Development of BeiDou Navigation Satellite System

China Satellite Navigation Office

Vienna, Jun 2013

Overview

Development Plan

Latest Progress

Recent Plans

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Development Plan

Latest Progress

Recent Plans

Development Plan

1. Development Objectives

★ Provide continuous, stable and reliable satellite navigation services for global users, serve the world, benefit the mankind

★ Suffice the requirements of national security and eco-social development, accelerate the national informatization construction as well as economy development mode transformation, realize social and economic benefits derived from satellite navigation industry

Development Plan

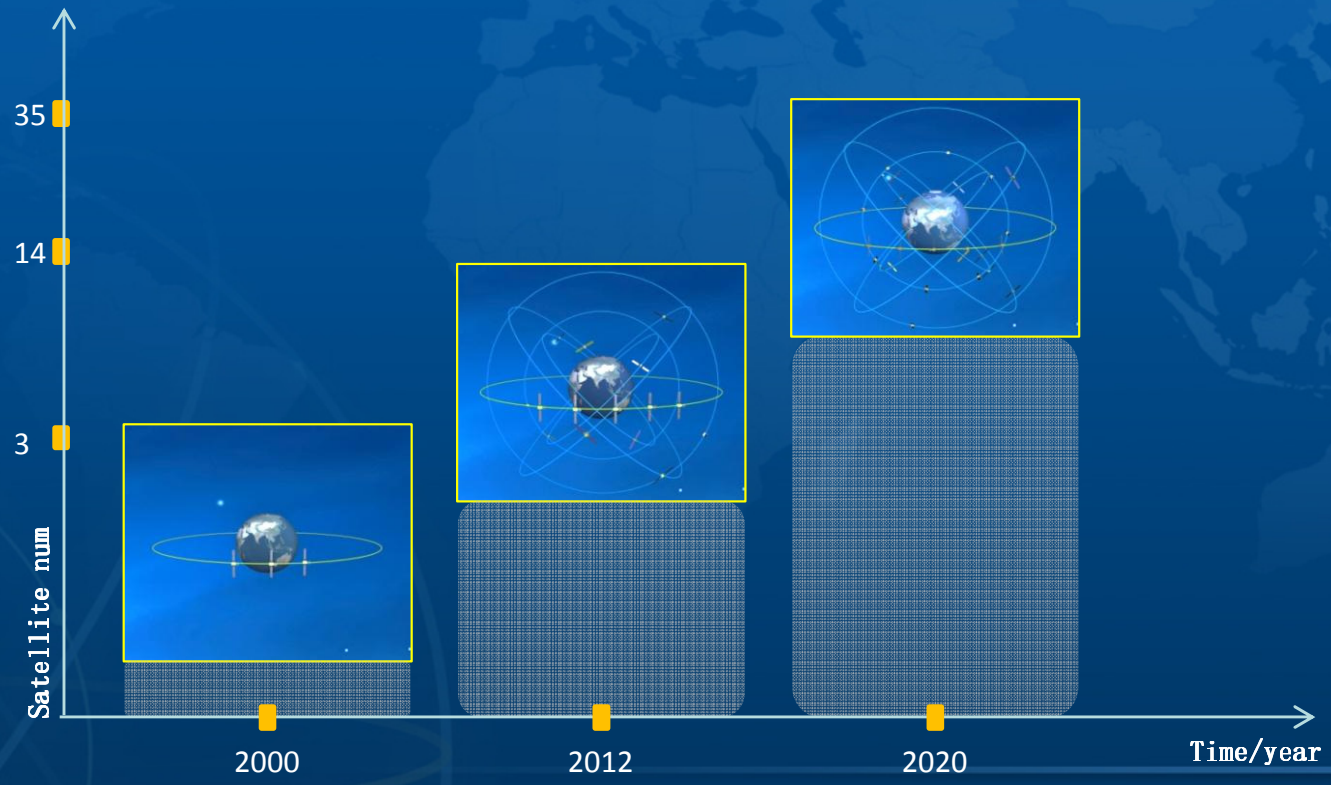
2. Deployment Plan

★ "Three-step" plan

– From regional to global, from active to passive

★ Development roadmap

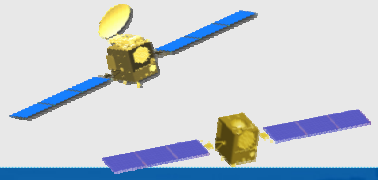
– Region-highlighted, world-oriented and distinctive



