

The Development of Surveying and Mapping in China

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China .P.R

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Part I :

General Situation of Surveying and Mapping

1. The legal systems of surveying and mapping

(1) The legal systems of surveying and mapping in China have been basically established, which has ensured the related activities can be done in right order.

Surveying and Mapping Law

Regulations for Surveying and Mapping Results Management

Regulations for Map Compilation and Publication

Regulations for Surveying Marks Protection

Regulations for Fundamental Surveying and Mapping (for approval)

Regulations for Fundamental Surveying and Mapping Plan

Regulations for Registration of Surveying and Mapping engineers

Provisions for Foreign Organizations or Individuals Who Perform Surveying and Mapping Activities in China

Regulation for Publishing Important Geographic Information

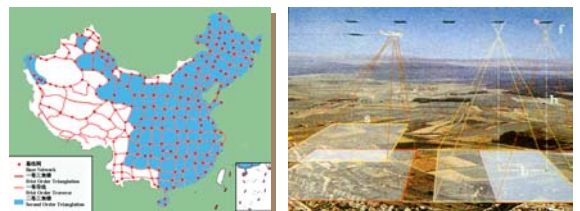
Regulations for Map Auditing Management

Regulation for Real Estate Survey

23 provincial and local Regulations

(2) Fundamental surveying and mapping

is the activity to establish a unified national control system, to produce or update the state's basic scale maps and fundamental geographic information systems.



Fundamental surveying and mapping has been invested, managed and implemented by the governments of different levels.

The central government is in charge of the surveying and mapping at 1:50 000 ~1:4million scale, while the provincial government for 1:5 000 and 1:10 000 scale, and local city government for 1:500~1:2000 scale.

2. The technologies and standards of surveying and mapping

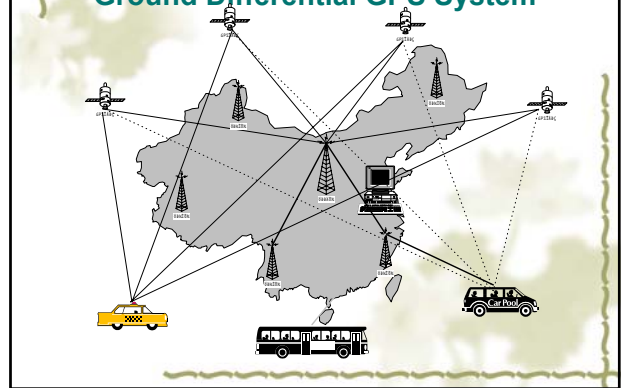
(1). The traditional surveying and mapping technologies have already been replaced by digital ones in recent years, and a number of surveying and mapping centers are established.



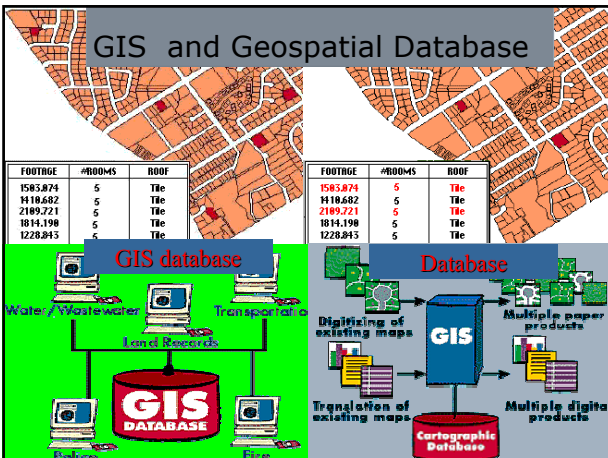
Air and Space Remote Sensing Technology



Ground Differential GPS System



GIS and Geospatial Database



(2). Many software and hardware systems for digital photogrammetry, satellite positioning, image processing, GIS management, etc., have been developed by ourselves.

