



BeiDou/GNSS Application Demonstration and Experience Campaign(BADEC) and iGMAS



by Xurong Dong
International Cooperation Research Centre, CSNO

12-16 December 2011, Vienna

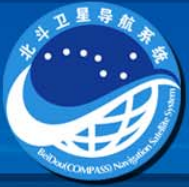




Presentation Contents

1. Background
2. BADEC as an Multi-GNSS Application
Demonstration & Experience Campaign
3. iGMAS: an international GNSS Monitoring &
Assessment Service
4. Conclusions

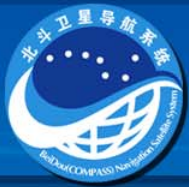




1. Background

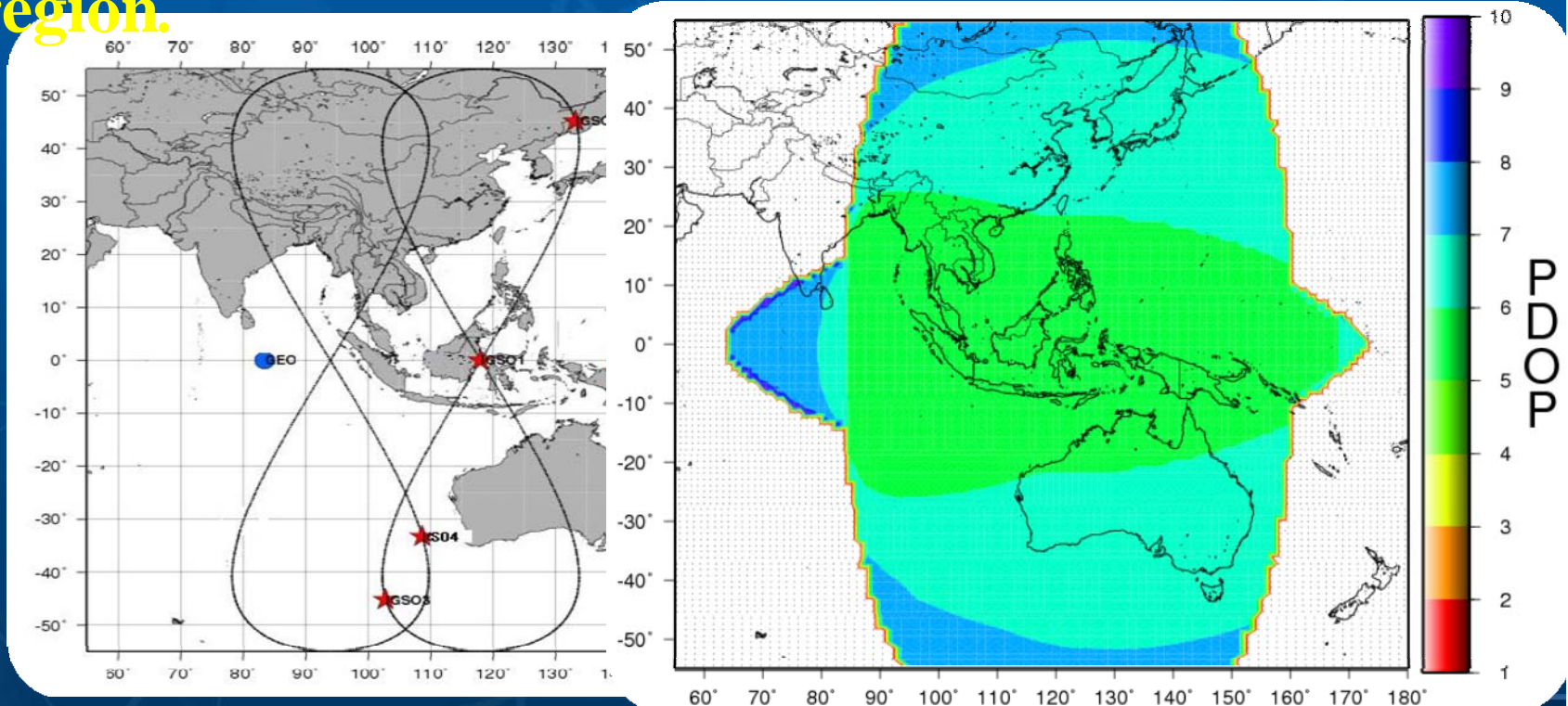
- **BeiDou System Initial Operation coming soon**
- **Preparing for “next generation GNSS”**
 - iGMAS
 - BADEC

北斗



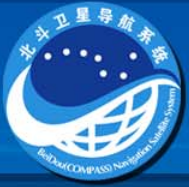
1.1 BeiDou Testing Operation Coming

- Current constellation : 7 operational satellites
 - 3GEO+4 IGSO
- Testing operational services in the Asia-Pacific region.



