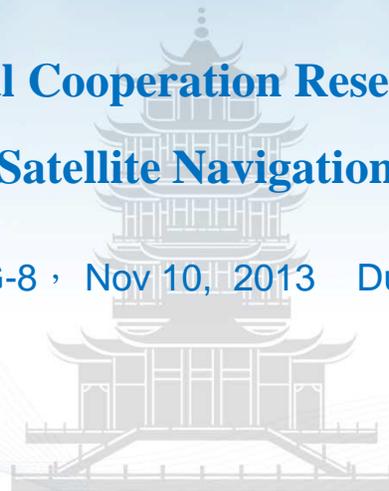




BADEC Progress & BeiDou/GNSS Applications

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

ICG-8 · Nov 10, 2013 Dubai



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Overview

BeiDou Navigation Satellite System (hereinafter referred to as "BDS") has provide regional service by the end of 2012, which will be another important contribution of China to the international GNSS application, as:

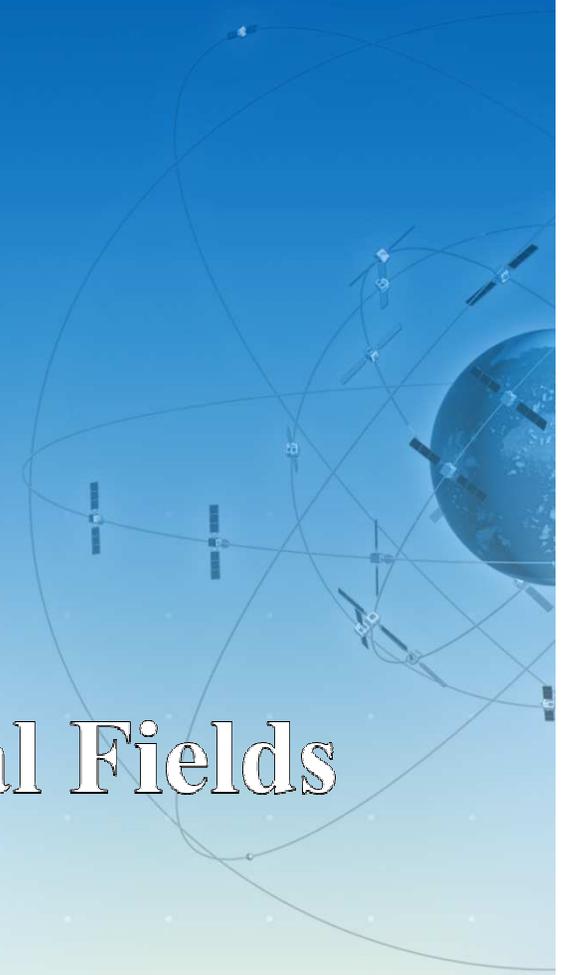
- Better performance will be achieved through multi-GNSS compatibility and interoperability than single system service.
- Integrated design of navigation satellite system and Wide Area Differential System will enable users acquire differential services conveniently.
- Positioning report will play an important role in the fields of disaster monitoring, tourism application, etc.