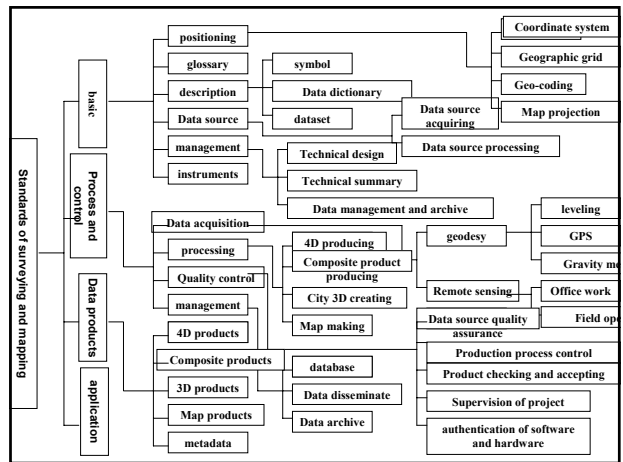
Such as :

VirtuoZo, JX-4, Geostar, MapStar, MapGIS, SuperMap, Geoway, CityStar, MapGIS, GeoWay, EzMap, CASS, CityMap, SymbolTool, IRSA6.1, Imageinfo, SARINFORS, GRACE1.0

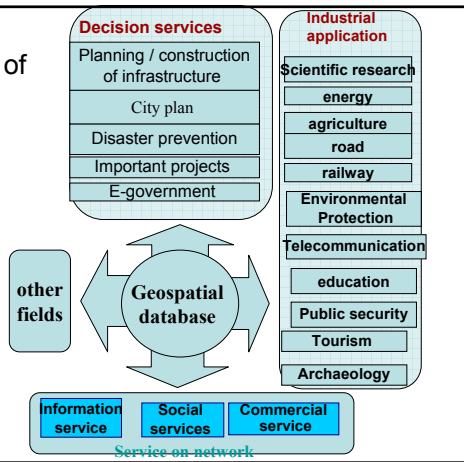


(3) The key techniques and methods for developing geo-spatial database with huge amount of data are formed.

(4) The standard systems of digital surveying and mapping are basically developed.



3. The application of geospatial information



(1) The provisions of topographic maps, geodetic survey results, aerial images and digital topographic data increase dramatically.

(2) More than 200 geographic information systems were developed for national and local government .

(3) Cadastral survey and Real estate survey have been performed widely in most towns in China.

(4) Engineering survey gets well done in the areas of land resources, city construction, transportation, irrigation works, and energy, etc..

(5) The companies dealing with geo-spatial information have emerged and grown rapidly.

(6) Geo-spatial information industry has become a new rapid economic growth point in the society.



Urban Planning Management

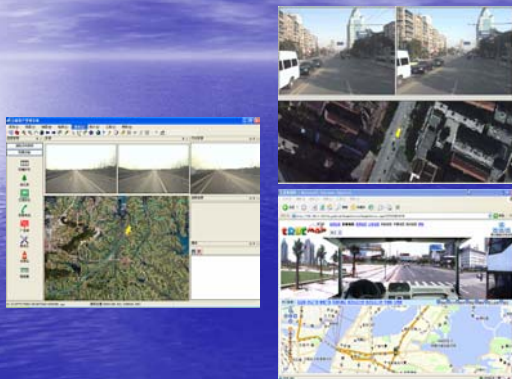


Investigation of Land Resources



Dynamically Monitor the status of land use by integrating GIS, GPS, and RS technology

GIS for Intelligent Traffic



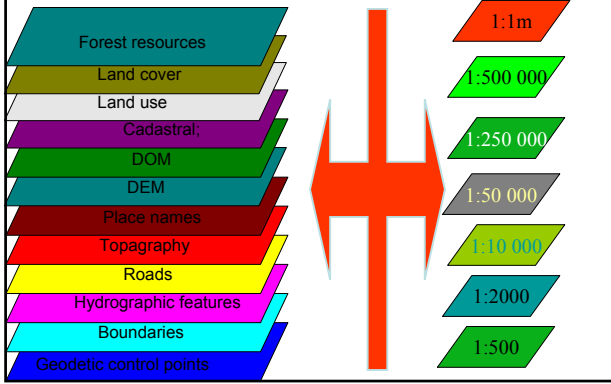
Part Two

Several Important Projects of Fundamental Surveying and Mapping

1. National fundamental geospatial information database

In 2006, national fundamental geospatial information database were built up completely.