Space Constellation

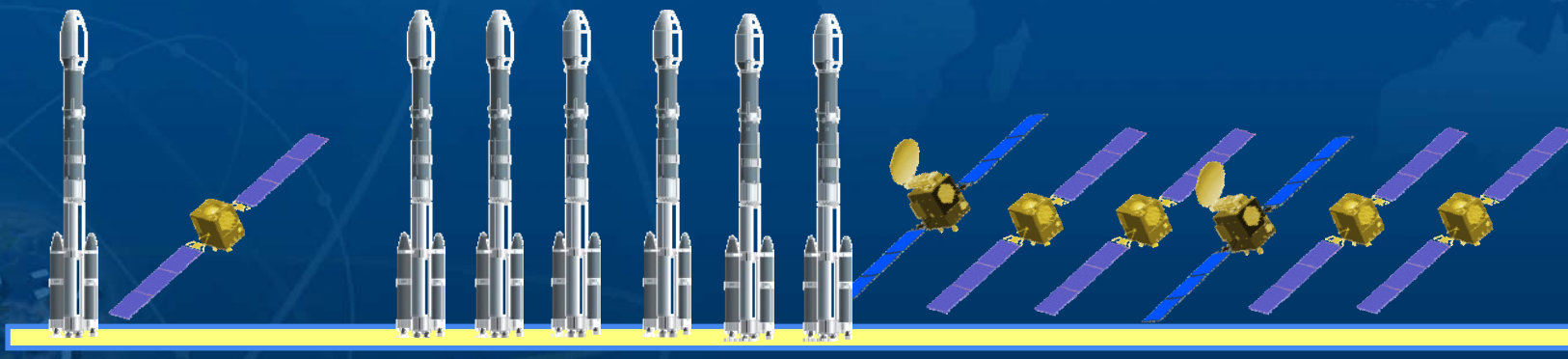
PDOP



1.2 Upcoming Improvements

- More BeiDou Satellites available soon :

- ◆ 1 more BeiDou navigation Satellites has been successfully launched early this month;
- ◆ Six more BeiDou navigation Satellites will be launched in 2012.