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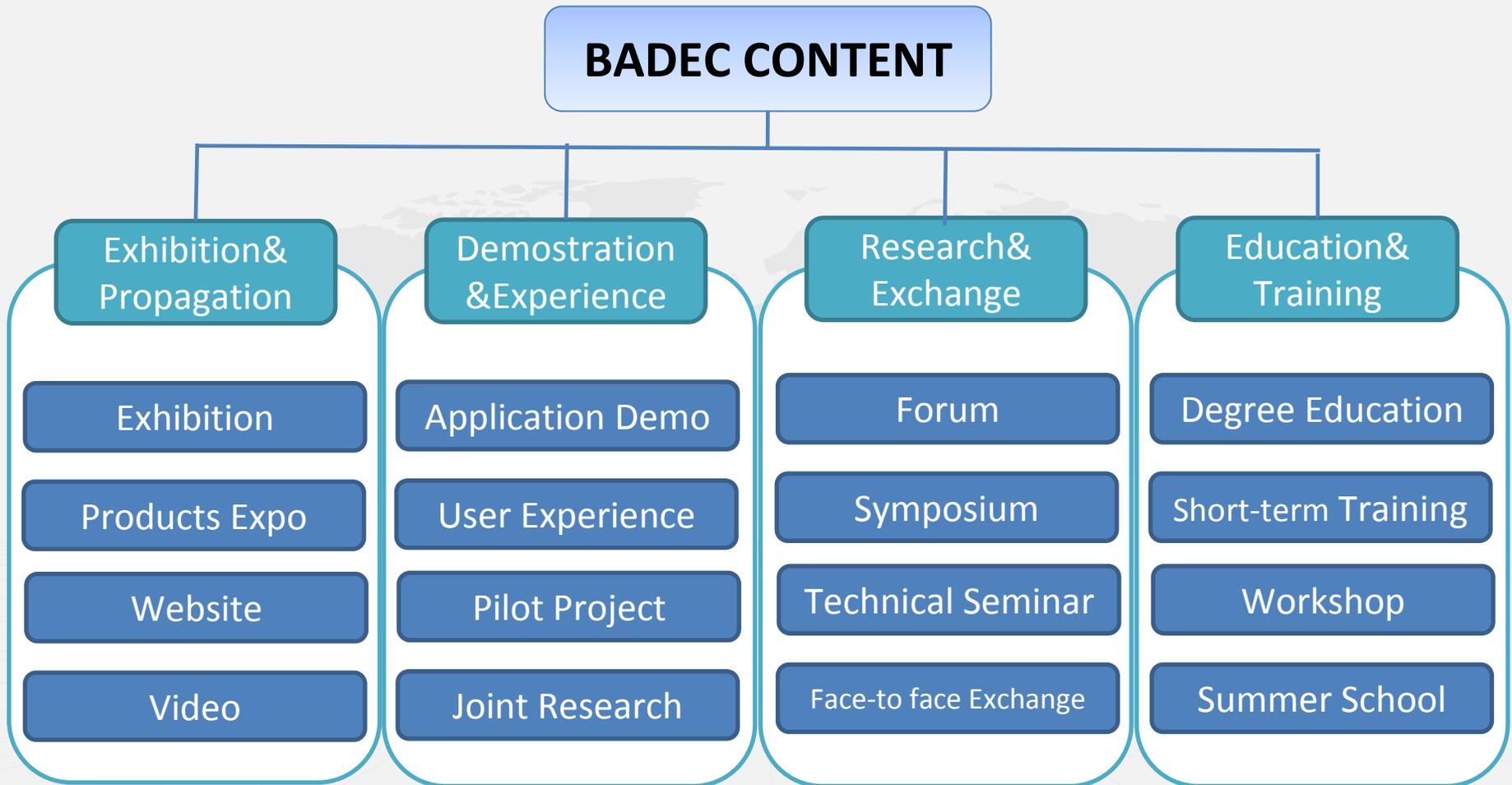
Background

- ★ Encourage global users to know more about BDS/GNSS
- ★ Promote the application of navigation satellite systems
- ★ Combine governments, industries and relevant institutions together
 - Survey global users' requirements
 - Explore new applications
 - Provide better GNSS services
 - Realize common development of all GNSS
- ★ China proposed BeiDou+ Application Demonstration & Experience Campaign (BADEC) under the ICG framework in December, 2011.

(BeiDou+ stands for multi-GNSS including BDS)

Background

BADEC CONTENT



I .BeiDou/GNSS Application Promotion Activities Targeting ASEAN

- **Time:** From September 3rd to 6th, 2013
- **Platform:** During 10th China-ASEAN Expo (Nanning, China);
- **Organizer:** Organized by CSNO and China-ASEAN Expo Secretariat
- **Theme:** BeiDou Makes China and ASEAN Closer.



