



*The Ninth Meeting of the International Committee on
Global Navigation Satellite Systems (GNSS)*

Progress of BeiDou Navigation Satellite System Applications

**International Cooperation Center,
China Satellite Navigation Office**

**Prague, Czech Republic
November 2014**

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Policies and Measures

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Typical Applications of BDS



Policies and Measures

1. System Service

- ★ Provide regional services to users in the Asia-Pacific area from the end of 2012
- ★ Promise to provide global users with open services free of charge
- ★ Persist in system development and enhancement, and keep improving service performances





Policies and Measures

1. System Service (continued)

★ Published related BDS documents:

- ★ BDS Open Service Performance Standard (version 1.0)
- ★ BDS Signal-In-Space Interface Control Document (version 2.0)

★ Unveil two civil signals of BDS- B1I &B2I

BeiDou Navigation Satellite System
Open Service
Performance Standard
(Version 1.0)



China Satellite Navigation Office
December 2013

BeiDou Navigation Satellite System
Signal In Space
Interface Control Document
Open Service Signal (Version 2.0)



China Satellite Navigation Office
December 2013

(Both Chinese and English versions of above documents are available at www.beidou.gov.cn; <http://en.beidou.gov.cn/>)



Policies and Measures

2. Application industrialization

- ★ **BDS - a key national science and technology program, with satellite navigation as an emerging industry with strategic importance**
- ★ **Formulate satellite navigation application policies, plans, national standard and IPR policies in the field of satellite navigation**





Policies and Measures

2. Application industrialization (Continued)

★ Key government document:

- ★ PRC State Council: National Program for Medium and Long-term Satellite Navigation Industry Development, 2013-09.
- ★ BDS applications are identified as national important programs in accordance with Some Opinions of the State Council on Promoting the Information Consumption to Expand Domestic Demand (PRC State Council, 2013-08)
- ★ Some Opinions on Promoting the Development of BeiDou Satellite Navigation Industry (NDRC, MoST, MIIT, etc, to be released)

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Policies and Measures

Promotion Activities

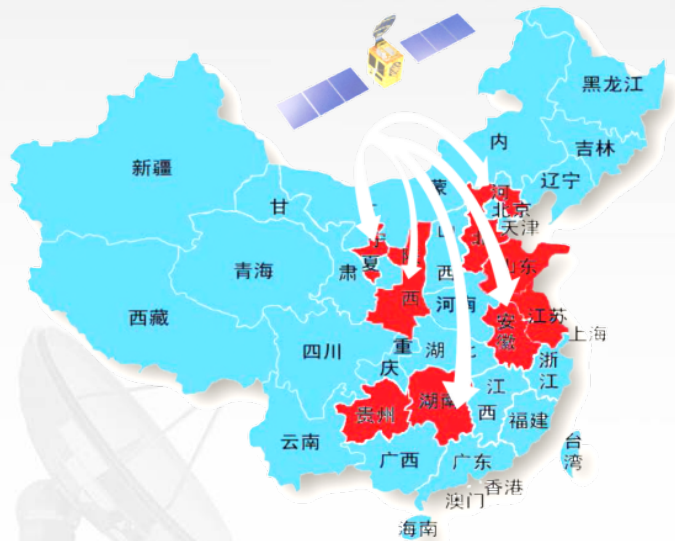
Typical Applications of BDS



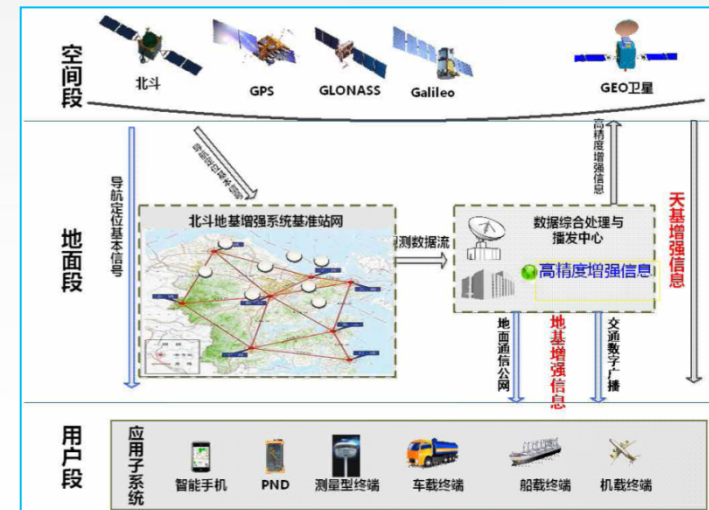
Promotion Activities

1. Application Demonstrations

- ★ Accelerate the demonstration applications of BDS in different industries and regions
- ★ Construct the BeiDou ground-based augmentation system and China Location Based Service Network