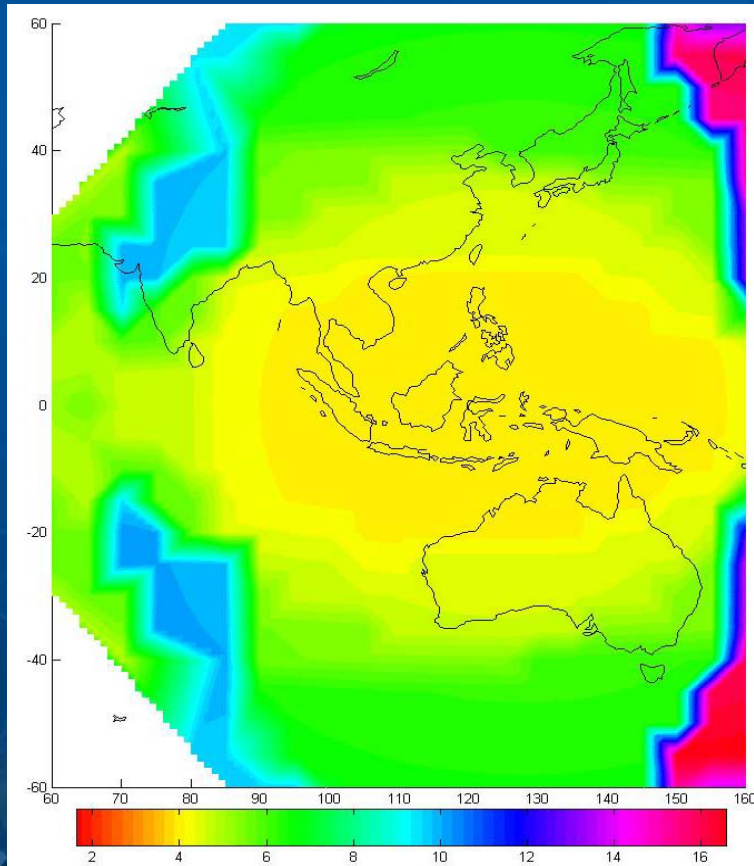
early this month

In 2012

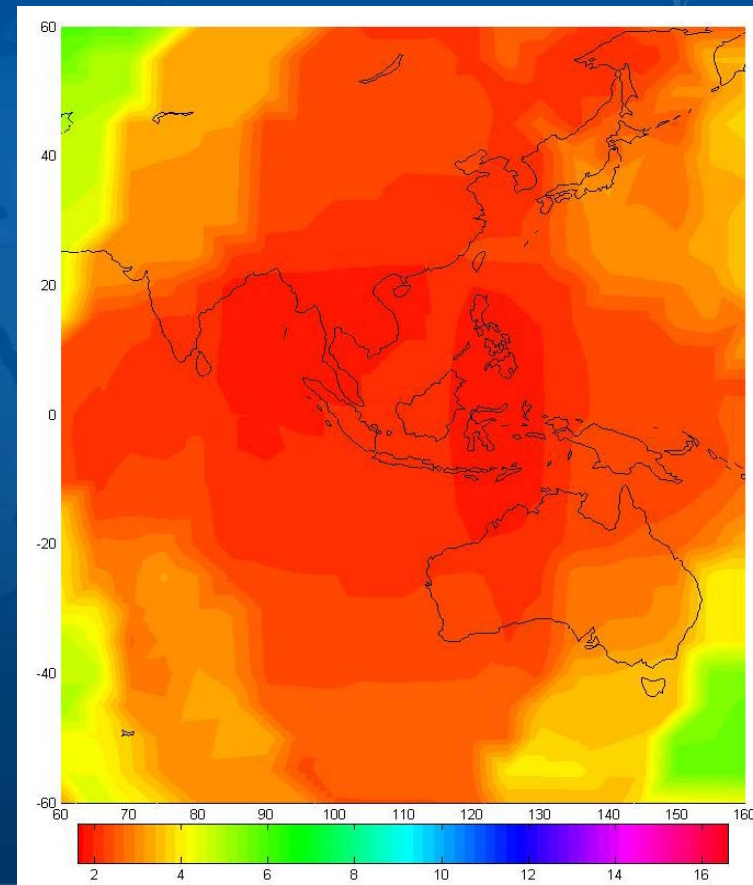
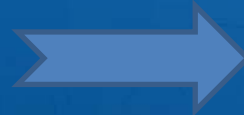


1.2 Upcoming Improvements

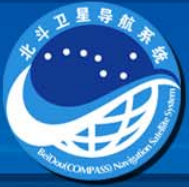
- The code-positioning accuracy with 14 satellites would be 5-10m with PDOP(4~8 \rightarrow 2~4) decreased