I .BeiDou/GNSS Application Promotion Activities Targeting ASEAN

- Exhibition
- Products display and on-site shows
- Report
- Seminar
- Face-to-face communication and exchange between representatives of ASEAN industry parks, users and product manufactures



II .Cooperation with International Organizations

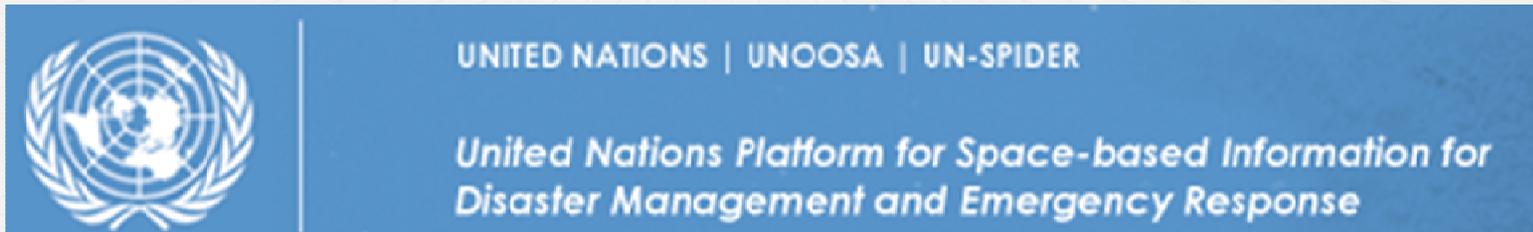
CSNO carried out communication with APSCO, ESCAP, UN-SPIDER and other international organizations, so as to organize BADEC event jointly and gain active response and supports.



Asia-Pacific Space
Cooperation Organization



The United Nations Economic
and Social Commission for Asia
and the Pacific



II .Cooperation with International Organizations

- ★ BeiDou/GNSS Promotion Activities on Disaster Risk Identification, Assessment and Monitoring
- **Time:** October 23rd to 25th, 2013
- **Platform:** During the United Nations International Conference on Space-based Technologies for Disaster Management
- **Organizer:** Organized by CSNO, supported by UNOOSA/UN-SPIDER-Beijing Office and National Disaster Reduction Center, China
- **Theme:** Promoting the BeiDou/GNSS application on disaster reduction
- **Exhibition, report, questionnaire.....**

Questionnaire

We would be very grateful if you could spare a few minutes to fill in this questionnaire.
Please mark all or circle those you consider most applicable.
Please note that all your information will be kept confidential and only used for internal reference.

1. Are there presentations on BeiDou/GNSS applications in the field of disaster management information?
A. Quite Informative () B. Less Informative () C. Not noticed ()

2. Is there any GNSS based service platform aimed at disaster management in your country/region?
A. Yes () B. No () C. Not sure ()
If yes, please specify:
Name of platform (under question or planning): _____
Title of _____ in charge organization: _____

3. Which function will your country/region be interested in by applying GNSS based service platform? (Multiple choice)
A. Disaster risk identification () B. Disaster risk assessment () C. Disaster risk management ()

4. Disaster emergency equipment () B. Rescue & command () F. Disaster evaluation & relief ()
G. Others (Please specify): _____

5. In which fields will your country/region probably expect to use the GNSS based service platform? (Multiple choice)
A. Emergency () B. Earthquake () C. Wild fire () D. Flood ()
E. Tsunami () F. Epidemic () G. Storm () H. Others (Please Specify): _____

6. What kinds of capabilities building and enhancement activities will your country/region prefer in the supporting integrated applications of GNSS and other space based technologies? (Multiple choice)
A. Training () B. Experts Exchange () C. Technical discussion through site visiting ()
D. Set up a working group () E. Initiate cooperation projects () F. Hold Workshop seminar ()
G. Others (Please Specify): _____