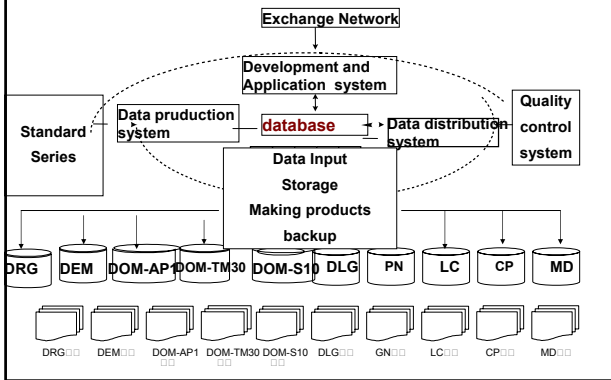
(1) the contents of the database



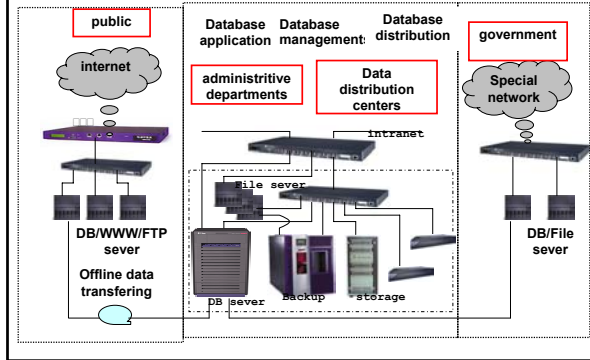
(2) fundamental geospatial information database at 1:50 000 scale

- It took 8 years and cost of □700 000 000
- Huge amount of data, total 5 TB
- Integration of various kinds of data resources.
- Providing the services on line or off line.

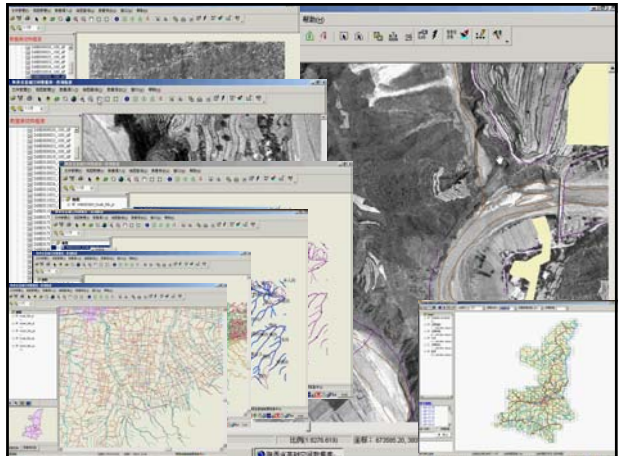
The structure of the database at 1:50 000 scale

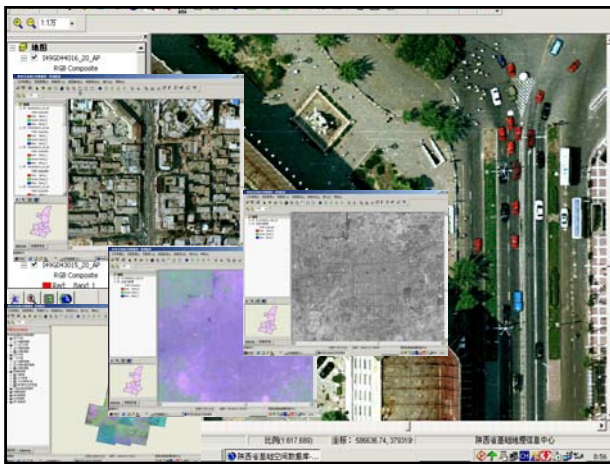


(3) the network and hardware of the database

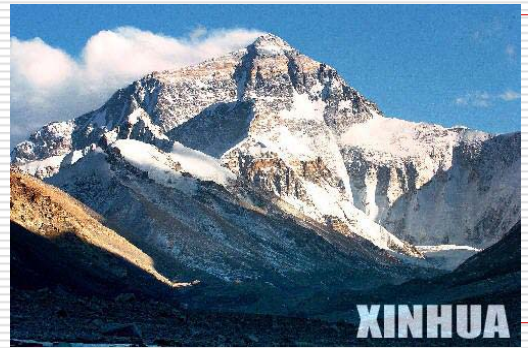


The interface of fundamental geographic information database





2 Height Survey of Everest in 2005



1 The history of height survey of Everest

No.	data	Organizers	height
1	1714	China	
2	1852	U.K	8840
3	1954	India	8847.6
4	1967	China	8850.32
5	1975	China	8848.13
6	1987	U.S.A-Italy	8846
7	1992	China Italy-	8846.27
8	1999	USA	8850
9	2004	Italy	8848.5
10	2005	China	8844.43