Current : 3+4



2012 : 5+5+4

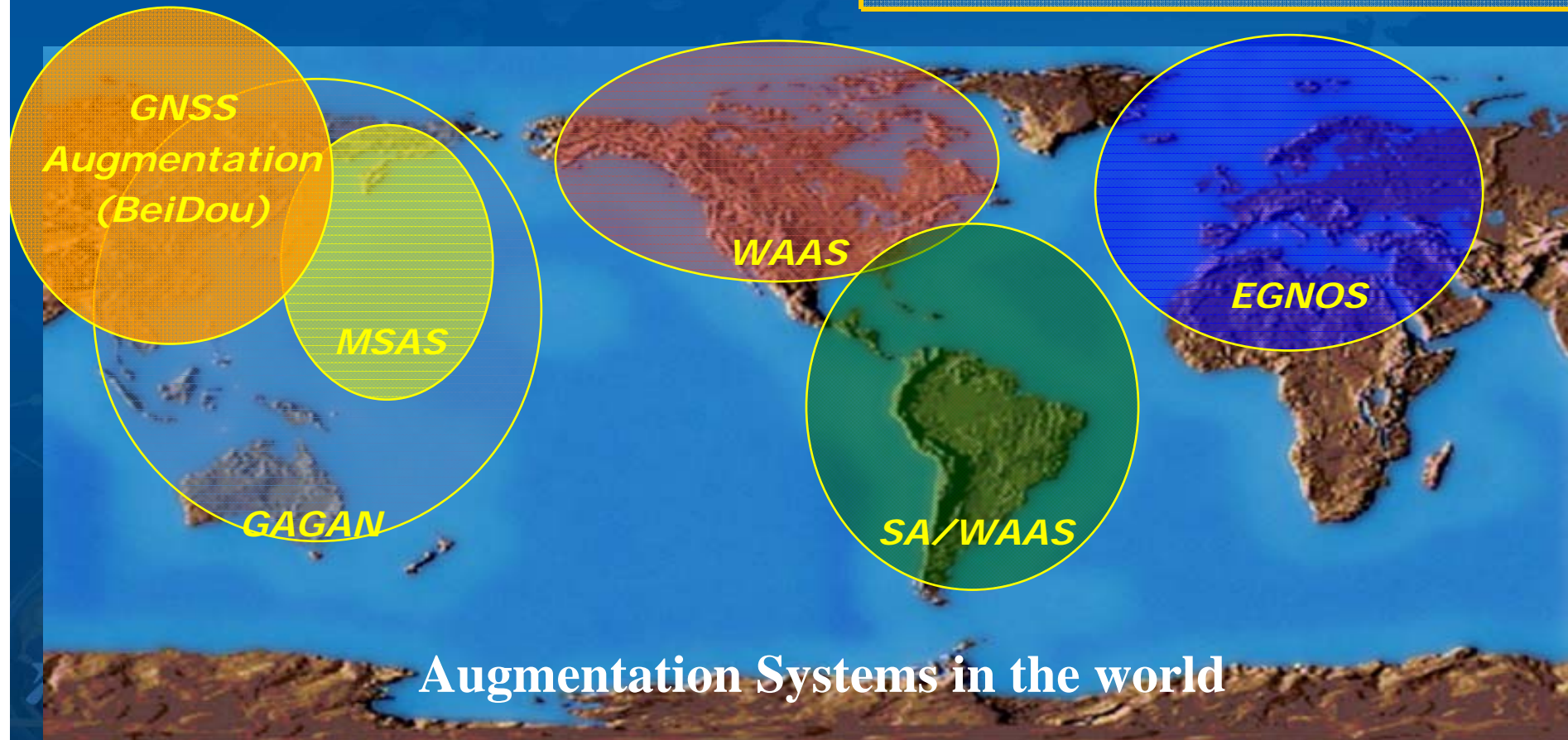


1.2 Upcoming Improvements

- Two kinds of specific regional services

Wide Area Differential Service

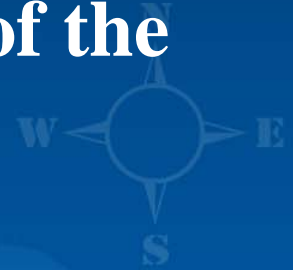
SMS





1.3 Preparing for “Next Generation GNSS”

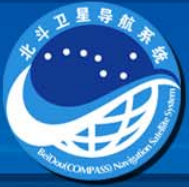
- Asia-Oceania region being the “showcase of the new GNSS era”(as proposed by MGA)
 - **Multi-constellation :**
 - **GPS+Glonass+Galileo+BeiDou+QZSS+IRNSS+SBAS**
 - **More satellites: more than 100 in 10 yrs**
 - **More new signals and services**





- “next generation GNSS” needs international cooperation
- to promote the interoperability of GNSS OS signals
- to widely monitor OS signals and service performance
- to provide timely updates to users regarding critical performance characteristics e.g. accuracy, availability
- So iGMAS subgroup setup by ICG-6 meeting , dedicated to deal with international GNSS Monitoring & Assessment Service





- With the new signals and services of BeiDou/GNSS satellites, users in Asia-Oceania region can gain early experience regarding the multi-constellation GNSS.
- ICRC introduced international cooperation plans of several long-term activities under the banner of the “BeiDou/GNSS Application Demonstration & Experience Campaign(BADEC)

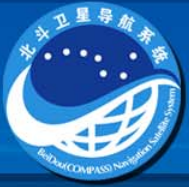




2. BeiDou/GNSS Application Demonstration & Experience Campaign (BADEC)

- **Goal**

- welcome the introduction and utilization of BeiDou services in the Asia -Pacific region
- Help people to know more about Multi-GNSS's knowledge, applications and benefits
- Let users experience the BeiDou/GNSS
- Demonstrate the performance and improvement
- Promote new multi-GNSS applications in the region
- Get needs feedback related to interoperability from user communities to GNSS providers,
- Encourage GNSS provider and users to carry out experiment or demonstration jointly