7. Will your country/region be interested in participating related international conference or carrying out international cooperation in the field of applying BeiDou/GNSS to disaster management?
A. Yes () B. No () C. Not sure ()

8. Are you/your country/your organization willing to be invited to give speeches on integrated applications of GNSS technologies for disaster management in future conferences, or to share plans, thoughts, case analysis, study results, activities progress or practical achievements?
A. Yes () B. No () C. Not sure ()
If yes, please specify:
Country/Organization: _____
Contact: _____
E-mail: _____

9. Please kindly rate down your comments or suggestions, which will be highly appreciated.



II .Cooperation with International Organizations

★ International Training

- Environment and Disaster Monitoring through Space Technology Training hosted by APSCO
- ASEAN Geological Survey Training
- Technology and Application of Communications Satellite Training hosted by ESCAP



III. Education and Training

- ★ ASEAN Plus Three (APT) Training Program on Understanding China – BeiDou/GNSS Subject
- **Time:** September 6th, 2013
- **Platform:** During APT training program on Understanding China
- **Organizer:** Co-organized by CSNO and the Department of International Cooperation and Exchanges, Ministry of Education
- **Theme:** Helping the foreign affairs' staff, governmental officers and scholars in ASEAN to know more about GNSS

Participants' Countries	
Cambodia	Indonesia
Laos	Malaysia
Myanmar	Philippines
Singapore	Thailand
Vietnam



III. Education and Training

- Lectures on BDS/GNSS
- Visiting the Air and Space Museum of Beihang University
- Visiting the Test & Assessment Research Center, CSNO
- Exhibition on BDS/GNSS



III. Education and Training

- ★ Relying on BeiDou/GNSS International Communication and Training Center, CSNO
- Summer School on International GNSS Frontier Technologies
 - The 2nd session was held on August 25 to 31, 2013
 - More than 60 trainees
- Master Program on Space Technology Applications(MASTA)
 - In September 2013, the 2nd session of MASTA (GNSS) program recruited 13 international under-graduate students to complete master degree.

IV. Other Annual Planned Activities

★ BADEC activities in Thailand

- In December
- Based on Memorandum of the China-Thailand Cooperation Meeting on Satellite Navigation in Oct. 2013

★ BeiDou/GNSS marine application promotion activities targeting Indonesia

- In December
- During the China-Indonesia Marine Scientific Research and Environmental Protection Seminar

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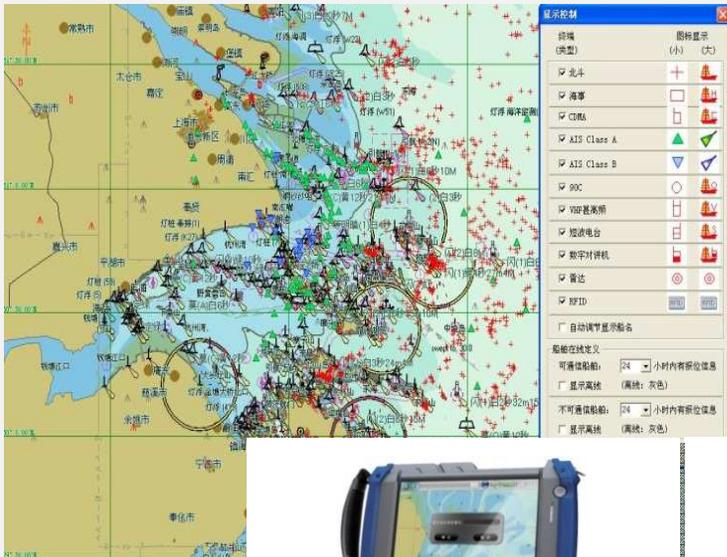
Overview

BADEC Progress

Application in Typical Fields



I .Vessel Monitoring



- ★ BDS/GNSS Vessel Monitoring System has been widely used in china.
- More than 40,000 customers
- Over 100 operation service branches