The history of height survey of Everest



The history of height survey of Everest



(2). Project Schedule

Date(2005)	task
March to May	making field survey
June to July	making data processing and analyzing
Oct. 9th	publishing the new height data as 8844.43 meters

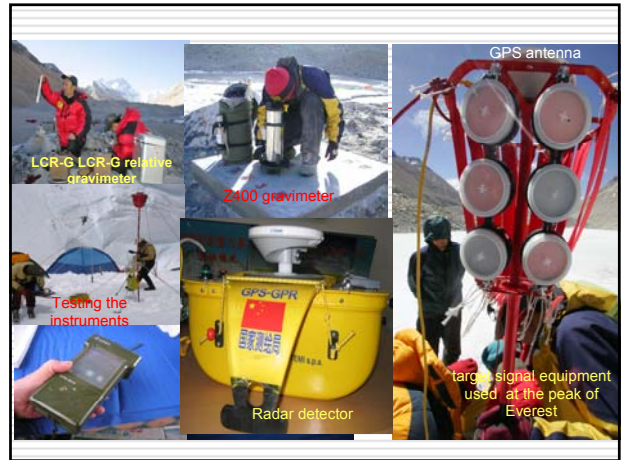
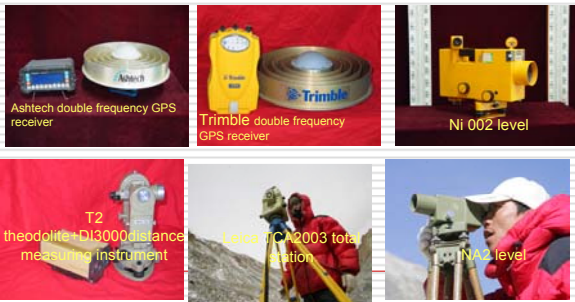
(3). methods

- integrating the methods of leveling, traverse line ,triangulation , GPS , gravity survey, Geoid precise , as well as snow depth Radar detection .

□4□Contents

location	tasks
around the mountain	88 GPS and joint-survey points
	96 gravimetric points; 397 km leveling line
near the peak of Everest	20 km traverse line 6 intersection points
at the peak of Everest	the target signal measurement with GPS and intersection
	the glacier layer depth measurement with Radar detector

(5) Instruments and devices used



Implementing GPS survey



Implementing leveling



6 Implementing gravity survey



Headquarter, 5 200 meters above the sea level

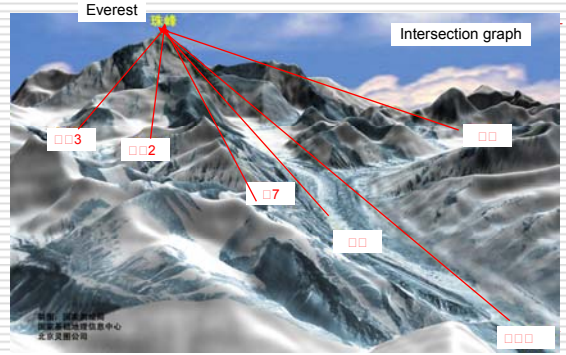


Lhasa gravimetric point, 4200 meters above the sea level



6 500 meters above the sea level

Implementing triangular intersection surveying



climbing up to the peak of Everest



at the peak of Everest



successfully climbed up to the peak of Everest, the wind force was more than 10 grade.