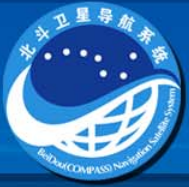


• Outline

It is a long-term campaign with a series of activities including

- Exhibition and Training programs
- Joint application demonstration and experiment Projects
- Workshop





• Schedule

– Phase 1: now-2012.12

- Establishing organization,
- Workshop
- Call for Application

– Phase 2: 2013-2015

- Exhibition and Training projects
- Joint application demonstration projects
- Joint experience and experiment projects
- workshop

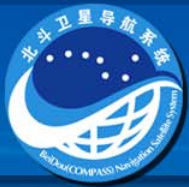




• General Principles

- Welcome every side' participation from all over the world
- Cooperate with MGA, IGS, other countries and organizations based on equality, mutual benefit, peaceful utilization of GNSS
- Providing both navigation grade and geodetic multi-GNSS receivers including BeiDou
- etc.





3. iGMAS:

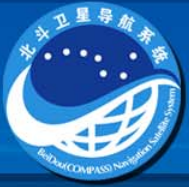
international GNSS Monitoring & Assessment Service

3.1 Objectives:

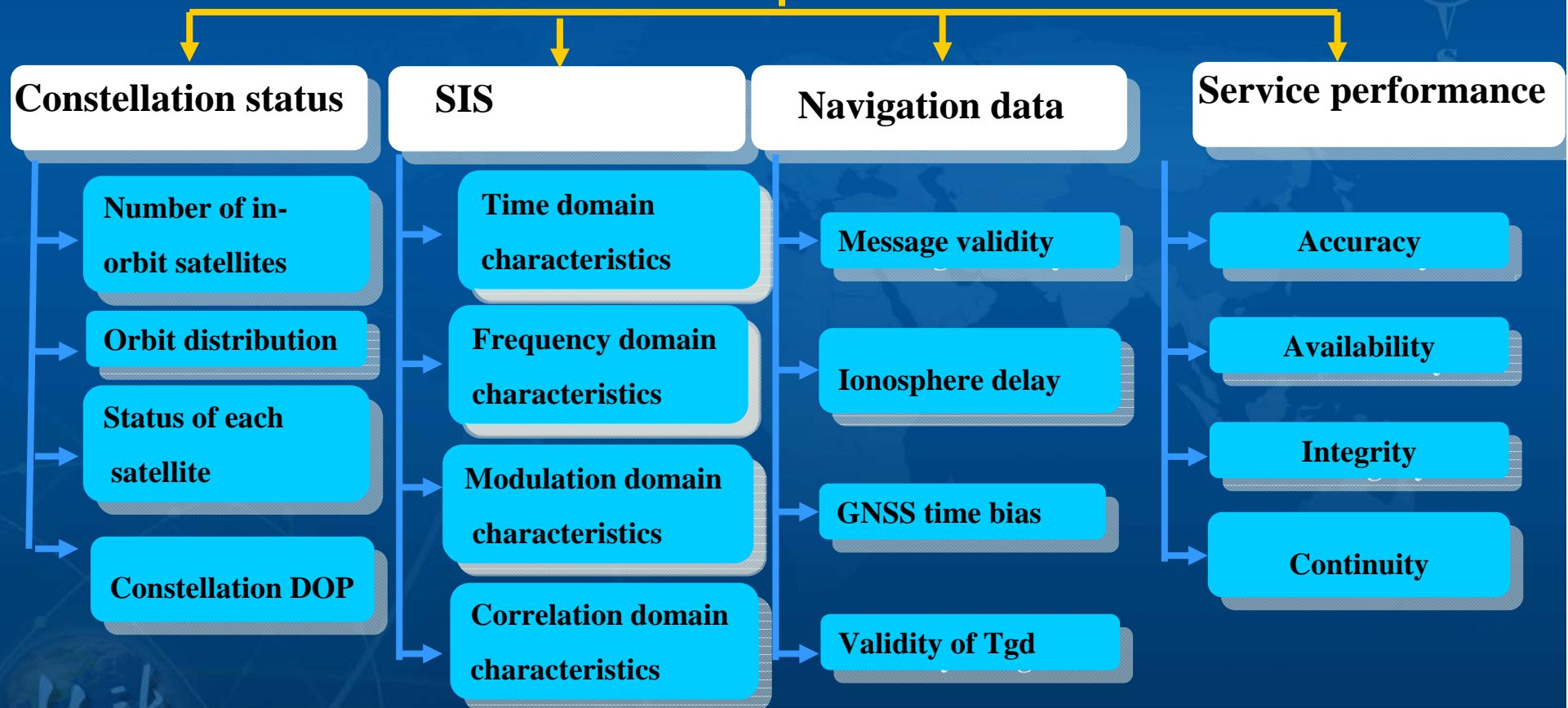
- to setup a global tracking network
- to monitor multi-GNSS open signal and service performance with not only multi-GNSS geodetic receivers but also high gain omni-directional antennas
- to share information to public