Development Plan

3. System Architecture

Space constellation	• 5 GEO • 30 Non-GEO
Ground control segment	• Master Control Stations (MCS) • Uplink Stations(US) • Monitoring Stations(MS)
User terminals	• BeiDou user terminals • Terminals compatible with other GNSS



Four types of services: open, authorized, wide area differential, short messages

★Positioning accuracy: < 10 m

★Velocity accuracy: < 0.2 m/s

★Timing accuracy: < 20 ns

Overview

Development Plan

Latest Progress

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1. System Construction

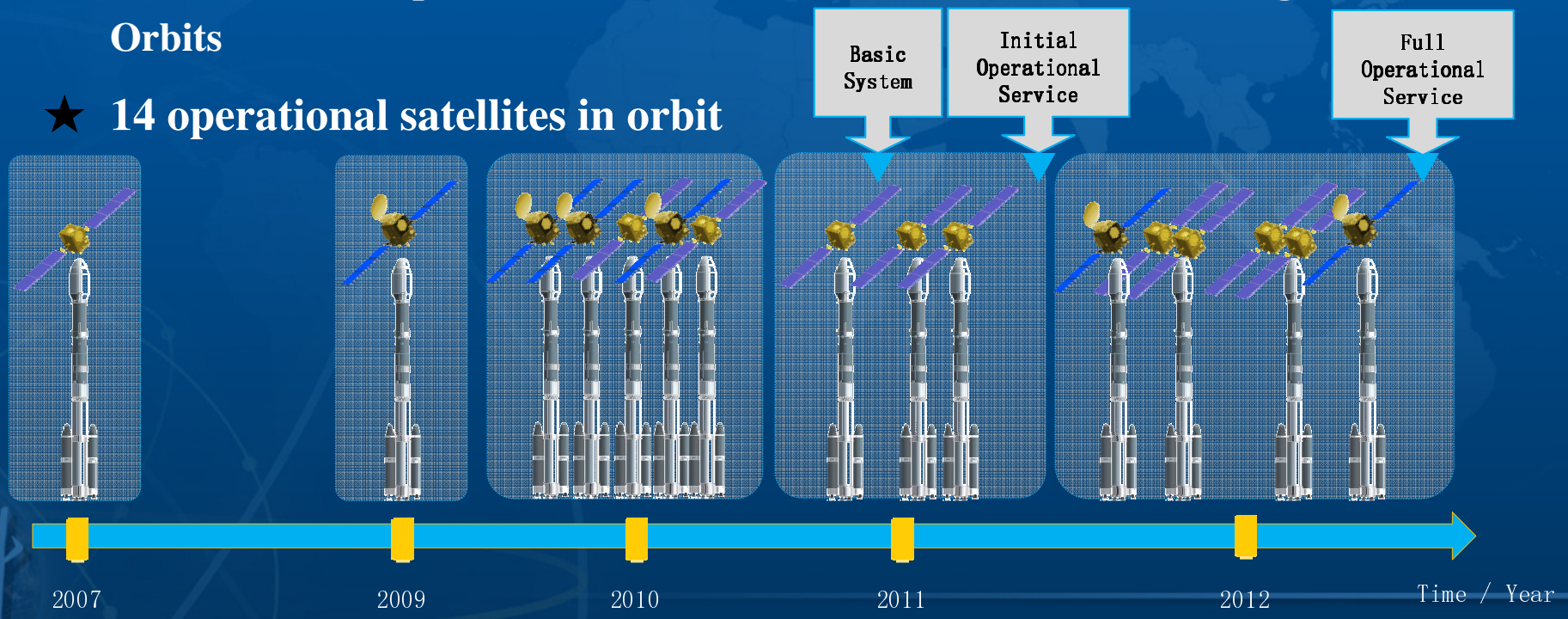
Complete the 2nd step of space constellation deployment