Making survey at the peak

GPS equipped on the top of the target signal equipment began to work

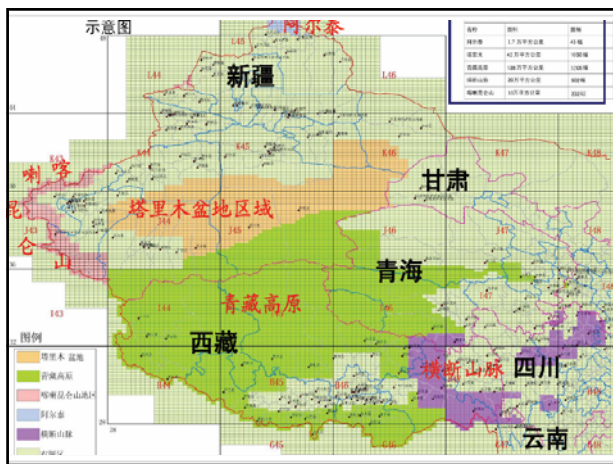


3 Mapping Project at 1:50 000 Scale in West Areas of China

1 background

- So far 2 000 000 km² (about 21% of land area of China) in west areas of China still have not been covered with topographic map at 1:50 000 scale.
- The project began 2006. The government plans to invest about 2.0 billion within five years.





(2) objectives

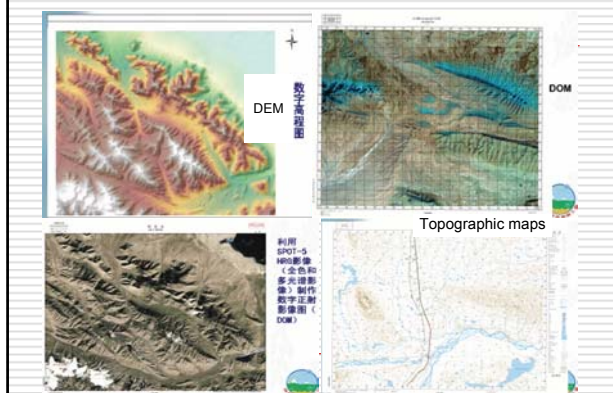
- About 5000 topographic maps and land cover maps at 1:50 000 scale covering the area will be produced.
- The related geo-spatial database, thematic feature database as well as the application systems will be developed.
- Map products of many kinds will be provided.

(3) The technological platforms to been used

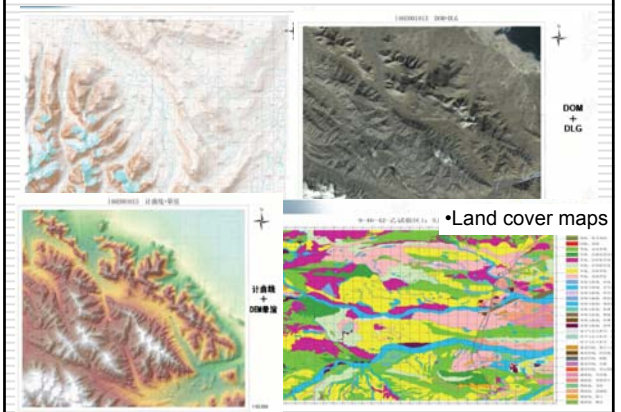
Concerning the geographic and climatic conditions in the western regions, the following technologies will be developed and used :

- IMU/DGPS-based digital aerial photogrammetric workstation;
- High-resolution optical satellite image Mapping System with few or without control points;
- High Precision mapping workstations based on synthetic aperture radar image
- Image Interpretation and Recognition software;
- Geoid Precise Software in the west region;
- Data analysis software from GPS continuously operating reference station in the west region.

(3) the data and map products



Composite maps



Thematic maps



Photo album



4 High resolution stereo mapping satellite

1 background

There is no high resolution stereo mapping satellite in China, so the data resources to produce and update basic geospatial information have become limited.

So the government plans to launch this kind of satellite in near future.

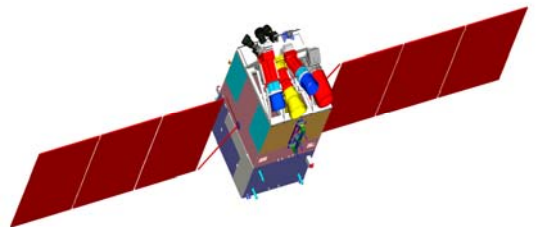
(2) Purpose

- To produce, update, and develop topographic maps and database at 1:50 000 scale
- To update parts of features on topographic maps at 1:10 000 to 1:25 000 scales
- To investigate national land resources

3 the satellite imagery

- Getting 3 array visible Imagery of 5m resolution
- Getting Multi-spectral Imagery of 10m resolution
- Getting visible Imagery of 2m resolution

flight Map





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Thank You !!