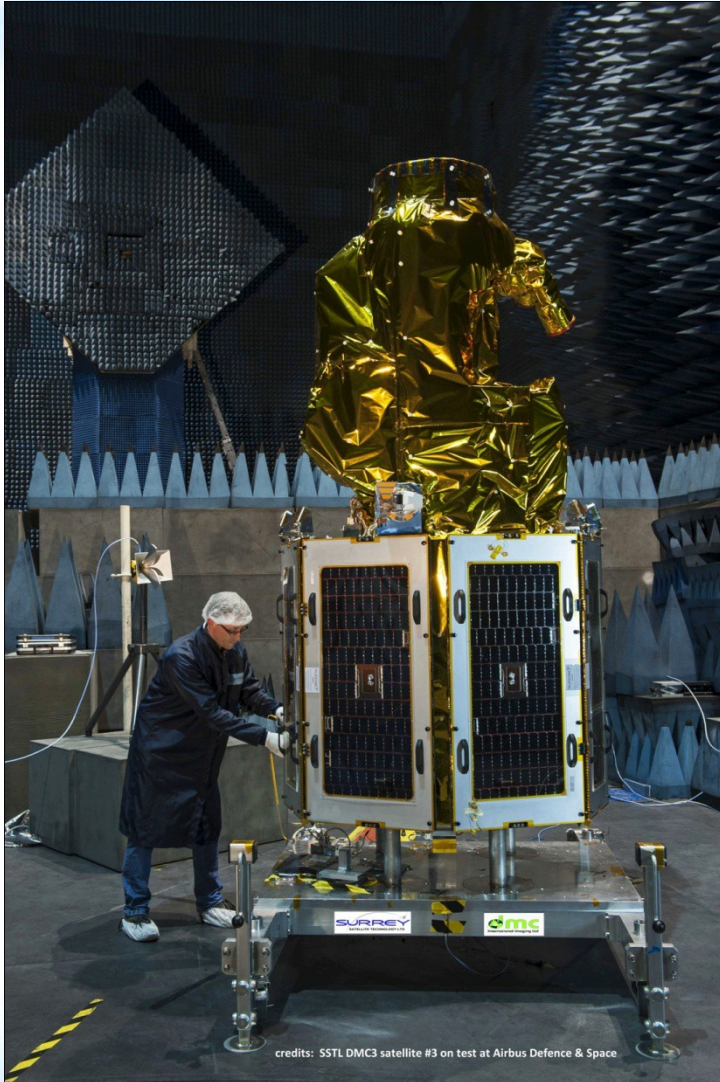


Africa Coverage

Beijing-1 data international distribution through the DMC



Triple Satellites in the Flight Configuration



Products and Services from Triple Satellite Constellation

Image Products:

- Basic imagery: 1m Pan/4m MS(G/R/B/NIR);
- Advanced imagery: Ortho, Mosaic, Pansharp, Stereo

Services

- Operational Monitoring based on guaranteed timely data
 - Change detection of interested features
 - Change detection of targeted area
- Guaranteed daily image acquisition – polar region or emergency
- Land cover feature extraction
- Direct Receiving Station (DRS)

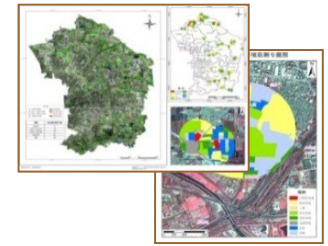
Applications

- City intelligent management

Image acquisition, information extraction, all data sources integration, analysis/reporting and operational management software



Image Products



Information Services



Software Products



Online Portal

The screenshot displays the 'Timely Service System of RS Online Portal'. The interface includes a 'Service Catalog' on the left with a tree view of data categories (Online Data, Hot Area, Global) and a search bar. The central area features a 'Welcome' login form with fields for 'User ID', 'password', and 'Code', and a 'Login' button. The right side shows a map of China with a red rectangle highlighting a region, and a table of operations below it.

hootTime	Operation
03-06 03:17:42	Locate Detail Order
03-15 03:16:12	Locate Detail Order
03-29 03:23:51	Locate Detail Order
03-15 03:16:08	Locate Detail Order

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- ❑ Online Portal used to order Tripe Satellite Constellation imagery products
- ❑ Most efficient way to find the image you want
- ❑ 24/7 ordering and delivery



Daily Imaging Anywhere on the Earth

- ❑ Triple Satellite Constellation launched by a single launcher
- ❑ Phasing three satellites 120° to form the ideal constellation
- ❑ Able to target anywhere on the Earth once per day using off-pointing capability (45°Max.)

Latitude	Off-pointing / revisit period			
	5°	15°	25°	35°
0°	8 days	3 days	2 days	Daily
±10°	8 days	3 days	2 days	Daily
±20°	8 days	3 days	2 days	Daily
±30°	7 days	3 days	2 days	Daily
±40°	7 days	2 days	2 days	Daily
±50°	6 days	2 days	Daily	Daily
±60°	4 days	2 days	Daily	Daily
±70°	3 days	Daily	Daily	Daily
±80°	2 days	Daily	Daily	Daily

With frequent revisit capability, offering “quarterly guaranteed data” services



Benefits to Worldwide Customers

- ❑ **The best combination of spatial resolution and time resolution**
 - <1m with 23km swath width that is the up limit of all very high resolution satellites
- ❑ **Identical payloads plus cross calibration over three satellites**
 - Convenient for quicker applications
- ❑ **High on-board geolocation accuracy**
 - Less ground reference points needed, less time and cost for map production
- ❑ **Stereo imaging and area imaging capabilities**
 - More applications are able to be created
- ❑ **24/7 imaging tasking plus large on-board memory**
 - Responsiveness and efficient cloud free image acquisition and download
- ❑ **“Earth surface change monitoring and intelligent management system”**
 - Creating new business opportunity for our customers
- ❑ **Comprehensive application expertise**
 - Provide in depth application supports





二十一世纪空间技术应用股份有限公司
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Thank You!

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