★ **6 BeiDou satellites have been launched by 4 launch vehicles in 2012.**

– **4 MEOs were launched at twice**

– **First time accomplished dual-launch of satellites into Medium/High Earth Orbits**

★ **14 operational satellites in orbit**



Latest Progress

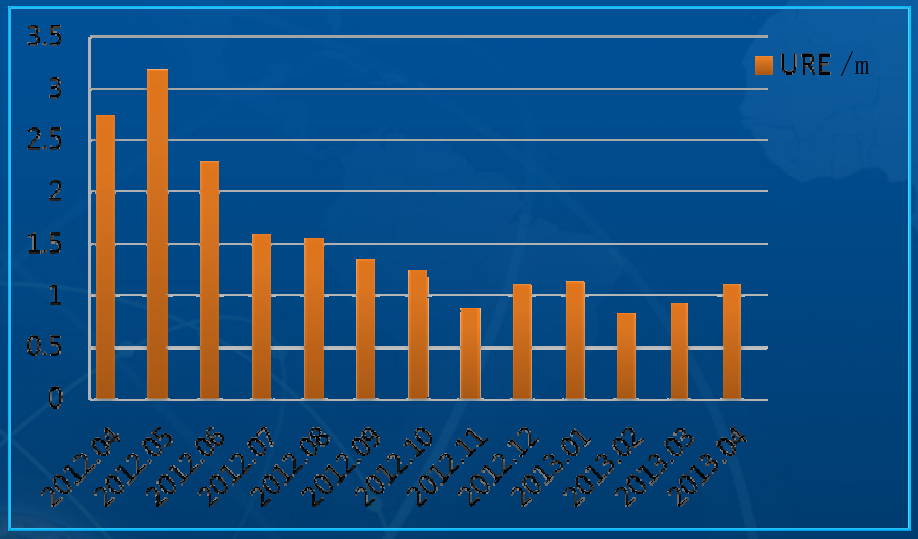
1. System Construction

System test

★ **Carry out system test continuously**

– **BeiDou System is under continuous and stable operation**

– **Service performances fulfill the designed requirements**



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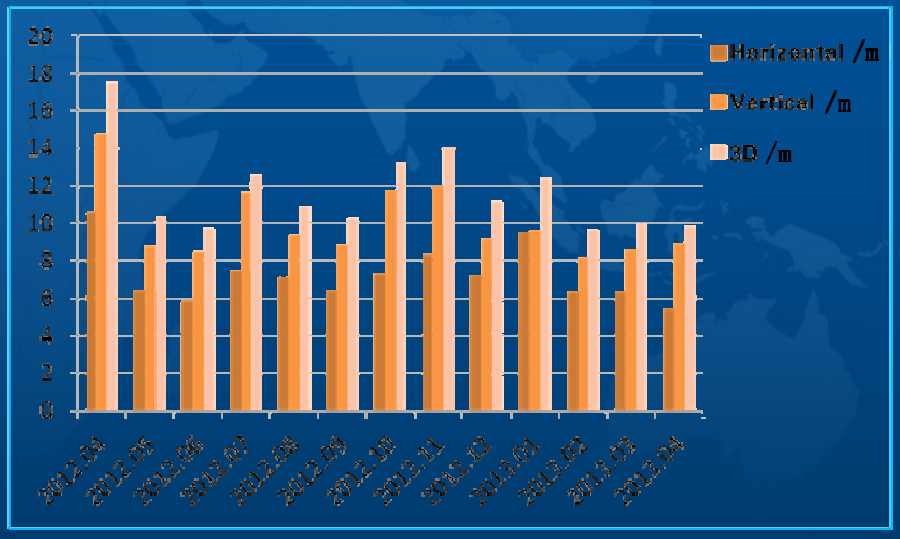


Positioning accuracy (95%)