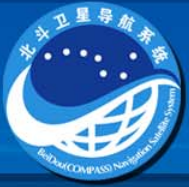
3.2 tasks:

- to monitor multi-GNSS SIS, constellation status, navigation data, and service performance
- to contribute to IGS and MGM network by co-location and data sharing
- to serve GNSS world with data, products, information
- to evaluate the parameters for interoperability

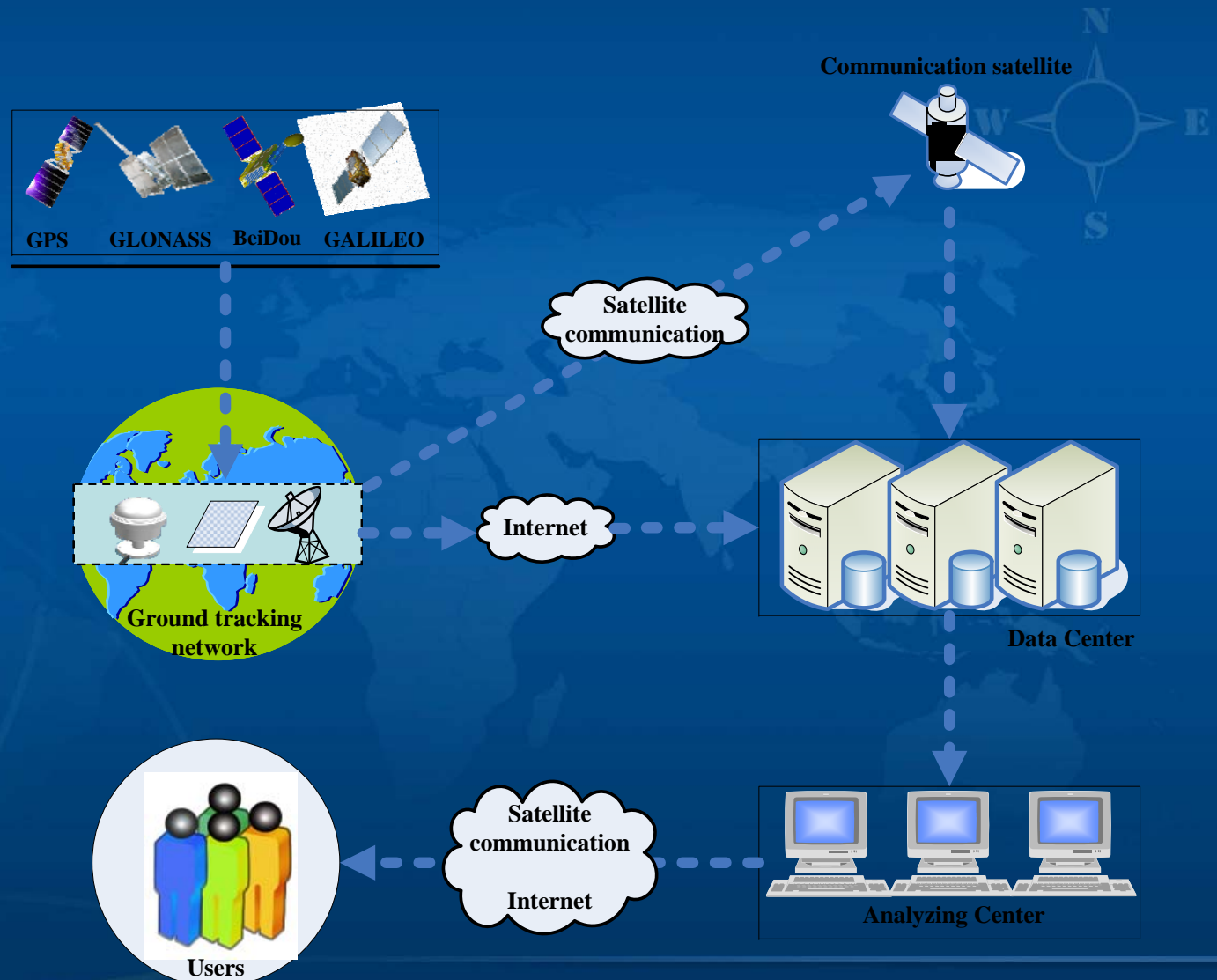


The elements for Monitoring and Assessment of GNSS





3.3 Infrastructure of iGMAS



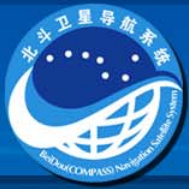


3.4 iGMAS's Complementary aspects to IGS & MGM networks

	iGMAS	IGS network	MGM net
Common points	<p>dealing with OS signals</p> <p>tracking Multi-GNSS signals</p> <p>based on int. cooperation</p> <p>providing data and product</p> <p>sharing information</p> <p>etc.</p>		
Complementary	<ul style="list-style-type: none">• Mainly Co-location with IGS,MGM stations• data including not only code,carrier phase but SIS quality, constellation status etc.• providing RINEX formatted data to the IGS in support of its multi-GNSS project		

3.4 iGMAS's Complementary aspects to IGS & MGM networks

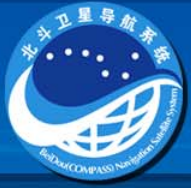
Mainly Co-location with IGS, MGM stations	iGMAS	IGS network	MGM net
Data and products	sharing with IGS, etc.		
Precise ephemeris, clocks	√	√	√
PM parameter.	√	√	√
Station coordinates, velocities	√	√	√
Constellation status monitoring	√		
Navigation signal anomalies	√		
navigation data monitoring etc	√		