Demonstration applications in regions



BeiDou ground-based augmentation system



Promotion Activities

2. International cooperation

- ★ Openness, cooperation, and resources sharing
- ★ BeiDou is of China, and also of the world
- ★ Compatibility and interoperability among multi-GNSS
- ★ International GNSS performance Monitoring & Assessment



Technical Working Group meeting on C&I
between China and Europe



iGMAS tracking stations



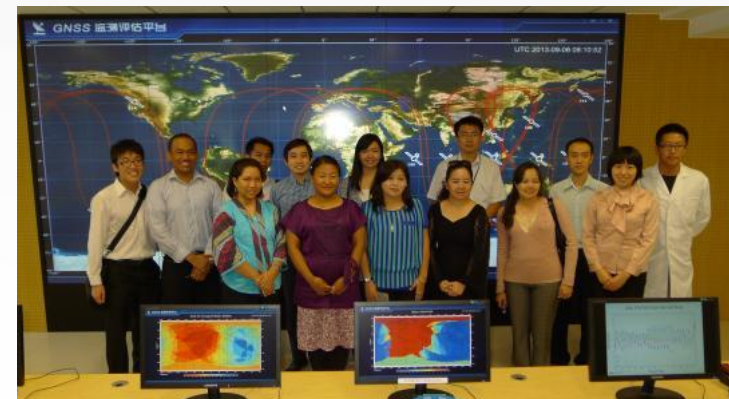
Promotion Activities

3. International Application Promotion

- ★ Carry out extensive cooperation in sectors of precision agriculture, disaster prevention and reduction, transportation and tourism, education and training, system monitoring and assessment
- ★ “BeiDou Asia-Pacific Tour” & “BeiDou ASEAN Tour”



BeiDou Satellite Navigation International Cooperation & Investment Forum



International Education & Training

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Policies and Measures

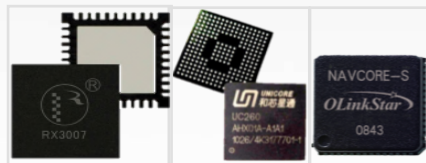
Promotional Activities

Typical Applications of BDS



1. Overview of Applications

- ★ A complete application industry chain has been formed
- ★ All-round breakthroughs have been made in some key technical areas
- ★ Related products have been used in transportation, marine fisheries, hydrological monitoring, disaster relief and reduction, mobile phone and vehicle navigation, etc





2. Industry Applications

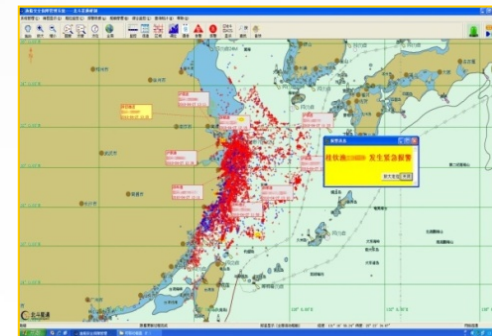
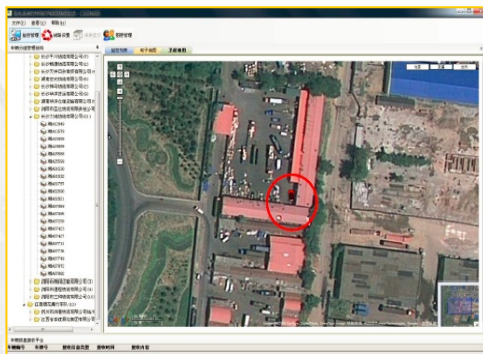
Transportation

- ★ Road transportation management



Marine Fishery

- ★ Vessel position monitoring
- ★ Emergency rescue and region alarm
- ★ Port entry and depart management





2. Industry Applications

Disaster Relief and Reduction

- ★ Rescue dispatching
- ★ Emergency communication
- ★ Rapid report



Meteorology

- ★ Meteorological sounding
- ★ Meteorological monitoring
- ★ Meteorological information gathering and release





2. Industry Applications

High Precision Application Area

BeiDou high-precision applications play an important role in surveying and mapping, machine control, bridge monitoring, precision agriculture, port scheduling. Satellite high-precision technologies not only enhance work efficiency and accuracy of operations, but also save system cost significantly.