Latest Progress

1. System Construction

Full Operational Service

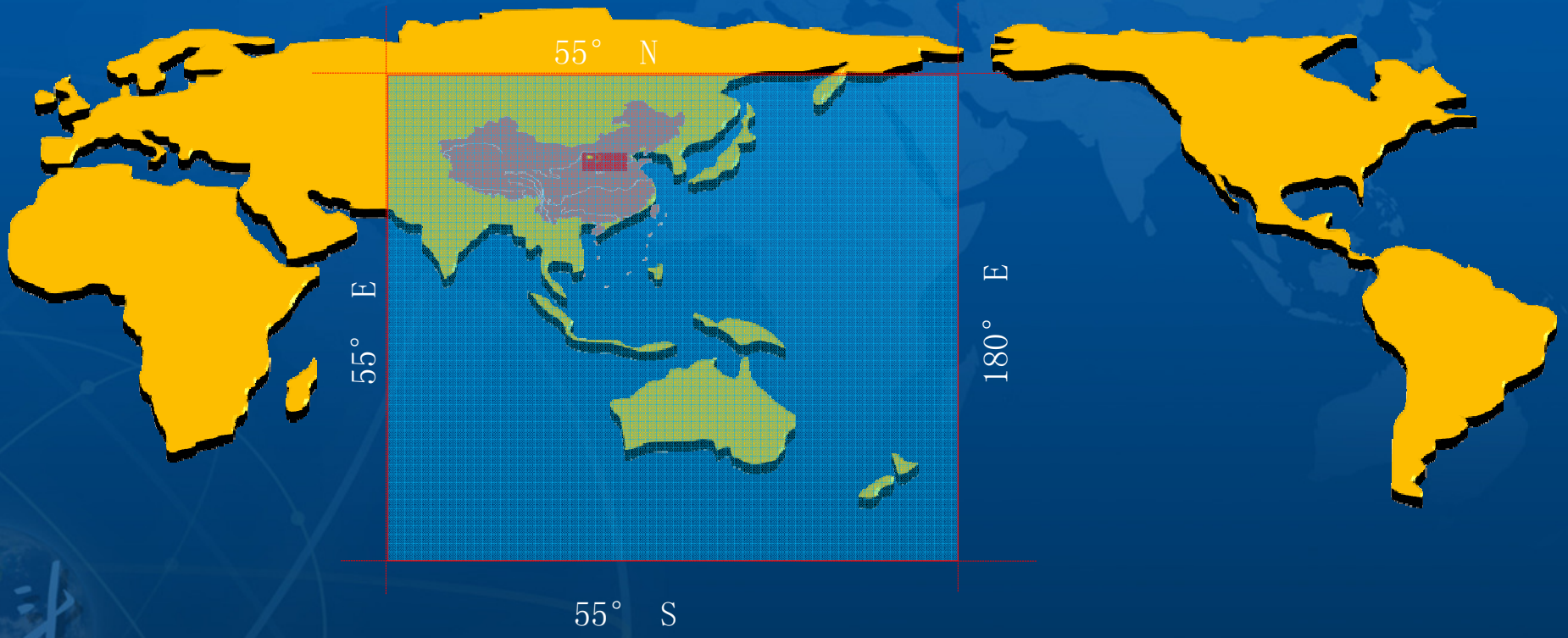
- ★ **December 27, 2012: BeiDou System formally provide Full Operational Service for China and its surrounding areas**
- ★ **ICD (version 1.0) and system logo were released**

Latest Progress

1. System Construction

Full Operational Service

The service performances of BeiDou System in China and its surrounding areas:



Latest Progress

1. System Construction

Full Operational Service

- **Positioning Accuracy: Horizontally, 10 m; vertically, 10 m**

Velocity Accuracy: better than 0.2 m/s

Timing Accuracy: one-way , 50 ns

Short message communications

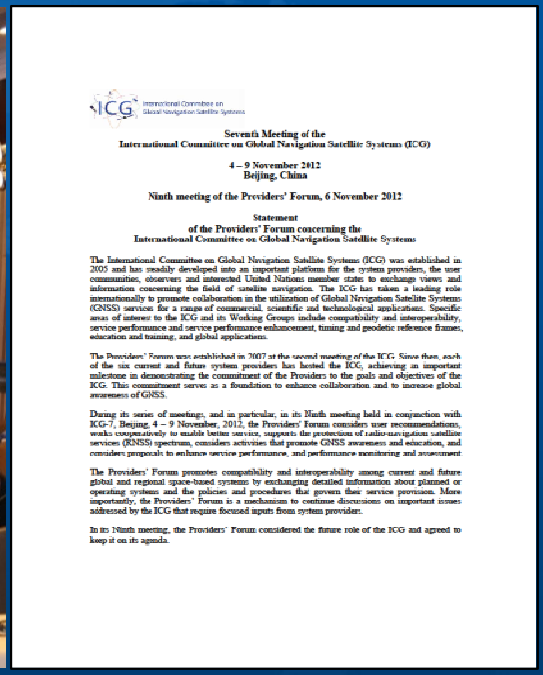
Wide area differential & Ground based augmentation

Latest Progress

2. International Activity

Multilateral and bilateral cooperation

ICG-7



ICG International Committee on Global Navigation Satellite Systems

Seventh Meeting of the International Committee on Global Navigation Satellite Systems (ICG)

4 – 9 November 2012
Beijing, China

Ninth meeting of the Providers' Forum, 6 November 2012

Statement of the Providers' Forum concerning the International Committee on Global Navigation Satellite Systems

The International Committee on Global Navigation Satellite Systems (ICG) was established in 2005 and has steadily developed into an important platform for the system providers, the user communities, observers and interested United Nations member states to exchange views and information concerning the field of satellite navigation. The ICG has taken a leading role internationally to promote collaboration in the utilization of Global Navigation Satellite Systems (GNSS) services for a range of commercial, scientific and technological applications. Specific areas of interest to the ICG and its Working Groups include compatibility and interoperability, service performance and service performance enhancement, timing and geodetic reference frames, education and training, and global applications.

The Providers' Forum was established in 2007 at the second meeting of the ICG. Since then, each of the six current and future system providers has hosted the ICG, achieving an important milestone in demonstrating the commitment of the Providers to the goals and objectives of the ICG. This commitment serves as a foundation to enhance collaboration and to increase global awareness of GNSS.

During its series of meetings, and in particular, in its Ninth meeting held in conjunction with ICG-7, Beijing, 4 – 9 November, 2012, the Providers' Forum considers user recommendations, works cooperatively to enable better service, supports the protection of radio-navigation satellite services (RNSS) spectrum, considers activities that promote GNSS awareness and education, and considers proposals to enhance service performance, and performance monitoring and assessment.

The Providers' Forum promotes compatibility and interoperability among current and future global and regional space-based systems by exchanging detailed information about planned or operating systems and the policies and procedures that govern their service provision. More importantly, the Providers' Forum is a mechanism to continue discussions on important issues addressed by the ICG that require focused inputs from system provider.

In its Ninth meeting, the Providers' Forum considered the future role of the ICG and agreed to keep it on its agenda.

Latest Progress

2. International Activity

Multilateral and bilateral cooperation

Latest Progress

2. International Activity

Popularization and initiative

- ★ **Popularize BeiDou/GNSS Application Demonstration and Experience Campaign (BADEC)**
- ★ **Carried out application demonstration and exhibition in Pakistan, Korea, etc.**
- ★ **Further promote the international GNSS monitoring and assessment initiative, published monitoring and assessment parameters document, and exploring the cooperation mode with Russia, Australia, Pakistan and other countries in monitoring and assessment domain**
- ★ **Start overseas site survey and construction preparation work, push forward development of international GNSS monitoring and assessment**