In summary, iGMAS is

1. complementary to IGS, MGM-net etc.
2. essential to promote the interoperability of OS signals
3. able to promote service assurance & performance
4. beneficial to
 - not only users to get assured open services
 - but also GNSS providers to make their own GNSS system sustainable development





3.5 BeiDou Monitoring and Assessment system

In 2007, a BeiDou tracking network was established:

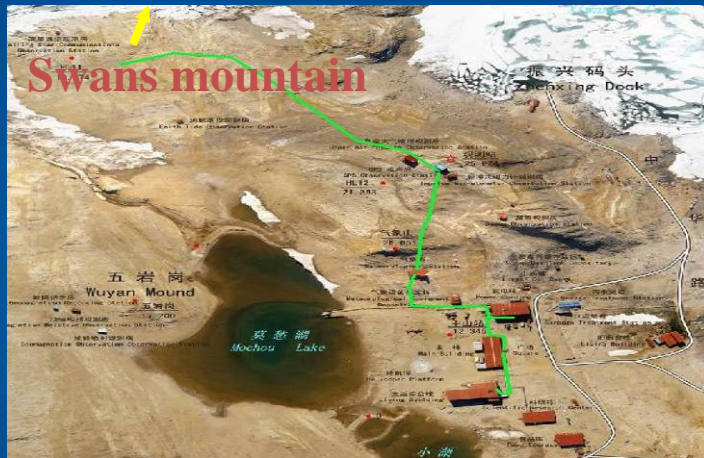
In China

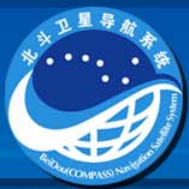
– with 6 tracking stations





Antarctic station





Analyzing center





- . In Feb. 2009, the BeiDou signal quality monitoring system was built by National Time Service Center, Chinese academy of sciences
- Since April, 2009, this system have performed :
 - signal quality monitoring and assessment for BeiDou GEOs and IGSOs successfully
 - also collecting and analyzing GPS signals and Galileo Glove-B signals





4. Conclusions

1. BeiDou is ready for providing testing operation services for users in Asia pacific region
2. Both iGMAS and BADEC are a long-term work, with a series of activities,
 - needing extensive international cooperation
 - all sides welcomed to take part in

北斗



Thanks for your attention.



Dr. Xurong Dong

International cooperation research center,

China Satellite Navigation Office

tel.: +86-10-88102315

fax. +86-10-88102328

email: dongxr@beidou.gov.cn ; rongerdx@163.com