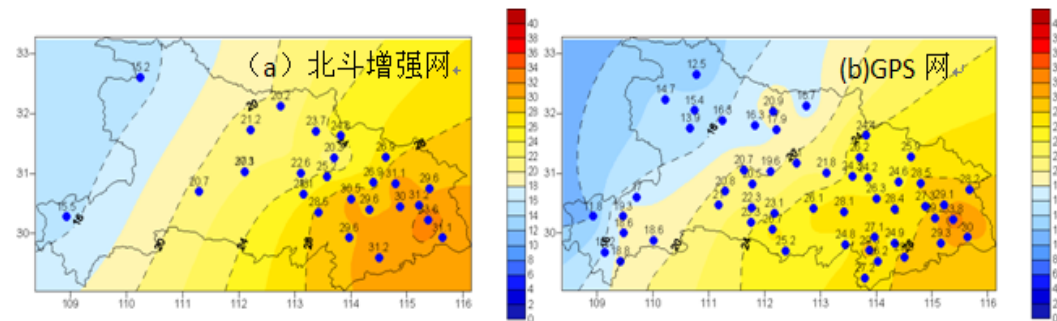
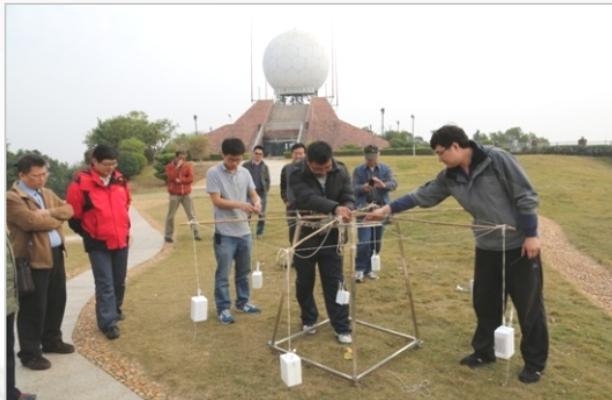


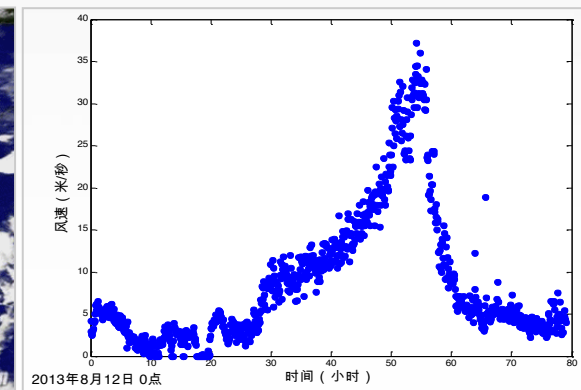
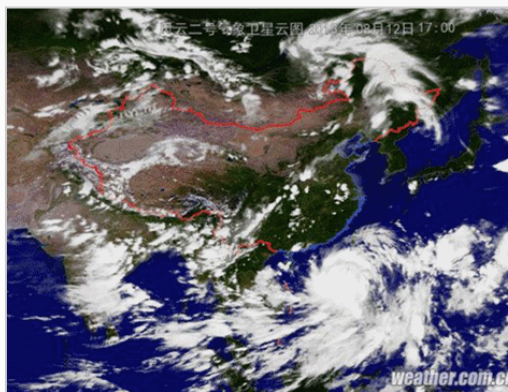
图 1 2013 年 2 月 26 日 11 UTC 湖北省大气可降水总量分布 (单位: mm)



2. Industry Applications

Comprehensive Disaster Mitigation Area

By using BeiDou/GNSS, Geographic Information technology, and Remote Sensing technology, it can help disaster relief personnel get to know landmarks, precisely positioning streets and buildings, management emergency service resources, thus shortening the rescue time, to protect personal safety and reduce property loss.