Handheld Monitor Terminal



BDS/GNSS Ship-borne Terminal

Land & Inland river



Inland-river and Ship-borne Terminal



BDS/GNSS Terminal

Offshore



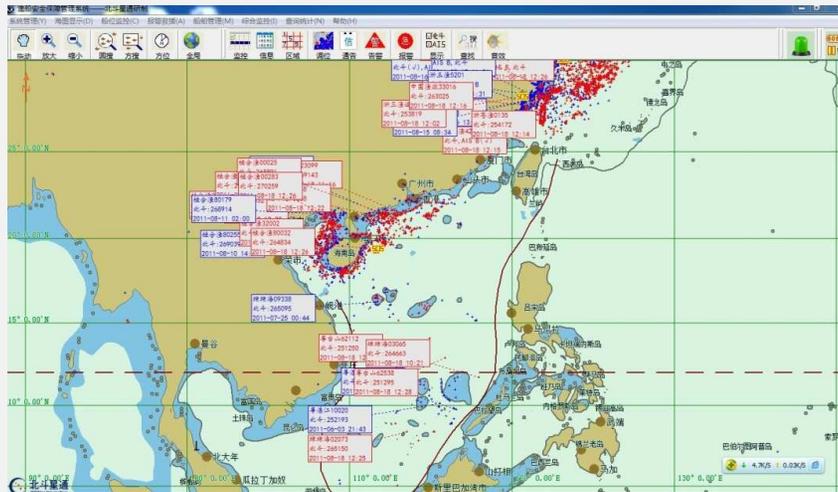
BDS/GNSS Ship-borne Terminal



BDS/GNSS Mobile Ship-borne Director

Offshore and far-sea

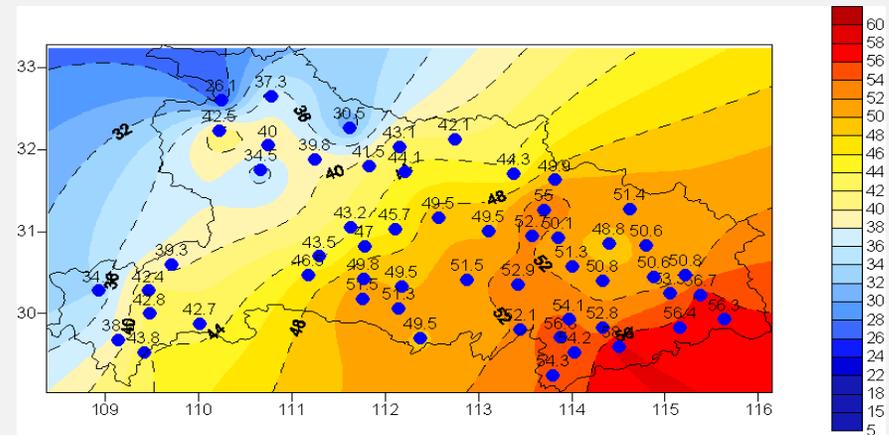
I .Vessel Monitoring



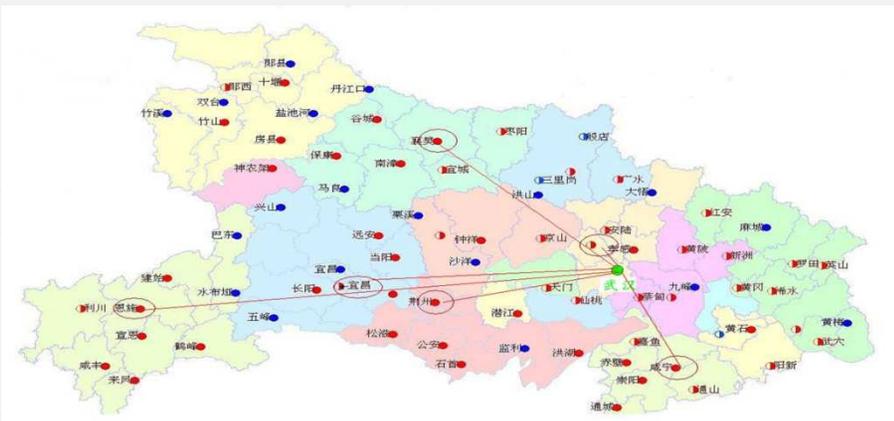
- The communication function strengthens the emergency communication abilities.
- The operation center received more than 200 emergency alarms per year.
- Remote communication for fisherman and their families could be realized through the operation center by combining BDS/GNSS with mobile phone.