Latest Progress

2. International Activity

Exchange and training

Latest Progress

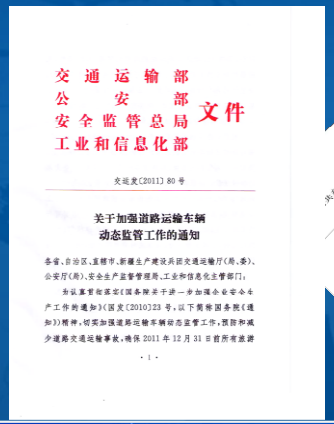
3. System Application

R&D of fundamental products

Latest Progress

3. System Application

Transportation



交 通 运 输 部
公 安 部
安 全 监 管 总 局 文件
工 业 和 信 息 化 部

交运发[2011] 80 号

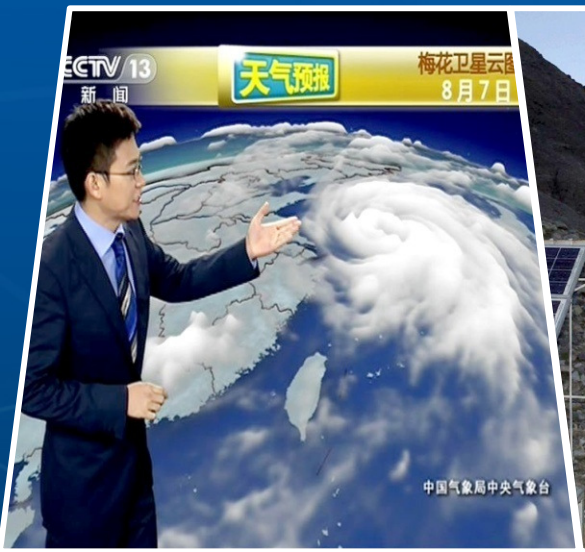
关于加强道路运输车辆
动态监管工作的通知

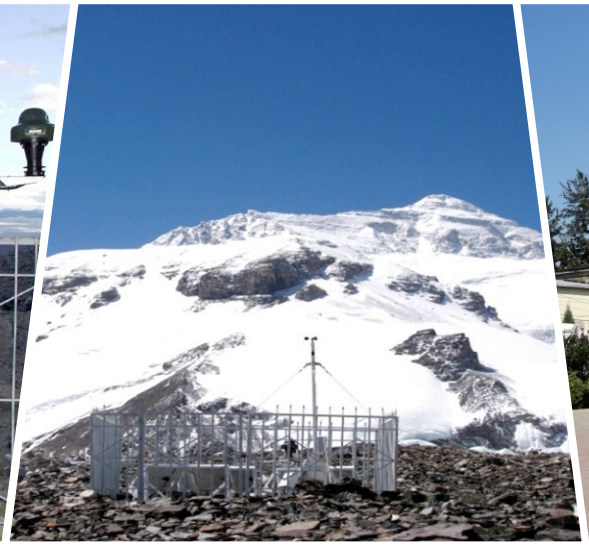
各省、自治区、直辖市、新疆生产建设兵团交通运输厅(局、委)、公安厅(局)、安全生产监督管理局、工业和信息化主管部门:

Latest Progress

3. System Application

Meteorology

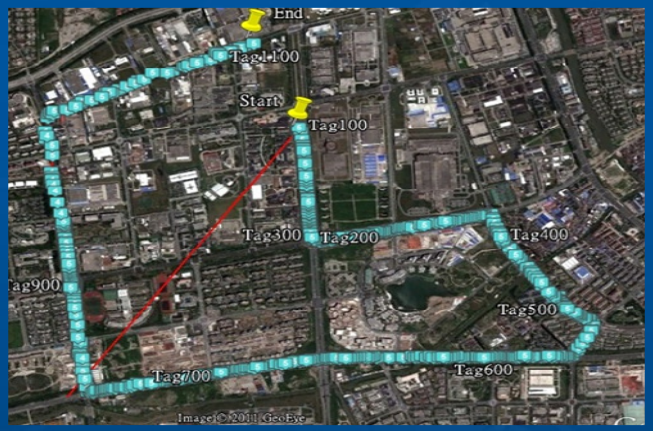




Latest Progress

3. System Application

Popular vehicle

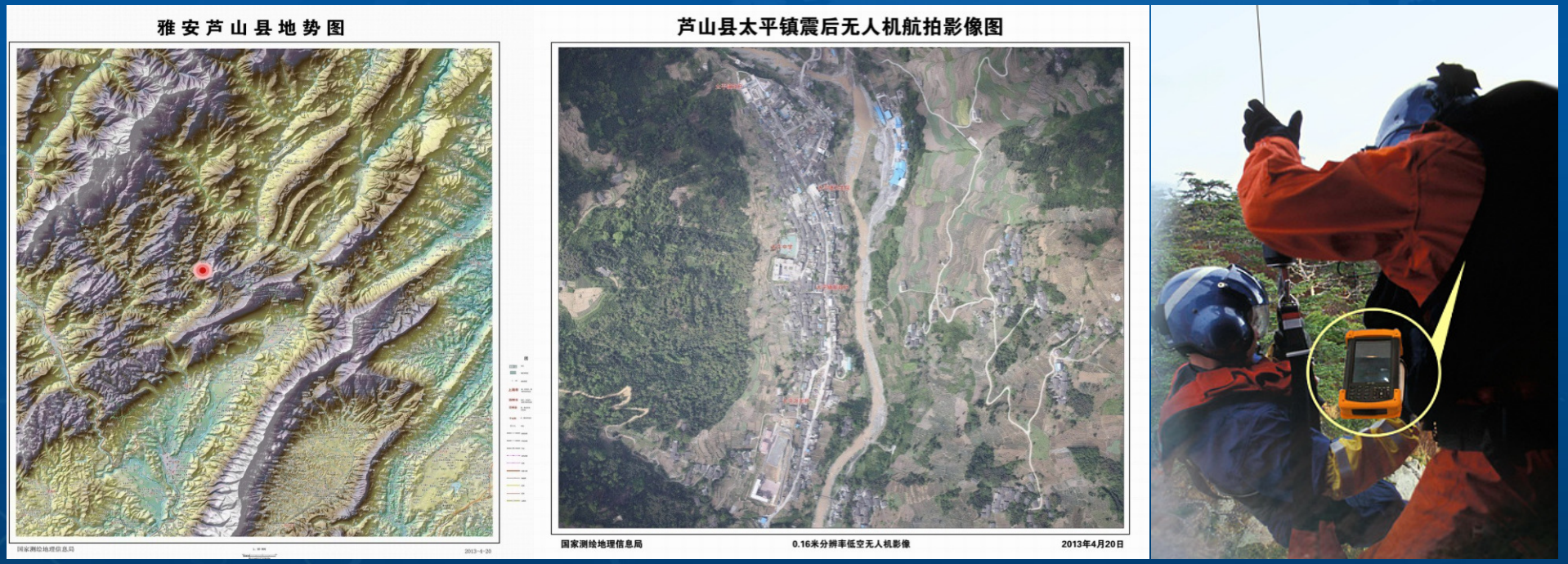


- ★ Organized large number of corporations to popularize BeiDou vehicle navigation terminals
- ★ Achieved "Ten, Hundred, Thousand" trial-production and batch-launch plan
- ★ In a transitional phase to batch production, and will enter into mass market step by step

Latest Progress

3. System Application

Emergency and disaster rescue



Lushan Earthquake on April 20, 2013

Latest Progress

3. System Application

Standardization affairs

- ★ **Prepare to establish Technical Committee on Satellite Navigation Standardization**
- ★ **Endeavoring to enter into the ICAO and IMO standard framework**
- ★ **Engaging in The Third Generation mobile communication standard Partnership Project (3GPP)**

Overview

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Recent Plans

Recent Plans

- Improve system availability and stability
- Provide continuous, stable and reliable services for users

Recent Plans

- Continue to deepen Sino-Russian, Sino-US, China-EU, Sino- Pakistan, Sino-Indonesia bilateral cooperation
- Carry on BADEC with the help of multilateral platform such as APSCO and China-ASEAN “10+1” cooperation
- Promote cooperation in international GNSS monitoring and assessment (iGMAS) domain and hope to become one of the monitoring and assessment center of ICG to share raw data and products with all members .

Recent Plans

- Continuously carry out standardization affairs such as ICAO, IMO and 3GPP, etc.
- Start to investigate and implement BeiDou international standardization tasks

Conclusions

★ BeiDou System has completed the 2nd step of development plan.

- Provide Full Operational Service
- Provide free of charge, stable and reliable PVT services

★ BeiDou, developed by China and serve for the world.

- Actively boost the joint development of GNSS
- Enable resource-sharing and mutual complementarity in the development of navigation satellite systems

Thank you!

China Satellite Navigation Office