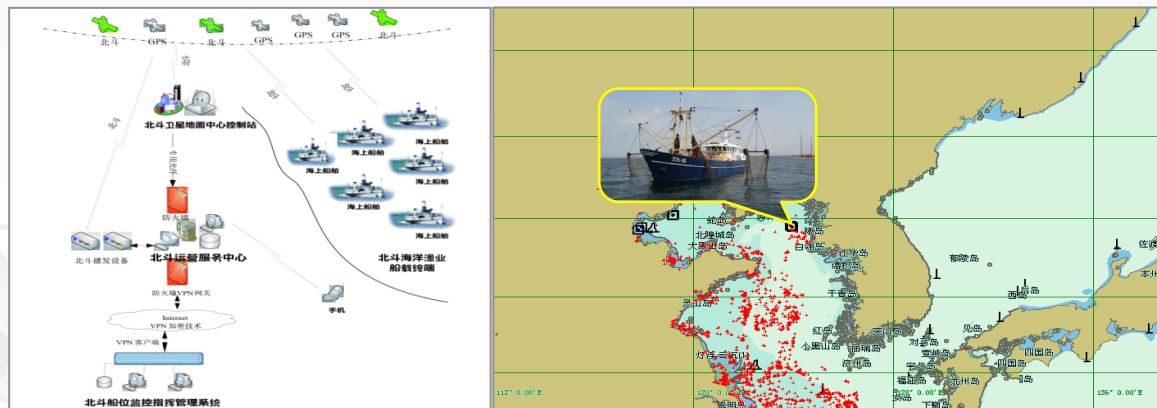




2. Industry Applications

Marine Application Area

With the combination of BeiDou/GNSS, Automatic Identification System (AIS) and communication systems, it will have the capability of distress alarm, search and rescue coordinating communications, on-site search position, maritime safety information broadcast and other functions, quickly and accurately providing maritime navigation, measurement speed, location, and other related services for maritime users.





2. Industry Applications

Traffic & Tourism Area

With current combination of BeiDou/GNSS and GIS, it will have better accuracy, efficiency and safety for users on the road, in the street or using public transport systems. It also reduce or even eliminate problems related to path planning and vehicle scheduling, to ease the traffic load and environment pollution, ensure traffic safety, improve transport efficiency, and promote social and economic development, improve the quality of people's lives.





3. Core BDS Components and Mass Market Applications

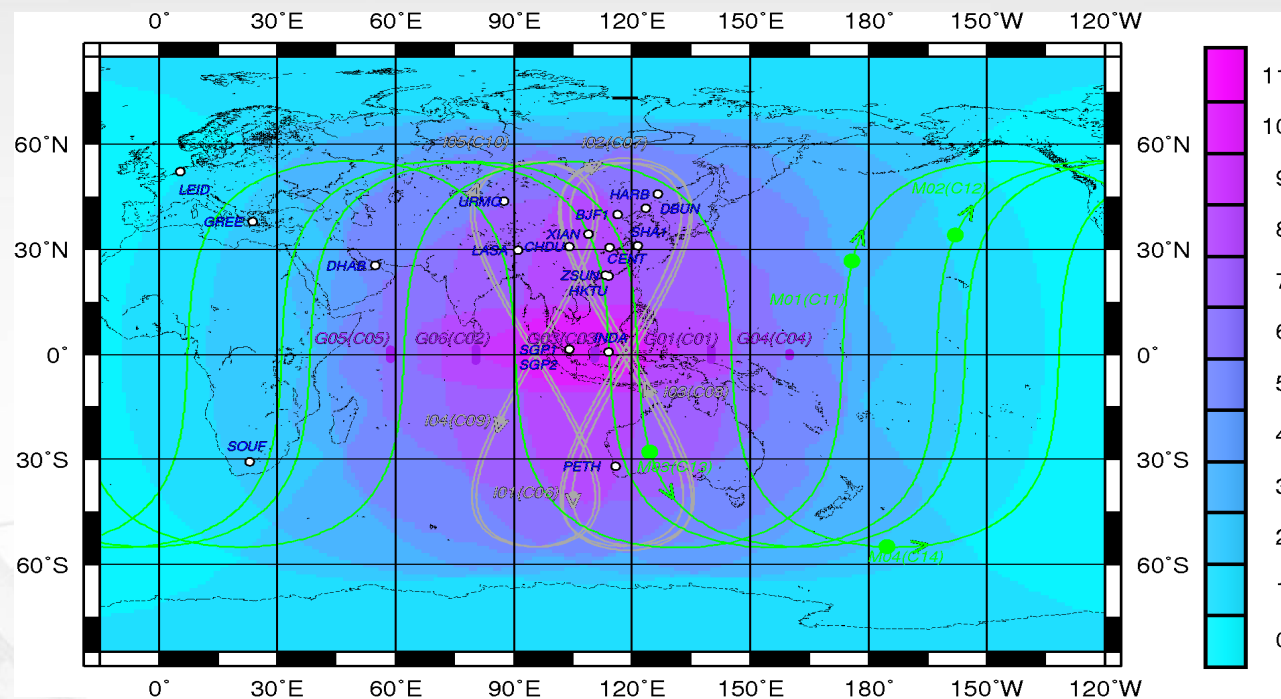
- ★ Numerous BDS core component products have launched, such as baseband chips, RF chips, antennas, high precision OEM boards, etc
- ★ BeiDou chips embedded mobile phones and vehicular terminals have been in practically used