II. Meteorological Application

- ★ Vapor ionosphere monitoring
 - Demonstration project in Hubei and Guangdong province
 - Demonstration sites built together with GPS
 - Data transmits to data-center in real-time



GNSS inversion water vapor distribution



6 stations in Hubei (Enshi, Yichang, Xiangyang, Jinzhou, Xianning and Xiaogan)



BDS+GPS+GLONASS

- More satellites
- More different frequency
- More observation data
- Higher accuracy

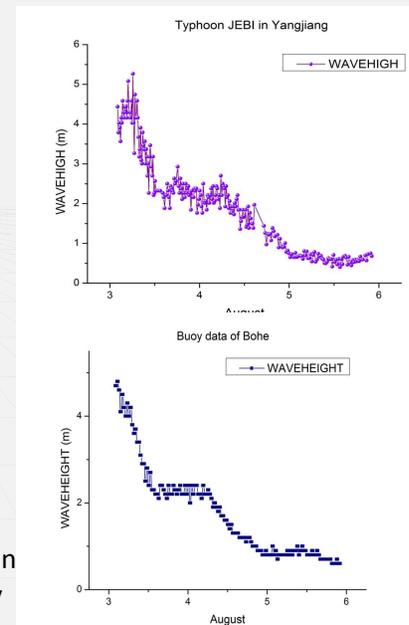
II. Meteorological Application

★ Typhoon observation

- BDS has hybrid constellation of 3 kinds of satellites(GEO, MEO, IGSO), which has complimentary geometry for the typhoon observation
- BDS GEO satellites could be used to detect the typhoon on the fixed observation field through land-based configuration
- BDS reflections has been verified for typhoon observation in the experiment in China, 2013



Antennas installation in Shenzhen observatory station



Wave height variation (typhoon JEBI) - BDS reflections

Wave height variation (typhoon JEBI) - Buoy data

III. Vehicle Monitoring

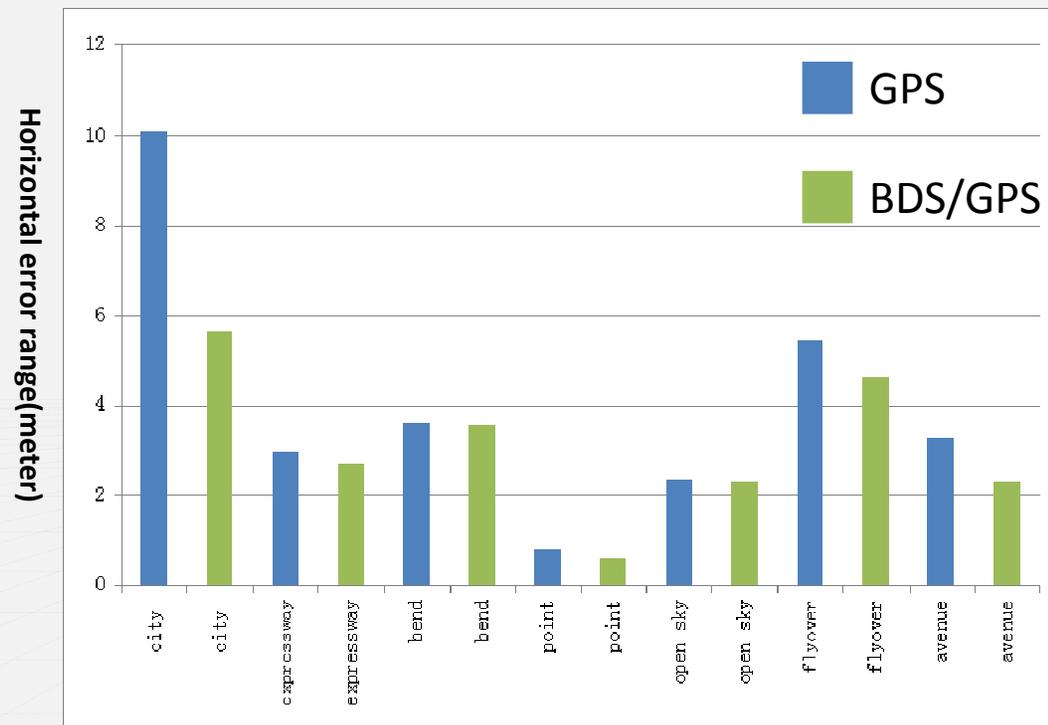
- BDS/GPS Transportation Monitoring Demonstration Project was initiated in October, 2011.
- Till October 2013, the project have installed 79 thousand BDS/GPS compatible terminals in vehicles in 9 demonstration provinces.
- Transportation service and management system is under construction and improvement.