4. Application Characteristics

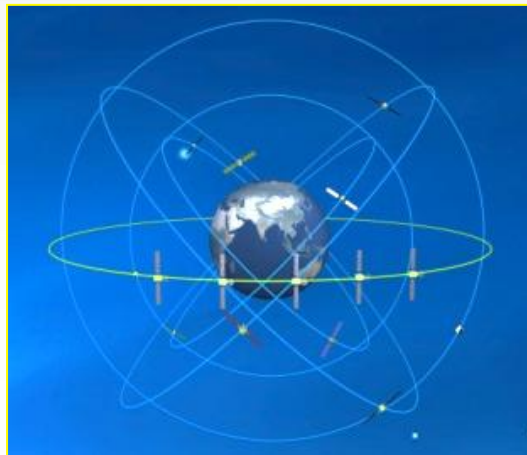
- ★ More navigation satellites resources in the Asia-Pacific region
- ★ Numerous choices of multi-GNSS compatible application
- ★ More accurate and stable GNSS services with BDS-enabled devices





4. Characteristics of Applications

- ★ A hybrid, asymmetric constellation consisting of GEO, IGSO and MEO satellites
- ★ Superior service performance, especially in regions with low geographic latitude, and city canyon, multi-level traffic interchange, tree-sheltered environment



Space constellation



Hydropower station
slope monitoring





4. Characteristics of Applications

- ★ Dual-frequency applications and establishment of augmentation systems
- ★ Offer more precise services with meter-level and decimeter-level accuracy to users



Forrest Pest Control



Precision Agriculture



BDS CORS Application in Laos (Courtesy of ComNav)



BDS CORS Application in Pakistan (Courtesy of BDNST)

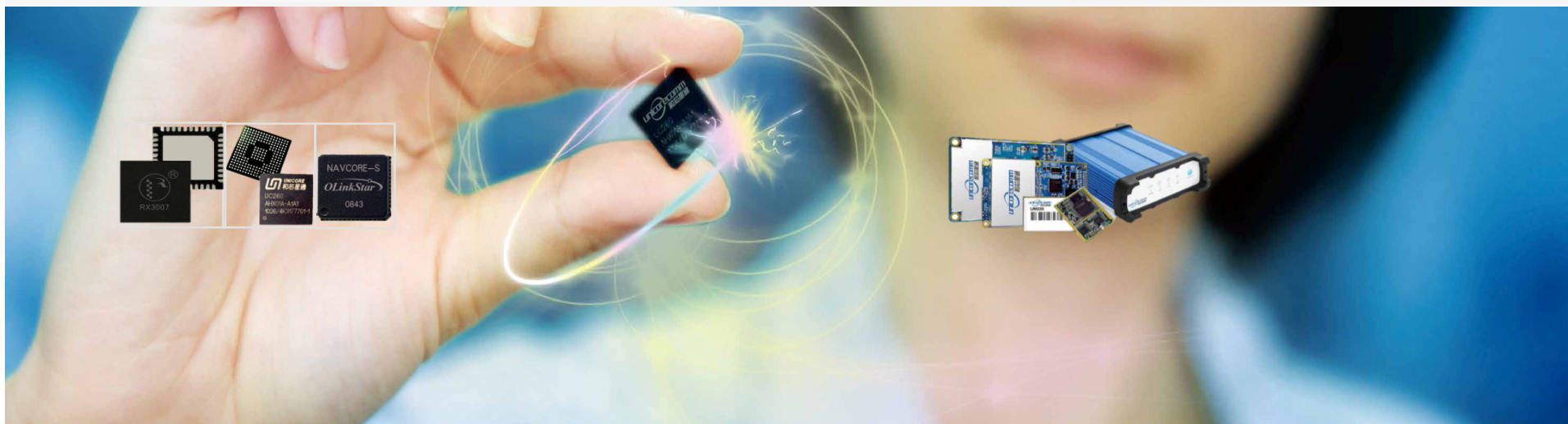


BDS CORS Application in Thailand (Courtesy of Optics Valley BeiDou)



5. Future Applications

- ★ Continuously increase investment and improve system performance to satisfy the market demands
- ★ Integrate with Internet, Internet of things, cloud computing and big data





Conclusions

- ★ **BDS has completed the 2nd step of development plan**
 - Provide Full Operational Service
- ★ **Applications of BDS/GNSS is gradually entering into public**
 - Based on breakthroughs in core technology
 - Guided by demonstration and stimulated by innovation
- ★ **BDS belongs to both China and the world**
 - Actively boost the joint development of GNSS
 - Enable resource-sharing and mutual complementarity in the development of navigation satellite systems



Thanks

China Satellite Navigation Office

<http://en.beidou.gov.cn>