Province	Total	Buse and dangerous goods vehicle	Truck
Guizhou	9486	9310	176
Hunan	10140	9326	814
Shanxi	100	0	100
Jiangsu	20788	9197	11591
Anhui	200	180	20
Shandong	14000	234	13766
Hebei	8890	730	8160
Tianjin	4287	180	4107
Ningxia	11329	0	11329
Total	79220	29157	50063

III. Vehicle Monitoring

- Horizontal accuracy assessment experiment between BDS/GPS and GPS



IV. High-precision Application

- ★ BeiDou Ground-based Augmentation System Demonstration Project in Hubei province
 - Consisting of 30 ground base stations
 - GNSS Receiver: UR370 (BDS/ GPS/ GLONASS);
 - Positioning accuracy: Horizontal < 2cm; Vertical < 5cm (RMS)



- Shorter time of initialization
- Higher accuracy and reliability

IV. High-precision Application

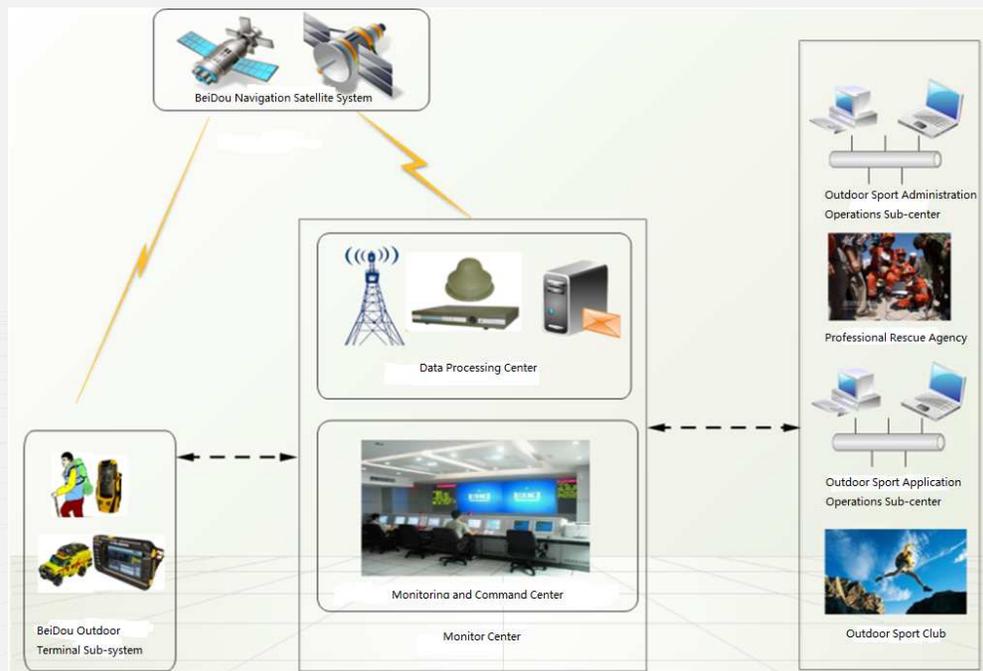
★ Driving Test System

- Based on high-precision positioning and heading technology of GNSS
- High-precision position information can be gained by Testing Cars in driving schools (position accuracy of 2cm, heading accuracy of 0.2° , and a velocity accuracy of 0.03m/s)
- BDS/GPS compatible terminal
 - Better accuracy
 - Higher availability



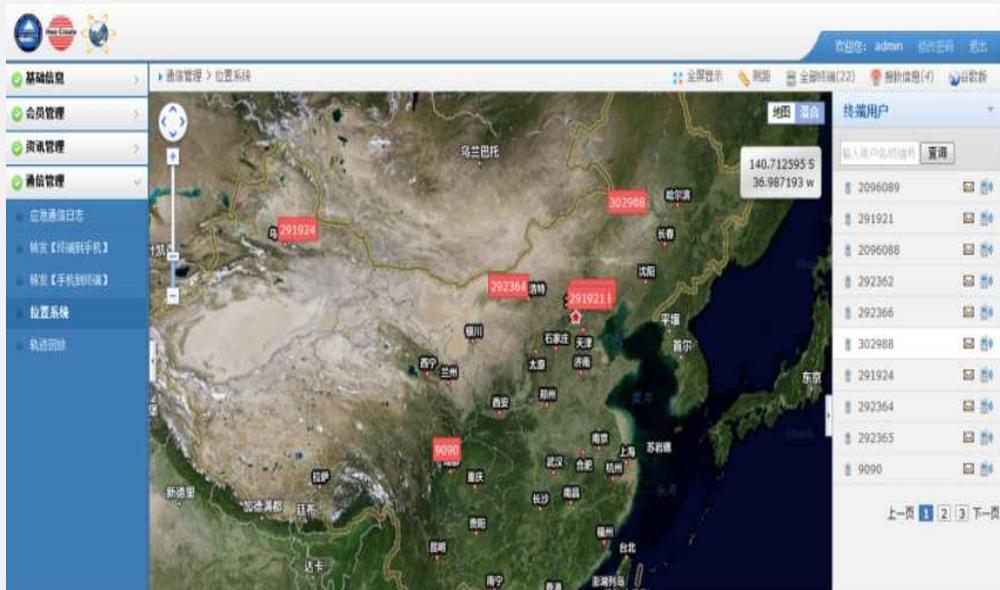
V. Tourism Application

- ★ Outdoor operating platform based on BDS/GPS
- Integrated information service platform comprised of communication, internet, mobile radio communication network
- Provide seamlessly connection between outdoors personnel, vehicles, medical aid agency, outdoor workers, family members and organizations



Handheld Terminal

V. Tourism Application



Supporting:

- BDS/GPS integrated navigation & positioning
- Communication
- Group Short Message sending and forwarding
- Display and tracking outdoor location
- SOS alarm
- User Management
- Tracks sharing
- Position sharing
-

Seamless communication connection could be realized and the needs of outdoor applications could be satisfied with the short message function supported by GNSS/Mobile Communications/Satellite Communications.

Summary

- Since the BADEC initiative was proposed in 2011 in ICG, China has been dedicating to promote BeiDou/GNSS application, and also made some progress. The participation of any GNSS provider and user in this campaign is welcome.
- With the joining of BDS, multi-GNSS could provide more accurate service, and better experience to users.
- BeiDou would like to make more efforts together with other GNSS providers and industry representatives, to provide more stable, reliable, and quality service to users worldwide, and jointly promote the development of GNSS.



Thank you!

www.beidou.gov.cn
beidouint@beidou.gov.cn